National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

National Park Service
Vegetation Mapping Inventory Program

Natchez Trace Parkway Vegetation Mapping Project

Natural Resource Report NPS/GULN/NRR—2016/1255





ON THIS PAGE
Photographs collected in Natchez Trace Parkway (Alabama, Mississippi, and Tennessee). From upper left clockwise to center: southern magnolia (*Magnolia grandiflora*), supercell thunderstorm over the Parkway, timber rattlesnake (*Crotalus horridus*), chanterelle mushrooms (*Cantharellus cibarius*), a small forested stream, Carolina anole (*Anolis carolinensis*), yellow garden spider (*Argiope aurantia*), and a section of the sunken Trace. Photographs by Andrew Strassman (U.S. Geological Survey).

ON THE COVER
The southern terminus of the Natchez Trace Parkway near Natchez, Mississippi; milepost 0.
Photograph by Kevin Hop (U.S. Geological Survey).

National Park Service
Vegetation Mapping Inventory Program

Natchez Trace Parkway Vegetation Mapping Project

Natural Resource Report NPS/GULN/NRR—2016/1255

Kevin Hop[1], Andrew Strassman[1], Carl Nordman[2], Milo Pyne[2], Rickie White[2], Joe Jakusz[1], Erin Hoy[1], and Jennifer Dieck[1]

[1]U.S. Geological Survey, Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

[2]NatureServe
601-A Foster Street
Durham, North Carolina 27701







August 2016

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received formal peer review by subject-matter experts whose background and expertise put them on par technically and scientifically with the authors of the information. The peer review was led according to the Fundamental Science Practices of the U.S. Geological Survey.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from the Gulf Coast Network website (http://science.nature.nps.gov/im/units/guln/publications.cfm) and the Natural Resource Publications Management website (http://www.nature.nps.gov/publications/nrpm/). To receive this report in a format optimized for screen readers, please email irma@nps.gov.

Please cite this publication as:

Hop, K., A. Strassman, C. Nordman, M. Pyne, R. White, J. Jakusz, E. Hoy, and J. Dieck. 2016. National Park Service Vegetation Mapping Inventory Program: Natchez Trace Parkway vegetation mapping project. Natural Resource Report NPS/GULN/NRR—2016/1255. National Park Service, Fort Collins, Colorado.

NPS 604/133665, August 2016

Contents

Page

Figures vii

Tables ix

Appendices xi

Executive Summary xiii

Acknowledgments xv

Introduction 1

- Natchez Trace Parkway Vegetation Mapping Project 1
- The National Park Service Vegetation Mapping Inventory Program 1
- Natural Resource Inventory and Monitoring Program 2
- Vegetation Mapping Inventory Program Standards 2
- The National Vegetation Classification Standard and the U.S. National Vegetation Classification 2
- Content Standard for Digital Geospatial Metadata 3
- Natchez Trace Parkway 4
  - Historical and Cultural Resources 6
  - Vegetation Resource 8

Project Overview 17

- General Process 17
  - Vegetation Classification 17
  - Study Plan 18
  - Digital Aerial Imagery 18
  - Orientation Meeting 23
  - Map Classification, Field Work, and Vegetation Mapping 24
  - Accuracy Assessment 25
  - Product Development 25
  - Close-Out Meeting 25
- Project Boundary Extent 26
- Minimum Mapping Units 26
- Classification Organization 26

Contents (continued)

Page

Vegetation Classification 27
Background to the Vegetation Classification 27
Methods 27
Preliminary Classification 27
Site Selection of 2009 Vegetation Plots 28
Field Data Collection 2009 and Prior Years 29
Data Entry and Quality Control 30
Data Preparation 31
Data Analyses 31
Vegetation Classification Results 33
Vegetation Descriptions 43
Vegetation Mapping 45
Methods 45
Preliminary Map Classification 45
Field Reconnaissance 45
Map Classification 49
Aerial Image Interpretation and Mapping 51
Database Development 52
Results 53
Map Classes 53
Summary Report of the Map Layer 73
Brief Analysis and Discussion 75
General Overview of the Parkway Vegetation Map 75
Non-Ruderal Forest and Woodland 76
Ruderal Forest 76
Shrublands 76
Herbaceous Vegetation 76
Open Water 77

Contents (continued)

Page

Cultural Vegetation 77
Accuracy Assessment 79
Methods 79
Purpose 79
Sampling Design 79
Data Analyses 83
Results 86
Users' Accuracy (Errors of Commission) 86
Producers' Accuracy (Errors of Omission) 88
Literature Cited 91

Figures

Page

Figure 1. Route of the Natchez Trace Parkway through Alabama, Mississippi, and Tennessee. 5

Figure 2. The Natchez Trace Parkway of the National Park Service is also designated a National Scenic Byway and All-American Road. 6

Figure 3. A sunken portion of the historic Natchez Trace trail giving evidence to a long history of foot, horse, and wagon traffic along with further soil compaction and erosion; Sunken Trace, milepost 41.5. 7

Figure 4. An American Indian burial mound along the Natchez Trace Parkway; Bynum Mounds, milepost 232.4. 8

Figure 5. Ecological sections of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee), as defined by the U.S. Department of Agriculture Forest Service. 9

Figure 6. A dry acidic forest of southern red, white, and post oaks (*Quercus falcata, alba, and stellata*) in Mississippi along the Natchez Trace Parkway near milepost 75. 11

Figure 7. A mesic circumneutral forest dominated by water oak (*Quercus nigra*) in Mississippi along the Natchez Trace Parkway near milepost 2. 11

Figure 8. An early successional forest of loblolly pine (*Pinus taeda*) and sweetgum (*Liquidambar styraciflua*) in Mississippi along the Natchez Trace Parkway near milepost 126. 12

Figure 9. An eastern redcedar (*Juniperus virginiana*) woodland where prairie is succeeding to forest in the Black Belt ecological subsection in Mississippi along the Natchez Trace Parkway near milepost 247. 13

Figure 10. Buzzard Roost Springs with exposed sandstone common to the Sand Mountain area in Alabama along the Natchez Trace Parkway near milepost 320. 14

Figure 11. A hardwood forest with deciduous canopy trees of white oak (*Quercus alba)* and sugar maple (*Acer saccharum*) in Tennessee along the Natchez Trace Parkway near milepost 399. 15

Figure 12. Flight line locations of 4-band aerial imagery collected during October and November 2011 at 30.48-centimeters per pixel resolution for the Natchez Trace Parkway vegetation mapping project. 20

Figure 13. An example in color-infrared from the 4-band aerial imagery set collected during October 2011 for the Natchez Trace Parkway vegetation mapping project. 21

Figure 14. An example in color-infrared from the 4-band aerial imagery set collected during November 2011 for the Natchez Trace Parkway vegetation mapping project. 21

Figure 15. Orientation meeting for the Natchez Trace Parkway vegetation mapping project held at the Natchez Trace Parkway headquarters. 23

Figures (continued)

Page

Figure 16. A field site visit during the orientation meeting for the Natchez Trace Parkway vegetation mapping project. 24

Figure 17. Locations of vegetation plots that supported the vegetation classification that was used for the Natchez Trace Parkway vegetation mapping project. 32

Figure 18. Field reconnaissance to correlate aerial image signatures with ground vegetation for the Natchez Trace Parkway vegetation mapping project 46

Figure 19. Locations of verification sites for the Natchez Trace Parkway vegetation mapping project. 48

Figure 20. Vegetation mapping decision tree for the Natchez Trace Parkway vegetation mapping project. 50

Figure 21. Vegetation map display from the Natchez Trace Parkway vegetation mapping project. 78

Figure 22. Locations of accuracy assessment sites to assess the accuracy of the vegetation map layer for the Natchez Trace Parkway vegetation mapping project. 82

Figure 23. Field classification of an accuracy assessment site for the Natchez Trace Parkway vegetation mapping project. 83

Tables

Page

Table 1. Hierarchy structure of the National Vegetation Classification Standard, Version 2 (Federal Geographic Data Committee 2008) for natural vegetation with example assignments from the U.S. National Vegetation Classification (USNVC 2016). 4

Table 2. Hierarchy structure of the National Vegetation Classification Standard, Version 2 (Federal Geographic Data Committee 2008) for cultural vegetation with example assignments from the U.S. National Vegetation Classification (USNVC 2016). 4

Table 3. Ecological provinces and sections of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee), as defined by the U.S. Department of Agriculture Forest Service 10

Table 4. Division classification of the U.S. National Vegetation Classification by climate regime for the Natchez Trace Parkway. 14

Table 5. Timeline by year and task event for the Natchez Trace Parkway vegetation mapping project. 18

Table 6. Digital aerial imagery sets collected for the Natchez Trace Parkway vegetation mapping project. 21

Table 7. Summary of vegetation plots used to build the initial vegetation classification for the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee). 27

Table 8. Oversampled U.S. National Vegetation Classification associations of Natchez Trace Parkway prior to the fall 2009 field season. 28

Table 9. Codes to cover scales and vegetation strata used during vegetation plot sampling to develop the initial vegetation classification of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee) 30

Table 10. Vegetation subsets (broad groupings) used for the analyses of vegetation plot data that were collected in the Natchez Trace Parkway during 1995, 2004, 2005, and 2009 31

Table 11. List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification. 34

Table 12. Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project. 54

Table 13. Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project. 61

Table 14. Frequencies of polygons and areas for map classes represented in the vegetation map layer for the Natchez Trace Parkway vegetation mapping project 73

Appendices

Page

Appendix A: Plot Sampling Form A-1

Appendix B: Descriptions of Vegetation Associations B-1

Appendix C: Field Key to Vegetation Associations C-1

Appendix D: List of Plant Species D-1

Appendix E: Descriptions of Map Classes E-1

Appendix F: Accuracy Assessment Form F-1

Appendix G: Accuracy Assessment Field Manual G-1

Appendix H: Accuracy Assessment Reconciliation H-1

Appendix I: Accuracy Assessment Contingency Table I-1

Executive Summary

The National Park Service (NPS) Vegetation Mapping Inventory (VMI) Program is an effort to classify, describe, and map existing vegetation of national park units for the NPS Natural Resource Inventory and Monitoring (I&M) Program. The NPS VMI Program is managed by the NPS I&M Division and provides baseline vegetation information to the NPS Natural Resource I&M Program. The U.S. Geological Survey Upper Midwest Environmental Sciences Center, NatureServe, NPS Gulf Coast Network, and NPS Natchez Trace Parkway (NATR; also referred to as Parkway) have completed vegetation classification and mapping of NATR for the NPS VMI Program.

Mappers, ecologists, and botanists collaborated to affirm vegetation types within the U.S. National Vegetation Classification (USNVC) of NATR and to determine how best to map them by using aerial imagery. Analyses of data from 589 vegetation plots had been used to describe an initial 99 USNVC associations in the Parkway; this classification work was completed prior to beginning this NATR vegetation mapping project. Data were collected during this project from another eight quick plots to support new vegetation types not previously identified at the Parkway. Data from 120 verification sites were collected to test the field key to vegetation associations and the application of vegetation associations to a sample set of map polygons. Furthermore, data from 900 accuracy assessment (AA) sites were collected (of which 894 were used to test accuracy of the vegetation map layer). The collective of all these datasets resulted in affirming 122 USNVC associations at NATR.

To map the vegetation and open water of NATR, 63 map classes were developed. including the following: 54 map classes represent natural (including ruderal) vegetation types in the USNVC, 5 map classes represent cultural (agricultural and developed) vegetation types in the USNVC, 3 map classes represent nonvegetation open-water bodies (non-USNVC), and 1 map class represents landscapes that had received tornado damage a few months prior to the time of aerial imagery collection. Features were interpreted from viewing 4-band digital aerial imagery by means of digital onscreen three-dimensional stereoscopic workflow systems in geographic information systems. (The aerial imagery was collected during mid-October 2011 for the northern reach of the Parkway and mid-November 2011 for the southern reach of the Parkway to capture peak leaf-phenology of trees.) The interpreted data were digitally and spatially referenced, thus making the spatial-database layers usable in geographic information systems. Polygon units were mapped to either a 0.5 hectare (ha) or 0.25 ha minimum mapping unit, depending on vegetation type or scenario.

A geodatabase containing various feature-class layers and tables present the locations of USNVC vegetation types (vegetation map), vegetation plot samples, verification sites, AA sites, project boundary extent, and aerial image centers. The feature-class layer and related tables for the vegetation map provide 13,529 polygons of detailed attribute data covering 21,655.5 ha, with an average polygon size of 1.6 ha; the vegetation map coincides closely with the administrative boundary for NATR.

Summary reports generated from the vegetation map layer of the map classes representing USNVC natural (including ruderal) vegetation types apply to 12,648 polygons (93.5% of polygons) and cover 18,542.7 ha (85.6%) of the map extent for NATR. The map layer indicates the Parkway to be 70.5%

forest and woodland (15,258.7 ha), 0.3% shrubland (63.0 ha), and 14.9% herbaceous cover (3,221.0 ha). Map classes representing USNVC cultural types apply to 678 polygons (5.0% of polygons) and cover 2,413.9 ha (11.1%) of the map extent. A map class representing catastrophically disturbed vegetation (undefined in the USNVC) apply to 55 polygons (0.4% of polygons) and cover 158.8 ha (0.7%) of the map extent. Map classes representing nonvegetation open-water bodies (non-USNVC) apply to 148 polygons (1.1% of polygons) and cover 540.1 ha (2.5%) of the map extent.

A thematic AA study was completed of map classes representing USNVC natural (including ruderal) vegetation types. Initial AA results were discussed with NATR staff. Following their input on how to handle map classes that fell below accuracy standards, adjustments were made to the vegetation map layer. Final results indicate an overall accuracy of 81.8% (kappa index of 81.1%) based on data from 894 of the 900 AA sites. Most individual map-class themes exceed the NPS VMI Program standard of 80% with a 90% confidence interval.

The NATR vegetation mapping project delivers many geospatial and vegetation data products. These products consist of an in-depth project report discussing methods and results, which include descriptions and a field key to vegetation associations, map classification and map-class descriptions, and a contingency table listing AA results. The suite of products also includes a database of vegetation plots, verification sites, and AA sites; digital pictures of field sites; field data sheets; digital aerial imagery; hardcopy and digital maps; and a geodatabase of vegetation and land cover (map layer), field sites (vegetation plots, verification sites, and AA sites), aerial imagery index, project boundary, and metadata. All geospatial products are projected in Universal Transverse Mercator, Zone 16 North, by using the North American Datum of 1983. Information on the NPS VMI Program and completed mapping projects are on the Internet at http://science.nature.nps.gov/im/inventory/veg.

Acknowledgments

The success of this vegetation mapping project was dependent on the collaborative efforts of several individuals from various organizations. The dedicated people who worked on this project collectively have a wide array of knowledge, skill, and expertise, essential in moving the National Park Service (NPS) Natchez Trace Parkway (NATR) vegetation mapping project to its completion. The authors of this report wish to acknowledge those individuals who have been vital in making this vegetation mapping project a success.

Funding for this project was provided by the NPS Vegetation Mapping Inventory Program with additional funding by the U.S. Geological Survey. The authors respectfully thank NPS Vegetation Mapping Inventory Program staff for entrusting this project to us, including coordinators Karl Brown and Tammy Cook for funding the NATR vegetation mapping project and giving guidance. The authors also thank Arnie Peterson, formerly Vegetation Mapping Coordinator for the NPS Gulf Coast Network, for his support to start up the NATR vegetation mapping project. Thanks are also in order to NPS NATR staff, in particular Lisa McInnis, Jesse Burton, and Deanna Boensch, for hosting this project with its series of meetings, training sessions, and field efforts.

The authors of this report also acknowledge our colleagues from within our own offices—the U.S. Geological Survey Upper Midwest Environmental Sciences Center and NatureServe. Of the Upper Midwest Environmental Sciences Center, the authors acknowledge Janis Ruhser for producing stereo models for three-dimensional mapping and making aerial images mosaicks for two-dimensional viewing; Stephanie Sattler for her work on the map book of aerial imagery, assistance in the accuracy assessment (AA) analysis, and reviewing report material; Larry Robinson for managing the collection of digital aerial imagery with contractors; JC Nelson for producing the random-site selection for AA; Enrika Hlavacek for producing the series of map graphics and composition and the metadata generation of the feature class layers and tables within the geodatabase; and Jayme Stone for reviewing report material and preparing close-out meeting materials. Of NatureServe, this project and report would not have been possible without the team effort of many of NatureServe's Conservation Science Division staff, particularly Mary Russo for getting classification data into and out of the central database of NatureServe with ease and speed. The authors of this report also thank the field crews that sampled the vegetation plots and AA sites. The crews collected the invaluable data needed for the project. The staff of the NatureServe Network Member Programs (Alabama Natural Heritage Program, Mississippi Natural Heritage Program, and Tennessee Natural Heritage Inventory) were vital to this project. The staff scientists of these programs worked with NatureServe Ecology staff to complete the field plot data collection in the fall of 2009 and the AA field data collection in 2015. Especially helpful were Al Schotz (Alabama), Heather Decker (Alabama), Heather Sullivan (Mississippi), Sherry Surrette (Mississippi), Todd Crabtree (Tennessee), and Roger McCoy (Tennessee).

All photographs in this report are by authors of or contributors to this report unless otherwise specified.

Introduction

Natchez Trace Parkway Vegetation Mapping Project

The Natchez Trace Parkway (NATR; also referred to as Parkway) vegetation mapping project was initiated by the National Park Service (NPS) Vegetation Mapping Inventory (VMI) Program to classify and map vegetation types of the Parkway. The goals of the project were to adequately describe and map vegetation types of the Parkway and to provide the NPS Natural Resource Inventory and Monitoring (I&M) Program, resource managers, and biological researchers with useful baseline vegetation information.

An orientation meeting was held at the NATR headquarters in spring of 2014 to begin vegetation mapping efforts for the NATR vegetation mapping project. The mapping project made use of an existing vegetation classification of the Parkway that had been completed for the NPS by NatureServe (Nordman et al. 2011). This vegetation classification continued in its development throughout the vegetation mapping project. The baseline aerial imagery for mapping the Parkway's vegetation was collected during fall of 2011. The mapping of the Parkway started in fall of 2014 and concluded in spring of 2015; field reconnaissance for mapping was completed in summer of 2014. An assessment study to determine the accuracy of the vegetation mapping followed the mapping; field classification was completed during summer and fall of 2015, and the analysis concluded with accuracy results by January 2016. The NATR vegetation mapping project was delivered to the NPS by fall of 2016.

Common to all NPS VMI Program projects, the three main components of the NATR vegetation mapping project are as follows: (1) vegetation classification, (2) vegetation mapping, and (3) map accuracy assessment (AA). In this report, each of these fundamental components is discussed in detail.

The National Park Service Vegetation Mapping Inventory Program

The NPS VMI Program is an effort to classify, describe, and map existing vegetation of national park units. Managed by the NPS Natural Resource I&M Program Division, the NPS VMI Program provides baseline vegetation information for the NPS Natural Resource I&M Program. Vegetation layers and associated information support a wide variety of resource assessment, park management, and planning needs. The layers and information also provide structure for framing and answering critical scientific questions about vegetation communities and their relation to environmental processes across the landscape.

Program scientists developed procedures for classification, mapping, and AA (The Nature Conservancy and Environmental Systems Research Institute 1994a, 1994b, The Nature Conservancy et al. 1994, NatureServe 2004, Lea and Curtis 2010). Ecology and mapping teams worked together to share knowledge and data and to resolve issues regarding classification and mapping procedures. The NPS VMI Program products meet Federal Geographic Data Committee (FGDC) standards for vegetation classification and metadata, and national standards for spatial accuracy and data transfer. Mapping standards include a minimum mapping unit of 0.5 hectares and a classification accuracy meeting or exceeding 80% (with a 90% confidence level) for map classes representing vegetation

types in the U.S. National Vegetation Classification (USNVC). All geospatial products are projected in Universal Transverse Mercator and use the North American Datum of 1983.

The NPS VMI Program provides an array of mapping and vegetation data products. Mapping products include aerial imagery sets, spatial databases of vegetation (including metadata), a map classification description or key, hard-copy maps of vegetation, and an AA of the vegetation map. Vegetation products include vegetation classification, a field key to vegetation types, formal descriptions and ground photographs of vegetation types, and field data in database format.

More information on the NPS VMI Program, as well as products of completed vegetation mapping projects, is on the Internet at http://science.nature.nps.gov/im/inventory/veg.

Natural Resource Inventory and Monitoring Program

The NPS Natural Resource I&M Program is a long-term effort to acquire information needed to help maintain ecosystem integrity for all NPS units with significant natural resources. One of the long-term goals of the Natural Resource I&M Program is to produce baseline inventories of biological and geophysical natural resources. The NPS VMI Program provides detailed vegetation maps based on aerial imagery and meets specified thematic accuracy standards (80%) set by the I&M Program. More information on the NPS Natural Resource I&M Program is available on the Internet at http://science.nature.nps.gov/im/index.cfm.

Vegetation Mapping Inventory Program Standards

The NPS VMI Program uses nationally defined standards, some of which are maintained by the FGDC. These standards include the following:

- National Vegetation Classification Standard (NVCS) (Federal Geographic Data Committee 2008),
- Spatial Data Transfer Standard (Federal Geographic Data Committee 1998b),
- Content Standard for Digital Geospatial Metadata (Federal Geographic Data Committee 1998a), and
- United States National Map Accuracy Standards (U.S. Geological Survey 1999).

The National Vegetation Classification Standard and the U.S. National Vegetation Classification

The NVCS (Federal Geographic Data Committee 2008) is a methodology to classify existing vegetation and is a framework to organize a vegetation classification within a hierarchical structure. The USNVC is a vegetation classification that follows the NVCS as a standard to define and organize existing vegetation in the United States. The NVCS is static in its hierarchical structure whereas the USNVC is flexible with its vegetation classification and concepts, yet remains in the structural hierarchy of the NVCS. The NPS VMI Program uses the USNVC to classify and describe vegetation of national park units to provide a uniform approach in vegetation classification. The use of a national standard aids effective resource stewardship by augmenting compatibility and widespread use of the information throughout the NPS and other Federal and State agencies.

In brief, the NVCS separates vegetation into two overriding categories: natural vegetation (including ruderal vegetation) and cultural vegetation. Each category is further divided into three main sections: (1) Upper (where physiognomy plays a predominant role), (2) Middle (where both floristics and physiognomy play a significant role), and (3) Lower (where floristics plays a predominant role). The hierarchical structures for natural and cultural vegetation types with examples of vegetation types from the USNVC are listed in Tables 1 and 2. Definitions of these various levels are detailed within Section 2 of the NVCS (Federal Geographic Data Committee 2008); however, because of the emphasis given by the NPS VMI Program to vegetation types of the floristic levels (alliance and association) and the group level of the NVCS, the following brief definitions are provided.

- An association-level type is the finest level of the NVCS and is "defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions and physiognomy" (Jennings et al. 2006, as quoted in FGDC 2008:14). "Associations reflect topo-edaphic climate, substrates, hydrology, and disturbance regimes" (FGDC 2008:14).
- An alliance-level type is hierarchically one level above the association level and is "defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation" (Jennings et al. 2006, as quoted in FGDC 2008:14). "Alliances reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes" (FGDC 2008:14).
- A group-level type is hierarchically one level above the alliance level (two levels above association level) yet is also the lowest level of the middle section of the NVCS hierarchy. The group level is defined in Table 2.4 of the NVCS as "combinations of relatively narrow sets of diagnostic plant species (including dominants and codominants), broadly similar composition, and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes" (FGDC 2008:17).

Content Standard for Digital Geospatial Metadata

Metadata are data that describe the content, quality, condition, and other characteristics of other data. As a standard product, the NPS VMI Program provides FGDC-compliant metadata files for each spatial-dataset produced. In 1998, the FGDC approved the Content Standard for Digital Geospatial Metadata, FGDC-STD-001-1998 (Federal Geographic Data Committee 1998a). This metadata standard has a common set of terminology and definitions to document digital geospatial data.

Table 1. Hierarchy structure of the National Vegetation Classification Standard, Version 2 (Federal Geographic Data Committee 2008) for natural vegetation with example assignments from the U.S. National Vegetation Classification (USNVC 2016).

[The Cherrybark Oak - Water Oak Forest Association—a vegetation type recognized by the Natchez Trace Parkway vegetation mapping project—is presented in its full hierarchical classification assignments by the U.S. National Vegetation Classification. The codes that follow classification names are code assignments.]

Level	Example
Upper: Physiognomy plays a predominant role.	
Formation Class	Forest & Woodland (1; C01)
Formation Subclass	Temperate & Boreal Forest & Woodland (1.B; S15)
Formation	Warm Temperate Forest & Woodland (1.B.1; F018)
Middle: Both floristics and physiognomy play a significant role.	
Division	Southeastern North American Forest & Woodland (1.B.1.Na; D006)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (1.B.1.Na.3; M008)
Group	North-Central Oak - Hickory Forest & Woodland (1.B.1.Na.3.b; G166)
Lower: Floristics plays a predominant role.	
Alliance	*Quercus shumardii* - *Quercus pagoda* - *Fraxinus americana* Coastal Plain Forest (A3235)
Association	*Quercus pagoda* - *Quercus nigra* Forest (CEGL004109)

Table 2. Hierarchy structure of the National Vegetation Classification Standard, Version 2 (Federal Geographic Data Committee 2008) for cultural vegetation with example assignments from the U.S. National Vegetation Classification (USNVC 2016).

[The Loblolly Pine Forest Plantation Cultural Subtype—a vegetation type recognized by the Natchez Trace Parkway vegetation mapping project—is presented in its full hierarchical classification assignments by the U.S. National Vegetation Classification. The codes that follow classification names are code assignments.]

Level	Example
Upper: Physiognomy plays a predominant role.	
Cultural Class	Agricultural & Developed Vegetation (7; CL01)
Cultural Subclass	Woody Agricultural Vegetation (7.A; CSC01)
Cultural Formation	Forest Plantation & Agroforestry (7.A.2; CFO02)
Cultural Subformation	Forest Plantation (7.A.2.1; CSF05)
Middle: Both floristics and physiognomy play a significant role.	
Cultural Group [optional]	Temperate & Boreal Plantation (7.A.2.1.2; CGR007)
Cultural Subgroup	Eastern North American Temperate Forest Plantation (7.A.2.1.2.a; CSG005)
Lower: Floristics plays a predominant role.	
Cultural Type	Native Southern Pine Plantation (7.A.2.1.2.a.4; CTY012)
Cultural Subtype [optional]	*Pinus taeda* Forest Plantation

Natchez Trace Parkway[1]

The NATR is a 715 kilometer (km) scenic roadway that runs from Natchez, Mississippi to Nashville, Tennessee and covers more than 21,000 hectares of landscape with most of its land contained within a nearly 240 m wide boundary corridor. The Parkway traverses through 16 counties in Mississippi, 2 counties in Alabama, and 7 counties in Tennessee (Figure 1). The Parkway was conceived and developed as a designed landscape that integrates a traditional rural, agrarian, and southern landscape

[1] Information within this section was largely compiled from the Web site for NATR at http://www.nps.gov/natr.

experience; facilitates leisurely and scenic travel; and links scenic, cultural, and natural features of interest. The NATR offers many opportunities for visitors to explore cultural history and nature. The Parkway also allows visitors to engage in outdoor recreational activities including hiking, biking, horseback riding, and camping.

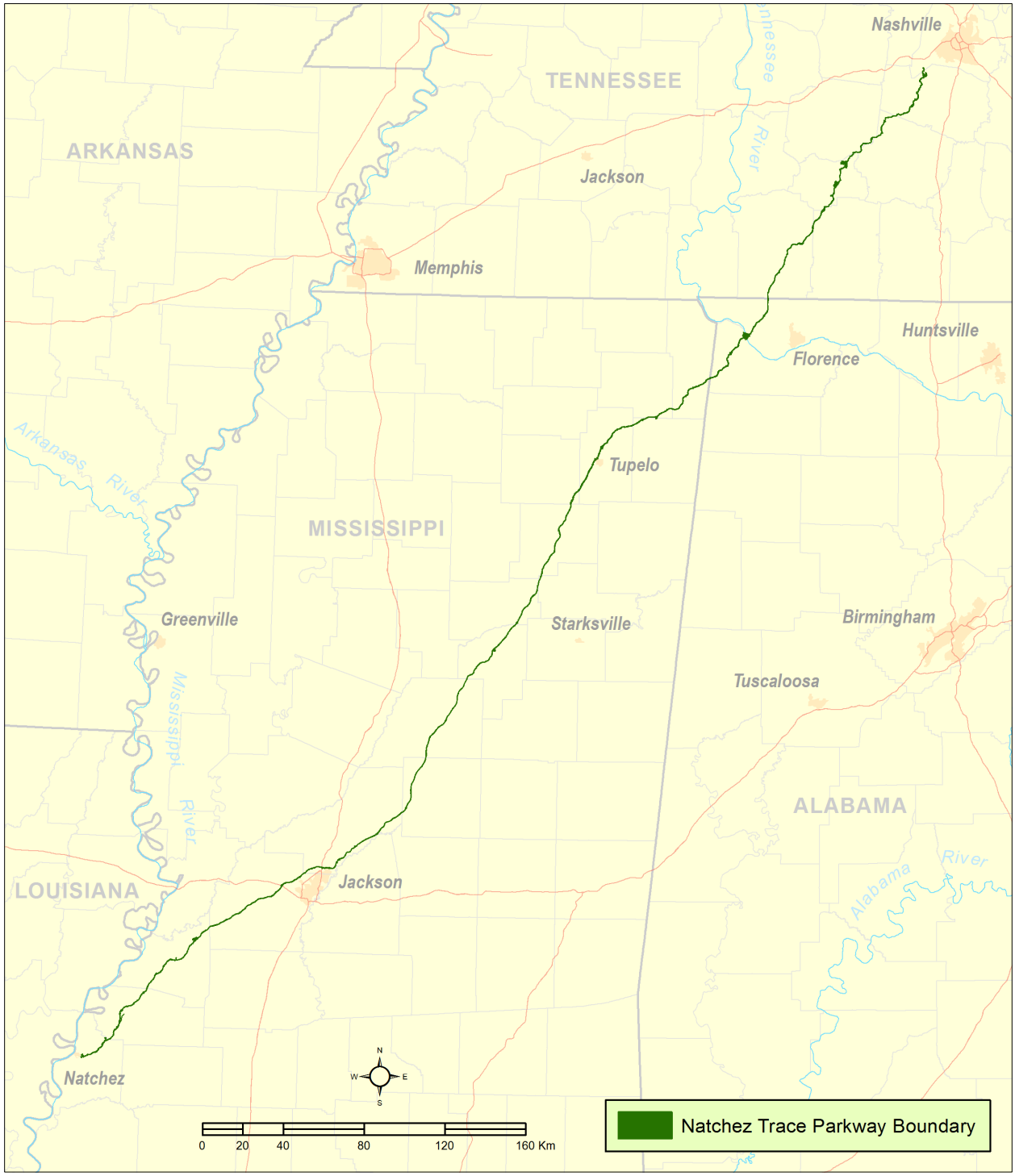


Figure 1. Route of the Natchez Trace Parkway through Alabama, Mississippi, and Tennessee.

Historical and Cultural Resources

The NATR was established on May 18, 1938, by the U.S. Congress as a national park unit of the NPS and is one of eight national park units within the Gulf Coast Network of the NPS Natural Resource I&M Program. The Parkway was completed in 2005 and commemorates the Natchez Trace, a historic trail that is one of the oldest transportation corridors in North America. The Natchez Trace facilitated travel, exploration, settlement, trade, military, and communication avenues for American Indians, European explorers, and American settlers during the centuries. In 1983, the U.S. Congress designated segments of the Natchez Trace trail that exist within NATR as a separate national park unit of the NPS, the Natchez Trace National Scenic Trail. These segments of the Natchez Trace parallel the Parkway in five areas from middle Tennessee to southern Mississippi and provide more than 100 km of trail. In 1996, the Parkway was designated a National Scenic Byway and All-American Road for its significant historic, cultural, natural, and scenic qualities (Figure 2).



Figure 2. The Natchez Trace Parkway of the National Park Service is also designated a National Scenic Byway and All-American Road.

The original Natchez Trace started as a series of animal trails that transformed into a migration corridor for larger herd animals. The series of trails eventually were connected and became a popular pathway for humans because the trail followed high ground and was easy to travel topographically. The use of the original Trace changed with cultural shifts in the region during the past centuries. Today, about 156 km of the historic Natchez Trace trail exist within the Parkway's boundary, separated into about 180 segments. Some of these segments are easily recognized by the deeply sunken path from the long history of foot, horse, and wagon traffic, along with soil compaction and erosion (Figure 3). The Parkway is unique among NPS units in honoring a travel route with this kind of historic depth.



Figure 3. A sunken portion of the historic Natchez Trace trail giving evidence to a long history of foot, horse, and wagon traffic along with further soil compaction and erosion; Sunken Trace, milepost 41.5.

Many cultural and historical resources exist within NATR from the long history of the original Natchez Trace, including sites in the immediate area surrounding the Trace that the Parkway passes through. These resources show the social changes that transpired in the region during this long period. More than 350 archeological sites and 22 burial and ceremonial mounds (Figure 4) are recognized along the Parkway; more than 20 American Indian tribes have an ancestral connection to the area with the recent tribes including the Chickasaw, Choctaw, and Natchez. The original Trace became a return path for boatmen who their floated their trade goods by boat down the Mississippi River. History of early exploration exists along the Parkway, including the death and burial site of Meriwether Lewis. The original Trace was traveled by American Indian nations and officials of the U.S. Government to sign treaties with each other. Historic homestead sites, plantations cemeteries, inn establishments, and mining sites are along the Parkway.



Figure 4. An American Indian burial mound along the Natchez Trace Parkway; Bynum Mounds, milepost 232.4.

Soldiers traveled the original Trace during their return from the War of 1812. During the American Civil War, soldiers marched to and from battle grounds on the Trace with some of these battle sites within the Parkway boundary. At one time, the United States designated the original Trace as a postal route for the delivery of mail. The Natchez Trace became a major transportation corridor from the mid-1780s to the mid-1820s. As new roads and steamboat industry developed, the use of the Trace went into a steady decline.

Vegetation Resource

The NATR provides an almost continuous greenway from southern Mississippi to central Tennessee as it passes through 4 distinct ecological sections (Figure 5) and 17 ecological subsections as defined by the U.S. Department of Agriculture (USDA) Forest Service (Keys et al. 1995, Cleland et al. 2007).

The four USDA Forest Service ecological sections are listed in Table 3, set within their respective ecological provinces. The southern 175.5 km (mileposts 0–109) are within the Coastal Plains-Loess Section (231H) and the northern 129 km (mileposts 362–442) are within the Interior Low Plateau-Highland Rim Section (223E). Between these sections, NATR alternates ecological sections. For 174 km (mileposts 109–217), the Parkway alternates between the Coastal Plains-Loess Section (231H) and the Coastal Plain-Middle Section (231B), skirting along the zone of contact of these two sections in some cases. North of this area is an extensive stretch of 164 km (mileposts 217–319) that is entirely within the Coastal Plain-Middle Section (231B). The NATR briefly enters a northwestern outlier of the Southern Cumberland Plateau Section (231C) in Alabama, locally known as Sand Mountain (mileposts 319–324). This area is a distinctive feature on the landscape and can also be

interpreted as part of the Interior Low Plateau-Highland Rim Section (223E). For 61 km (mileposts 324–362), the Parkway alternates between the Interior Low Plateau-Highland Rim Section (223E) and the Coastal Plain-Middle Section (231B), marking the transition between warm and cool temperate climates.

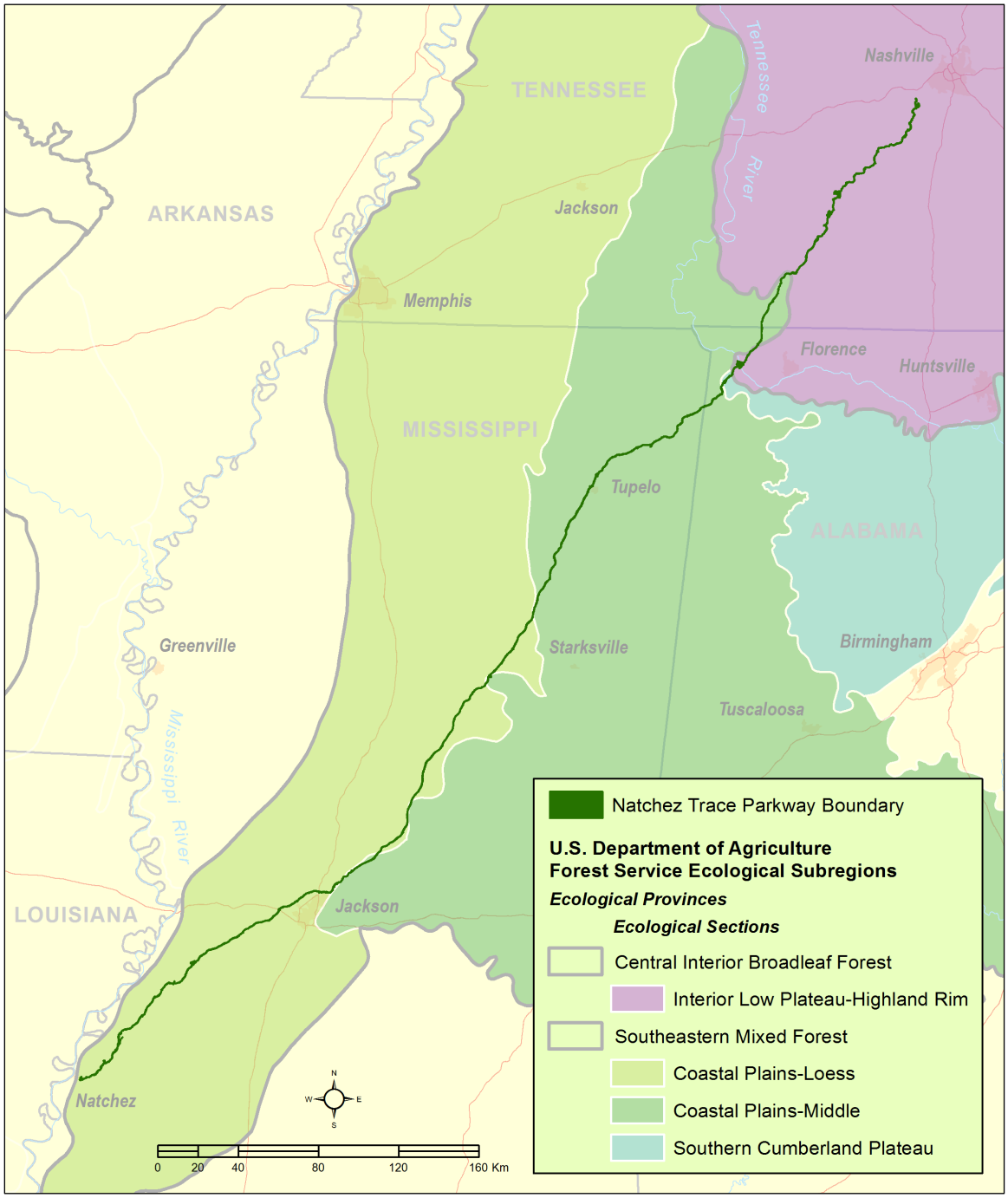


Figure 5. Ecological sections of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee), as defined by the U.S. Department of Agriculture Forest Service.

Table 3. Ecological provinces and sections of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee), as defined by the U.S. Department of Agriculture Forest Service.

Province Code Section Code	Province Name Section Name
223	**Central Interior Broadleaf Forest**
223E	Interior Low Plateau-Highland Rim
231	**Southeastern Mixed Forest**
231B	Coastal Plains-Middle
231C	Southern Cumberland Plateau
231H	Coastal Plains-Loess

The NATR passes through several diverse habitats, including upland hardwood forests, upland mixed pine-hardwood forests, riparian and bottomland hardwood forests, shrub and herbaceous wetlands, prairies, fallow fields, croplands, rivers, and lakes. Natural vegetation and land-use patterns are influenced by the climate, landforms, and geology throughout the Parkway. The following sections provide brief vegetation descriptions of the Parkway within each USDA Forest Service ecological section, starting at the southern terminus near Natchez, Mississippi, and concluding at the northern terminus near Nashville, Tennessee.

Coastal Plains-Loess Section (231H)

This part of NATR in the southern part of the Coastal Plains-Loess Section (231H) is heavily influenced by the particular climate, landforms, and geology of the area. Much of the topsoil is composed of loess, a fine silt that was deposited by winds following the retreat of glaciers in the terrain to the north. This soil is very rich but also very erodible. The natural formation of the landscape and subsequent erosion have created steep bluffs and deep ravines. The forests of these ravines are disinctive for containing southern magnolia (*Magnolia grandiflora*) and spruce pine (*Pinus glabra*), which are not known in the Parkway north of this ecological section. In general, the southern flora of this warm temperate area contains more broad-leaved evergreen trees and shrubs, which are particularly characteristic of these latitudes. Oak-dominated forests on dry and more acidic sites may contain southern red oak (*Quercus falcata*), white oak (*Q. alba*), and post oak (*Q. stellata*) (Figure 6). On more mesic and circumneutral sites, cherrybark oak (*Quercus pagoda*), Shumard's oak (*Q. shumardii*), black walnut (*Juglans nigra*), bitternut hickory (*Carya cordiformis*), pecan (*C. illinoinensis*), white ash (*Fraxinus americana*), and sweetgum (*Liquidambar styraciflua*) are present, as well as willow oak (*Q. phellos*) and water oak (*Q. nigra*), which have a greater presence in the south (Figure 7). More level surfaces were used extensively for agriculture, and where agriculture has ceased, many forests are composed of early successional species such as loblolly pine (*Pinus taeda*) and sweetgum. The wetlands and swamps of this ecological section are likely to contain water tupelo (*Nyssa aquatica*) and laurel oak (*Quercus laurifolia*), which do not exist along the Parkway north of this area.



Figure 6. A dry acidic forest of southern red, white, and post oaks (*Quercus falcata, alba, and stellata*) in Mississippi along the Natchez Trace Parkway near milepost 75.



Figure 7. A mesic circumneutral forest dominated by water oak (*Quercus nigra*) in Mississippi along the Natchez Trace Parkway near milepost 2.

North of Jackson, Mississippi, near milepost 105 to south of Mantee, Mississippi, near milepost 217, NATR alternates between the Coastal Plains-Loess Section (231H) and the Coastal Plains-Middle Section (231B). In this area, which is north of the ranges of southern magnolia and spruce pine, the vegetation is not as distinctive. Where loess is present in the topsoil, it is very thin and does not have as much of an influence on the landscape and vegetation. Much of the land has previously been in agriculture, and these parts of the landscape have either been planted in loblolly pine, or are vegetated by early successional forests composed of loblolly pine and sweetgum (Figure 8).

Coastal Plains-Middle Section (231B)

Between mileposts 217 and 319 and again between mileposts 336 and 362, NATR is in the Coastal Plains-Middle Section (231B) where the vegetation components are generally similar to the Coastal Plains-Loess Section (231H). The vegetation of the Coastal Plains-Middle Section (231B) consists mostly of pine and oak-dominated forests on dry and more acidic sites with white oak, post oak, and southern red oak. Near Tupelo, Mississippi, the Parkway passes through the Black Belt ecological subsection, a narrow north-south strip with distinctive clay soils that formerly had extensive native prairies. Shortleaf pine (*Pinus echinata*) is nearly absent in this area (although loblolly pine is present), and eastern redcedar (*Juniperus virginiana*) is abundant, particularly in areas where prairie has succeeded to forest (Figure 9). Northern red oak (*Quercus rubra*) exists in upland forests in the northern Coastal Plains-Middle Section (231B). Also in this ecological section, at about milepost 257, bald-cypress (*Taxodium distichum*) reaches its northern limit along the Parkway. South of milepost 257, bald-cypress is a prominent feature in wetter bottomlands and swamps.



Figure 8. An early successional forest of loblolly pine (*Pinus taeda*) and sweetgum (*Liquidambar styraciflua*) in Mississippi along the Natchez Trace Parkway near milepost 126.



Figure 9. An eastern redcedar (*Juniperus virginiana*) woodland where prairie is succeeding to forest in the Black Belt ecological subsection in Mississippi along the Natchez Trace Parkway near milepost 247.

Southern Cumberland Plateau Section (231C)

For a short distance in Alabama, NATR crosses the margin of the Southern Cumberland Plateau Section (231C) and is further identified as the Sandstone Mountain Subsection (231Cd). This area (locally known as Sand Mountain) is primarily sandstone of Mississippian age (Figure 10), in contrast to most of the ecological section that is of younger Pennsylvanian age. The far western end of this area, where the Parkway passes, appears to have been largely cleared. The area could have been included in the Interior Low Plateau-Highland Rim Section (223E), but that ecological section is overwhelmingly composed of limestones and cherts, not sandstone, making this area unusual no matter which ecological section it is placed in. The soils derived from the sandstones are likely to be acidic and could support Virginia pine (*Pinus virginiana*) and chestnut oak (*Quercus prinus*), which do not range much further south than this area. Loblolly pine is still likely to be present, but its natural range ends just north of this area; therefore, loblolly pine is likely to be less abundant.

The Parkway briefly reenters the Coastal Plains-Middle Section (231B) in far southwestern middle Tennessee, before continuing across the Interior Low Plateau-Highland Rim Section (223E) towards Nashville, Tennessee. Around the Alabama-Tennessee State line, there is a stretch of about 61 km (mileposts 324–362) where NATR alternates between the Coastal Plains-Middle Section (231B) and the Interior Low Plateau-Highland Rim Section (223E). This area also marks the transition from a warm temperate climate to a cool temperate one. This change in climate is reflected in the USNVC as a transition from warm temperate to cool temperate plant communities (Table 4).



Figure 10. Buzzard Roost Springs with exposed sandstone common to the Sand Mountain area in Alabama along the Natchez Trace Parkway near milepost 320.

Table 4. Division classification of the U.S. National Vegetation Classification by climate regime for the Natchez Trace Parkway.

Climate Regime Vegetation	Warm Temperate Division	Cold Temperate Division
Upland Forest and Woodland	1.B.1.Na. Southeastern North American Forest & Woodland	1.B.2.Na. Eastern North American Forest & Woodland
Flooded and Swamp Forest	1.B.3.Nb. Southeastern North American Flooded & Swamp Forest	1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest
Upland Shrubland and Herbaceous Vegetation	2.B.2.Ne. Southeastern North American Grassland & Shrubland	2.B.2.Nc. Eastern North American Grassland & Shrubland
Wetland Shrubland and Herbaceous Vegetation	2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland	2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

Interior Low Plateau-Highland Rim Section (223E)

As NATR enters Tennessee and into the Interior Low Plateau-Highland Rim Section (223E), several cumulative changes in the flora, landforms, and climate result in a very different flora and suite of plant communities than were present between Natchez and Jackson, Mississippi. This area primarily is dominated by deciduous canopy trees (Figure 11). Occasional instances of shortleaf pine and loblolly pine may have escaped from plantings, but pine is not a major forest component as pine is along NATR in Mississippi. Northern red oak and chestnut oak are major components of the vegetation, along with post oak, southern red oak, and white oak. At this latitude, water oak, overcup oak (*Quercus laurifolia*), and swamp chestnut oak (*Q. michauxii*) cease to be present, because these species tend to be present in the warm temperate areas.



Figure 11. A hardwood forest with deciduous canopy trees of white oak (*Quercus alba)* and sugar maple (*Acer saccharum*) in Tennessee along the Natchez Trace Parkway near milepost 399.

Project Overview

General Process

The objective for the Natchez Trace Parkway (NATR) vegetation mapping project was to identify and map existing vegetation types of the Parkway. To accomplish this goal, three main components to the NATR vegetation mapping project were necessary: (1) vegetation classification, (2) vegetation mapping, and (3) map accuracy assessment (AA). Each of these main components is discussed in greater detail within this report; however, as with any vegetation mapping project, several intermediate steps are inherent to the process. The following sections provide an overview of the process to complete the NATR vegetation mapping project, including the three main components and the intermediate steps. This overview process is presented somewhat in order of sequence; however, some overlap of process steps intrinsically exists.

Vegetation Classification

Prior to the NATR vegetation mapping project, a vegetation classification of the Parkway had been developed for the National Park Service (NPS) by NatureServe (Nordman et al. 2011). Although the vegetation classification effort was independent of this NATR vegetation mapping project, the 2011 classification served as a foundation supporting this project to map the vegetation communities of the Parkway. The vegetation classification was further developed during the NATR vegetation mapping project from the mapping and AA efforts. Vegetation community concepts, names, and codes were updated to the current version of the U.S. National Vegetation Classification (USNVC), including hierarchical placement in the USNVC. Furthermore, additional vegetation associations in the USNVC were discovered during the mapping and AA efforts. These associations were added to the vegetation classification for the Parkway.

The 2011 vegetation classification was derived from vegetation plots collected during 1995, 2004–5, and 2009. Vegetation analyses provided detailed ecological information to affirm vegetation associations in the USNVC and to document the vegetation associations with local descriptors. A field key to vegetation associations complemented the 2011 vegetation classification. The vegetation classification and key were continually refined throughout the NATR vegetation mapping project with additional data from map reconnaissance, verification, and AA. Additional quick plots were collected in 2014 during the map reconnaissance effort. (A quick plot is a vegetation plot examining the major vegetative components without completing a botanical inventory.) These quick plots provided support for vegetation associations discovered after the vegetation plot collection efforts.

In total, 605 vegetation plots are included in the database to support vegetation classification for the NATR vegetation mapping project. The plot data were originally entered into the NPS PLOTS Database Version 2.0 (NatureServe 2005) and were eventually converted to the NPS PLOTS version 4.0 (National Park Service 2015) database. The NATR vegetation mapping project identified 122 natural (including ruderal) associations in the USNVC. Methods and results of vegetation classification are provided in the “Vegetation Classification” section of this report.

Study Plan

A detailed study plan was submitted to the NPS Vegetation Mapping Inventory (VMI) Program August 2011 with a revised version submitted May 2013. These plans focused on the second half of the "12-Step Guidance for NPS Vegetation Inventories" (version dated November 10, 2010[2]) because the development of the ecological classification (including vegetation plot collection, analysis, and drafting of the vegetation descriptions and key) had been completed for the NPS during 2004–5 and 2009–11.

A timeline outlining the sequence of task events for the NATR vegetation mapping project, most of which are discussed in this report, are listed in Table 5.

Table 5. Timeline by year and task event for the Natchez Trace Parkway vegetation mapping project.

[Each year is split into four blocks to better approximate when most of a particular task was completed. These blocks represent January–March, April–June, July–September, and October–December. Recon, Reconnaissance; Clsf, Classification; Dvlp, Development; Interp, Interpretation; AA, Accuracy Assessment]

Task	2011	2012	2013	2014	2015	2016
Aerial Image Collection						
Aerial Image Process						
Vegetation Key						
Project Orientation						
Map Field Recon						
Map Clsf Dvlp						
Map Image Interp						
AA Field Data						
AA Analysis						
Vegetation Clsf Update						
Project Products						
Project Close Out						

Digital Aerial Imagery

Digital aerial imagery provides baseline data for mapping vegetation types and other land-cover features. Vertical photographs (photographs taken with the aerial camera pointed straight down at the ground) collected with proper overlap for each flight line allows an interpreter to study the

[2] Version accessed at http://science.nature.nps.gov/im/inventory/veg/docs/Veg_Inv_12step_Guidance_v1.0.pdf.

photographs three-dimensionally with a stereoscope (Avery 1978) or, as with the NATR vegetation mapping project, to view stereo models of digital aerial images in three dimensions (3D) using computers and specialized geographic information system (GIS) software. Because ecologic settings are taken into account when mapping vegetation types, viewing the aerial images in 3D helps recognize those ecologic settings.

Digital 4-band—true-color and color infrared—aerial imagery were acquired in the fall of 2011 for the NATR vegetation mapping project using a plane-mounted digital camera. This set of imagery became the primary source for image interpretation and mapping. The aerial imagery was collected at a pixel resolution of 30.48 centimeter (centimeter measurement calculated from a standard 12-inch measurement). The goal of fall-dated imagery, particularly with the color infrared bands, was to capture peak leaf-phenology change of hardwood trees; thus, aiding mappers in viewing distinctions among various hardwood-forest types.

Staff from the Upper Midwest Environmental Sciences Center of the U.S. Geological Survey coordinated the collection of digital aerial imagery with an aerial flight contractor. Several parameters were put in place for this acquisition:

- a fall-dated imagery set showing peak leaf-phenology change of trees,
- a date to capture peak leaf-phenology change that was coordinated with Parkway staff,
- a suitable pair of images for stereo viewing with 60% forward lap and 30% side lap,
- a collection time that would avoid long shadows and maintain proper color balance,
- a pixel resolution of 30.48 centimeters (equivalent to 12 inches), and
- a minimum of 100-m buffer beyond the administrative boundary of the Parkway.

The aerial mission contractor, Kucera International, used a plane-mounted, large-format 136-megapixel Microsoft UltraCamX (UCx) digital aerial camera. The UCx employs a 4-band sensor (red, green, blue, and near infrared) that is 14,430 by 9,420 pixels in size. The camera system employs a sophisticated inertial measurement unit (IMU) and a sensitive global positioning system (GPS) to track the precise location and position of the camera sensor at the instance of exposure. Image processing software uses this positional data to reference each image frame to the surface of the Earth within 1 meter (m) (Mostafa et al. 2007).

With a north-south latitudinal difference of nearly 500 kilometers (spanning five degrees of latitude), the aerial imagery mission was collected during two dates to better capture leaf phenology senescence of trees. The northern mission included the Parkway south of U.S. Highway 82 to Nashville, Tennessee, and was collected on October 14, 2011. The southern mission included the Parkway north of U.S. Highway 82 to Natchez, Mississippi, and was collected November 11, 2011. (The two aerial missions overlapped each other by one flight line length in the vicinity of U.S. Highway 82, as discussed later in this section.) The aerial imagery captured leaf-phenology close to onset of change, granted leaf senescence varied from northern to southern latitudes even within the northern and southern aerial mission extents. The imagery set provided aerial views to complete field work and mapping.

The aerial imagery mission captured 849 images with 25 flight lines and covered the entire Parkway with a minimum 100 m buffer beyond the Parkway boundary. The northern reach of imagery consists of flight lines 1–16 and the southern reach consists of flight lines 16–25. Flight line 16 was captured during both the October and November aerial missions. The extent of flight line 16 is between mileposts 182 and 213. This overlap helped the image interpreters adjust their interpretation of hardwood forest types by comparing leaf phenology between the two flight lines. The flight line locations for the aerial imagery collected for the NATR vegetation mapping project are shown in Figure 12.

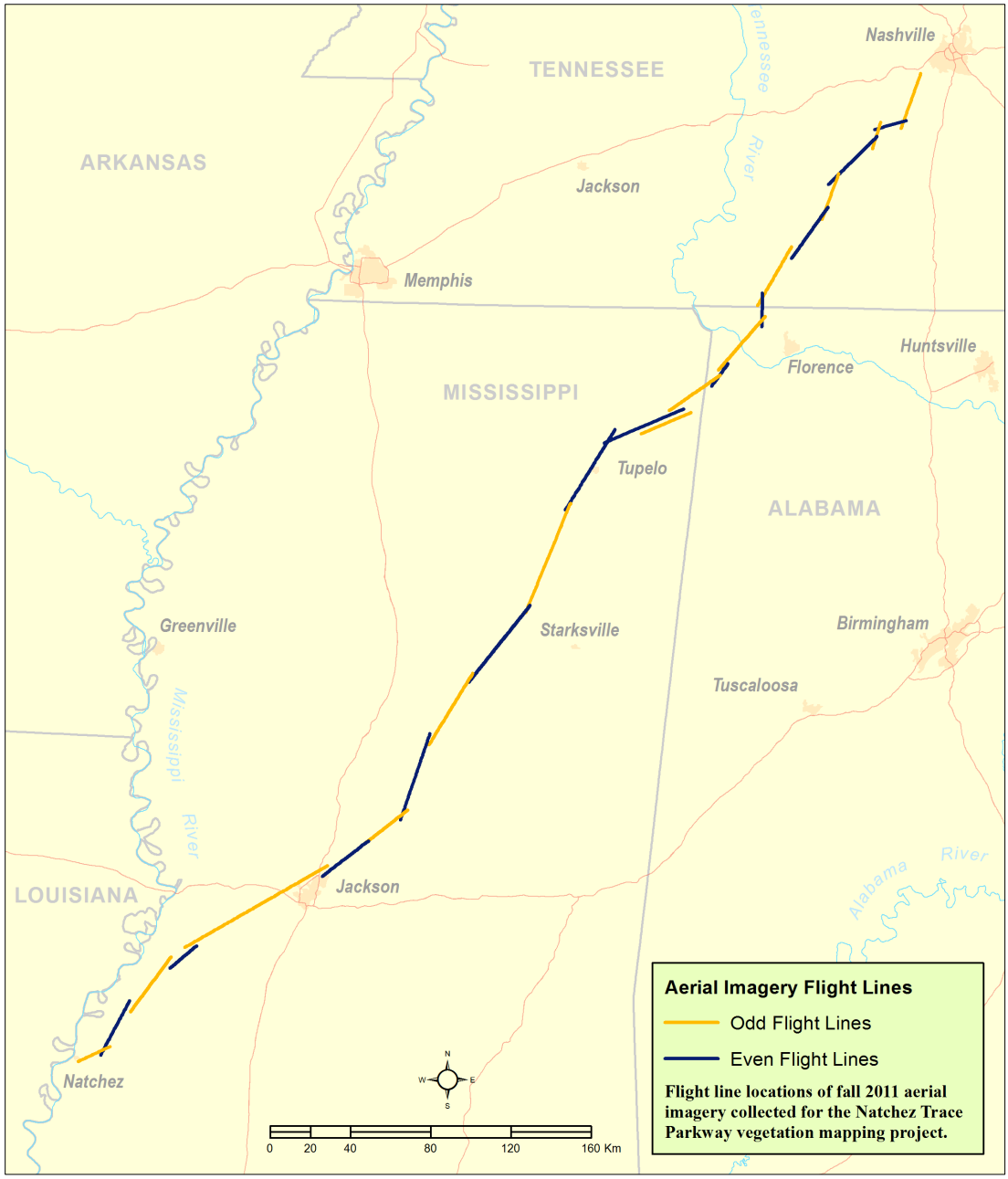


Figure 12. Flight line locations of 4-band aerial imagery collected during October and November 2011 at 30.48-centimeters per pixel resolution for the Natchez Trace Parkway vegetation mapping project.

Baseline information about the digital aerial imagery collected for the NATR vegetation mapping project is listed in Table 6. The aerial image in Figure 13 shows an example from flight line 16 that was collected October 14, 2011. The aerial imagery in Figure 14 shows an example from flight line 16 that was collected November 11, 2011, and is of the same area as shown in Figure 13. Viewing these two images side by side, an interpreter can compare the leaf phenology stage of hardwood forest types that were captured by each date of imagery within this aerial mission overlap. As mentioned previously, this overlap of aerial imagery aided image interpreters to adjust their interpretation of hardwood forest types.

Table 6. Digital aerial imagery sets collected for the Natchez Trace Parkway vegetation mapping project.

[m, meters; ha, hectares; cm, centimeters; in, inches]

Imagery Date	Imagery Type	Pixel Resolution	Footprint (pixels)	Footprint (m)	Area (ha)
10-14-2011	4-band Imagery	30.48 cm (12 in)	14430 by 9420	4389.2 by 2871.2	1262.8
11-11-2011	4-band Imagery	30.48 cm (12 in)	14430 by 9420	4389.2 by 2871.2	1262.8

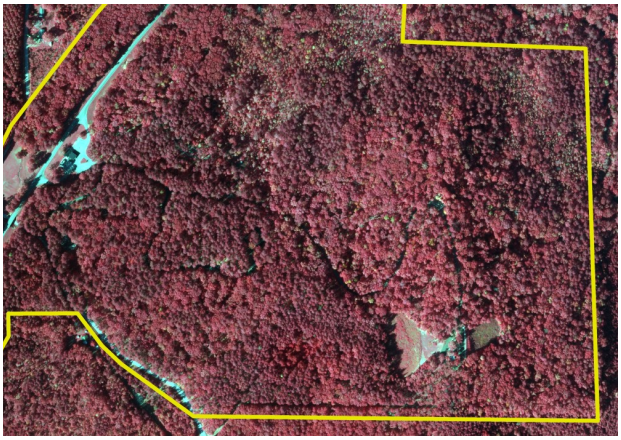


Figure 13. An example in color-infrared from the 4-band aerial imagery set collected during October 2011 for the Natchez Trace Parkway vegetation mapping project.
(The yellow line designates the Parkway boundary. The area is of Jeff Busby Site, milepost 193.)

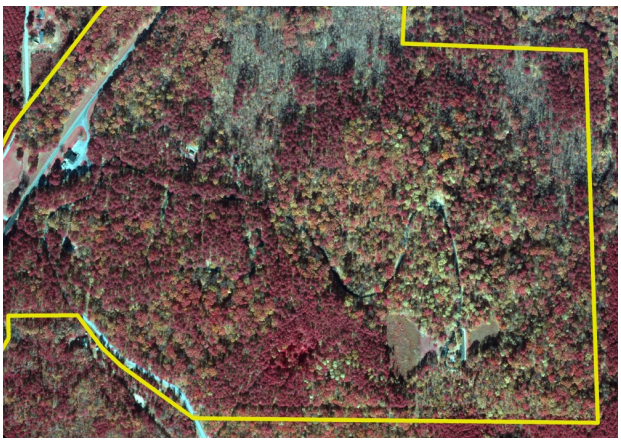


Figure 14. An example in color-infrared from the 4-band aerial imagery set collected during November 2011 for the Natchez Trace Parkway vegetation mapping project.
(The yellow line designates the Parkway boundary. The area is of Jeff Busby Site, milepost 193.)

The digital aerial imagery was reviewed to assure that requirements for mapping purposes were met. Upon acceptance, exposures were adjusted for viewing and interpreting purposes. The aerial imagery was then processed for both field and mapping purposes. Processing resulted in making two products: (1) a two-dimensional orthorectified mosaic of each imagery set for background display in a GIS and (2) stereo models to view and map images in 3D using a GIS and specialized 3D computer hardware and software.

Orthorectified Mosaic

Individual image tiles from the digital aerial imagery collected for the NATR vegetation mapping project were converted to Tagged Image File Format (TIFF) format and referenced to the Earth using the GPS and IMU records generated by the camera. Because the IMU records the rotation values from the camera sensor in three directions (roll, pitch, and crab), and the GPS records the horizontal and vertical values from the sensor at the moment of exposure, specific software programs can reference each digital aerial image precisely to its ground position. To further increase the fit of the images to the Earth, software programs drape each aerial image over the landscape using digital elevation models (DEM).

Once referenced, or orthorectified, the individual digital aerial images were color balanced and "stitched" together to form an orthoimage mosaic for each flight line. Each mosaic was compressed into Joint Photographic Experts Group 2000 to accommodate computer hardware systems and GIS software with manageable file sizes. Each orthoimage mosaic was projected in the Universal Transverse Mercator, Zone 16 North, by using the North American Datum of 1983 and the North American Vertical Datum of 1988.

Stereo Models

Digital aerial image tiles were collected with a 60% overlap along flight lines. An overlap in aerial images allows for the making of stereo models that are used for onscreen 3D viewing in GIS and specialized computer software. Before aerial imagery can be viewed in 3D, block files must be generated for the stereo models (a block file is a separate georeferencing file that a GIS uses to maintain the alignment of the stereo-pair imagery). These block files establish each aerial image's relation to its adjacent stereo pair so that the overlap areas are always precisely aligned and the image's overlapping areas can be viewed in stereo. Stereo models use processed but unreferenced, unrectified imagery because image displacement of features is required for 3D viewing. For the NATR vegetation mapping project, stereo models were produced using LPS Core software (renamed to Photogrammetry Suite, ERDAS, Inc.). For viewing in 3D and map interpretation, the stereo models were imported into Stereo Analyst for ArcGIS (ERDAS, Inc.). The imported stereo models allowed for georeferencing information of the associated block file to be read and the stereo pairs of aerial imagery to display in 3D and in the correct geospatial position. Because the stereo model contains georeferencing information, the information delineated on-screen in the GIS by the mapper is also georeferenced as it is drawn. More information on the use of stereo models with specialized stereo viewing equipment for mapping is provided in the "Vegetation Mapping" section of this report.

In addition to mosaic orthoimages and stereo models, a feature-class layer was produced to show center locations of individual aerial images in a GIS. This feature class is incorporated into the geodatabase for the NATR vegetation mapping project. The aerial orthoimagery mosaic for each flight line is also included as a product for the NATR vegetation mapping project, along with a nonspatial digital map book of aerial images of the Parkway.

Orientation Meeting

An orientation meeting was held May 6–7, 2014, at the NATR headquarters near Tupelo, Mississippi, to discuss the mapping, AA, and end products for the NATR vegetation mapping project (Figure 15). Cooperators met to achieve the following objectives:

- provide an overview of the NPS VMI Program and data applications;
- become informed of the history, purpose, landscape, management, science, and specific interests of the Parkway;
- provide an overview of the vegetation sampling and classification work already completed;
- provide an overview of the digital aerial imagery already collected and processed;
- present the major steps remaining for the vegetation mapping project and view examples of final products;
- discuss an action plan for field work and review the project schedule;
- review and become acquainted with the vegetation classification developed for the NATR vegetation mapping project; and
- visit various sites along the Parkway (Figure 16) south of Tupelo, Mississippi.

Representatives from the Alabama Natural Heritage Program and the Tennessee Natural Heritage Inventory also participated.



Figure 15. Orientation meeting for the Natchez Trace Parkway vegetation mapping project held at the Natchez Trace Parkway headquarters.



Figure 16. A field site visit during the orientation meeting for the Natchez Trace Parkway vegetation mapping project.

Map Classification, Field Work, and Vegetation Mapping

In conjunction with the orientation meeting, the classifiers and mappers for the NATR vegetation mapping project discussed the vegetation classification. This discussion prepared the mappers for field reconnaissance of vegetation within the Parkway. Three field efforts were completed during the summer of 2014 by the mappers, and the mappers were assisted by a classifier. The purpose of field reconnaissance was to visit the vegetation types in the field, discern their appearances in the aerial images, and establish mapping protocols. Between the second and third field efforts, preliminary maps of select locations were produced by the mappers. During the third field effort, the performance of the map and field key to vegetation associations of NATR were tested. From the verification results, the map and vegetation field key were adjusted accordingly.

The mapping proceeded from fall 2014 to spring 2015, with mappers interpreting vegetation and land cover types by viewing the digital aerial imagery collected for this project. The mappers viewed the aerial imagery stereoscopically by using computer workstations equipped with both 3D and GIS software. Map conventions based on field work and the vegetation classification helped maintain consistency in mapping. A draft version of the vegetation map (a spatial database layer) was completed in spring 2015, was provided to Parkway staff for review and comment, and was then prepared for AA.

To map vegetation and open water of NATR, 63 map classes were developed. Of these 63 map classes, 54 represent 114 of the 122 USNVC associations identified with this vegetation mapping project; 8 associations were determined always less than minimum mapping unit (MMU). (Several map classes represent more than one association while others represent a single association.) Another five map classes represent cultural vegetation types (agricultural and developed) in the USNVC, three map classes represent nonvegetation open water (non-USNVC), and one map class represents

landscapes that had received tornado damage about 6 months prior to the date of aerial imagery collection; the remnant vegetation could not be classified to the USNVC. The vegetation map layer provides 13,529 polygons of detailed attribute data covering 21,655.5 hectares (ha). Methods and results of vegetation mapping are provided in greater detail in the "Vegetation Mapping" section of this report.

Accuracy Assessment

An AA was completed on the draft version of the vegetation map layer. During the summer of 2015, field crews collected data from 900 stratified-random selected sites to evaluate the accuracy of the vegetation map layer for those map classes representing USNVC associations. The AA field data were then compared to the vegetation map data. Results from the AA study indicate an overall accuracy of 81.8% (kappa index of 81.1%) based on an analysis of data from 894 of the 900 AA sites. The results were tabulated into a contingency matrix. Methods and results of the AA are provided in greater detail in the "Accuracy Assessment" section of this report.

Product Development

Ultimately, a geodatabase containing four feature classes was produced, including the following: (1) vegetation and land-cover polygons showing locations of vegetation types and general land-cover features; (2) vegetation points showing locations of vegetation plots, verification sites, and AA sites; (3) locations of the digital aerial imagery set obtained for the NATR vegetation mapping project; and (4) project boundary extent. Included in the geodatabase are relate tables providing further information to the feature classes, including links to classifications and detailed sampling data. A second geodatabase was produced containing a feature class that presents locations and data of field reconnaissance sites. All geospatial products were projected in the Universal Transverse Mercator, Zone 16 North, by using North American Vertical Datum of 1988.

The suite of products produced and compiled for the NATR vegetation mapping project includes the project geodatabases, an orthorectified mosaic for each flight line of aerial imagery collected for the project, metadata documentation for geospatial datasets, individual aerial image tiles, an aerial imagery map book, a vegetation database with the formal field data collected during this project (vegetation plots, verification sites, and AA sites), data sheets and digital pictures of formal field data, maps and graphics showing a representation of each feature class within the project geodatabase, and this NPS Natural Resource Report.

Close-Out Meeting

The objective of a close-out meeting for any particular NPS VMI Program vegetation mapping project is for the NPS (at the park unit, network, and national levels) to receive final products from the developers and to be provided briefings on the vegetation mapping project, including summaries of results and demonstration of products. These meetings provide a venue for questions and answers between the recipients and developers, which ultimately enhances the understanding and use of products by the recipients.

A close-out meeting for the NATR vegetation mapping project was scheduled for September 2016 at the Parkway headquarters. In addition to functions that are standard to a close-out meeting, the

agenda included a field workshop for attendees to (1) view firsthand a vegetation plot, a verification site, various AA sites, and some classified polygons of the vegetation map layer and (2) make use of the descriptions and the field key to vegetation associations.

Project Boundary Extent

The project boundary extent for the NATR vegetation mapping project coincides closely with the NATR administrative boundary. The total map extent is 21,655.5 ha. A feature-class layer showing the extent of the project boundary was developed and incorporated into the geodatabase for the NATR vegetation mapping project.

Minimum Mapping Units

The NPS VMI Program's standard MMU of 0.5 ha was applied to mapping forest and cultural types. For woodland, shrubland, and herbaceous vegetation types, as well as nonvegetated open water, a MMU of 0.25 ha was applied. This smaller MMU was applied to woodland types because they were comparatively rare throughout NATR. The smaller MMU was also applied to shrubland and herbaceous vegetation types because of their frequent interface with the Parkway's road system. Furthermore, when forest types represented by the same map class were intersected by road structures, a MMU of 0.25 ha was applied to each side of the road to reach at least a 0.5 ha MMU collectively. Allowances for reduced MMUs were applied to vegetation types that were identified along the Parkway's boundary. The vegetation types are discussed in the "Vegetation Mapping" section of this report.

Classification Organization

Throughout this project report and the final products related to the NATR vegetation mapping project, the vegetation classification provided is from a 2016 version of the USNVC (USNVC 2016), which follows the methodology and organizational hierarchy of the National Vegetation Classification Standard, version 2 (Federal Geographic Data Committee 2008). The National Vegetation Classification Standard makes a distinction between natural (including ruderal) and cultural vegetation. Areas with at least 1% vegetation cover are classified and described with the USNVC with one exception—aquatic areas are only included when at least 10% vegetation cover (emergent or submergent) is present. These aquatic areas are not described in the USNVC.

The term "vegetation type" is used throughout this report to reference vegetation classification units in general, at any level of the classification hierarchy. For example, the *Quercus falcata* - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest Association, *Quercus stellata* - *Quercus falcata* - *Quercus alba* Interior Low Plateau Woodland Alliance, and the South-Central Interior Oak Forest & Woodland Group are each treated as a vegetation type.

Vegetation Classification

Background to the Vegetation Classification

A vegetation classification of the Natchez Trace Parkway (NATR) was completed in 2011 by NatureServe (Nordman et al. 2011) for the National Park Service (NPS). Although the vegetation classification effort was independent of this NATR vegetation mapping project, the 2011 classification served as a foundation supporting this project to map the vegetation communities of the Parkway. As the NATR vegetation mapping project progressed with the mapping and accuracy assessment (AA) efforts, further development of the vegetation classification continued. Upon conclusion of this vegetation mapping project, vegetation community concepts, names, and codes were updated to the current version of the U.S. National Vegetation Classification (USNVC), including their hierarchical placement in the USNVC. Furthermore, additional vegetation associations in the USNVC were discovered during the mapping and AA efforts. These associations have been added to the vegetation classification for the Parkway.

The following sections provide an overview of the vegetation classification of NATR, which includes the vegetation classification development prior to this NATR vegetation mapping project. For details on any of the vegetation classification methods, please consult Nordman et al. (2011).

Methods

Preliminary Classification

In support of classifying the vegetation of NATR, an initial round of vegetation plot data collection by NatureServe was undertaken in 2004 with additional plot data collected in 2005. These plot data and legacy (collected outside the purview of this vegetation classification) data from 1995, collected by The Nature Conservancy (Table 7), were classified to associations of the USNVC using multivariate analysis (PC-Ord 5 software package). A number of USNVC associations were documented with only a few plots, and the vegetation plot dataset (for 2004 and 2005) was determined to be inadequate for classifying the vegetation of NATR. In 2009, additional vegetation plot data, therefore, were collected along the Parkway to capture more information on undersampled vegetation types and sparsely sampled geographic areas. A sampling strategy was developed to target these communities of interest and clearly delineate the undersampled areas for field crew visits. Oversampled USNVC associations (Table 8) were those associations represented by eight or more vegetation plots collected along the Parkway prior to the fall 2009 field season. A total 250 plots exist in 14 oversampled associations. The other associations, which had fewer than eight plots, were considered undersampled and were the focus of fieldwork.

Table 7. Summary of vegetation plots used to build the initial vegetation classification for the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee).

Plot Codes	Year	Number Of Plots	Predominant Plot Type
NATR.001 – NATR.093	1995	93	Quick plots (The Nature Conservancy)
NATR.100 – NATR.207	2004	97	Mostly full plots (NatureServe)
NATR.208 – NATR.406	2005	253	Enhanced quick plots (NatureServe)
NATR.500 – NATR.655	2009	154	Mostly full plots (NatureServe)

Table 8. Oversampled U.S. National Vegetation Classification associations of Natchez Trace Parkway prior to the fall 2009 field season.

[USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global]

USNVC CEGL Code	USNVC Association Name	Plot Count
CEGL002067	*Quercus alba* - *Quercus rubra* - *Carya* (*alba*, *ovata*) / *Cornus florida* Acidic Forest	8
CEGL002070	*Quercus alba* - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest	10
CEGL002411	*Fagus grandifolia* - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest	9
CEGL004771	*Quercus phellos* - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Forest	16
CEGL006011	*Pinus taeda* / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Forest	46
CEGL007124	*Juniperus virginiana* var. *virginiana* - (*Quercus* spp.) Forest	8
CEGL007244	*Quercus falcata* - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest	41
CEGL007246	*Quercus falcata* - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest	21
CEGL007261	*Quercus prinus* - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest	12
CEGL007330	*Liquidambar styraciflua* - (*Liriodendron tulipifera*) Temporarily Flooded Forest	26
CEGL007353	*Liquidambar styraciflua* - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Forest	8
CEGL007700	*Quercus prinus* - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest	10
CEGL007795	*Quercus alba* - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest	18
CEGL008450	*Pinus taeda* - *Quercus* (*falcata*, *hemisphaerica*, *nigra*) - *Liquidambar styraciflua* / *Rhus copallinum* - *Vaccinium stamineum* Forest	17

Site Selection of 2009 Vegetation Plots

The sampling strategy to collect additional vegetation plots in 2009 utilized the land-cover map of the Southeastern Gap Analysis Program (Biodiversity and Spatial Information Center 2008) and level IV ecoregions of the Environmental Protection Agency (EPA) (Environmental Protection Agency 2004, Omernik et al. 2005) to identify broad areas potentially containing the plant communities of interest. The USNVC associations for all of the existing plots for 2004 and 2005 were crosswalked to the ecological systems within the GAP land-cover map and the ecoregions within the EPA level IV ecoregion map. Various combinations of EPA level IV ecoregions and GAP ecological systems were created to identify those combinations that were oversampled units. From the existing field plot locations and their USNVC associations, undersampled units could be deduced. The undersampled units were used for analysis and generation of plot locations. Site selection processes for the additional vegetation plots to be collected in 2009 were done in ArcGIS (Version 9.3, Esri), using Hawth's Tools extension (Beyer 2004) for random point generation. Points were distributed across the undersampled combinations of EPA level 4 ecoregions and GAP ecological classes. The number of points in each EPA/GAP class combination was determined by and distributed proportionally to the area of undersampled EPA/GAP class combinations along NATR with the following constraints:

no more than 30 and no less than 5 points shall be within a given EPA/GAP class combination. Some of these class combinations ultimately had fewer than five points when the very small size of the mapped area precluded placement of five points while maintaining minimum distances of 80 meters (m) apart from each other to prevent overlap of the survey area. The EPA/GAP class combinations that took up a significantly larger portion of the undersampled areas within the Parkway had more vegetation plots than the EPA/GAP class combinations that represented a small portion of the undersampled areas within the Parkway. Using these area-weighted estimates of the number of points to sample for each EPA/GAP class combination in the field, each EPA/GAP class combination was given a limited number to be sampled per State: 26 plot sites were selected for Alabama, 146 plot sites were selected for Mississippi, and 52 plot sites were selected for Tennessee. A minimum distance of 80 m between any two sites was enforced.

Field Data Collection 2009 and Prior Years

The field sampling methodology was adapted from field-method standards of the NPS Vegetation Mapping Inventory Program (NatureServe 2004). Details are provided therein with a general summary provided below.

Vegetation plots for sampling were placed to represent the character of an entire stand of vegetation. Plots were usually placed at least 15 m from the boundary of another vegetation type to reduce the variability associated with the transition from one vegetation type to another. This distance was not possible for small or linear vegetation stands. To determine the boundary of a unique vegetation type was sometimes difficult because two adjacent stands may be floristically similar but are separated in the USNVC based on physiognomic criteria (e.g., amount of shrub or tree canopy cover).

Field crews located vegetation plot sites by navigating to each evaluation point that was generated by the sampling scheme. To reach each plot site, a Wide Area Augmentation System enabled Garmin 5 GPS unit, or a comparable unit, was used. At each vegetation plot, the field crew recorded the coordinates, determined the GPS positional accuracy, and collected vegetation data. The primary association type at that plot was determined by the field crew using an existing field key to the ecological and human-influenced USNVC associations of NATR. A “fit” value of high, medium, or low was also selected to characterize the fit of the description in the vegetation field key based on expert opinion. In some cases, a secondary or alternate association was also recorded, and notes were taken on any difficulties keying out the plot site.

Vegetation data were collected by staff biologists and ecologists of NatureServe and the NatureServe Network Member Programs, including the Alabama Natural Heritage Program, Mississippi Natural Heritage Program, and Tennessee Natural Heritage Inventory. Further support was provided by NPS staff. The timing of vegetation data collection was scheduled based on seasonal factors. The Tennessee, Alabama, and northern Mississippi sections of NATR were completed in early fall 2009, and the central Mississippi sections were completed in late fall 2009. In November 2009, vegetation plot collection was completed on the Parkway near Natchez in southwestern Mississippi.

The 2009 vegetation data were collected from 140 vegetation plots. The plots were typically rectangular and measured 20 m by 50 m (0.1 hectares). In some rare circumstances, 20 m by 20 m

(400 meters squared) plots were used in uniform nonforested vegetation. For each vegetation plot location, environmental and vegetation data were collected. Environmental information about each plot included slope, aspect, soil texture, and evidence of disturbance. Within each plot, the vegetation was visually separated into strata. The canopy cover and average height of each stratum were visually estimated. The 2004 vegetation data were collected from vegetation plots in a similar manner to the 2009 data collection and the 2005 vegetation data were collected using circular enhanced quick plots (Nordman et al. 2011).

The vegetation data included recording a complete list of vascular plant species and the percent cover of each species in the various vegetation strata (canopy, subcanopy, tall shrub, short shrub, and herbaceous stratum). Percent cover was assigned using cover classes for each stratum and the overall cover for that species in the plot (Table 9). Digital pictures were collected of the plot to provide additional information and assist in classifying the plot. Field crews took pictures in each cardinal direction from the plot center and took at least one other picture that best captured the character of the vegetation. Finally, the field crew gave the plot a provisional classification name. For an example of a plot form, see "Appendix A: Plot Sampling Form."

Table 9. Codes to cover scales and vegetation strata used during vegetation plot sampling to develop the initial vegetation classification of the Natchez Trace Parkway (Alabama, Mississippi, and Tennessee).

Cover scales	Vegetation strata
T 0–1%	T1 Emergent Canopy
P >1–5%	T2 Main Canopy
1 >5–15%	T3 Subcanopy
2 >15–25%	S1 Tall Shrubs
3 >25–35%	S2 Short Shrubs
4 >35–45%	S3 Dwarf-shrubs
5 >45–55%	H Herbaceous (field layer, including tree seedlings)
6 >55–65%	A1 Floating-leaved aquatics
7 >65–75%	A2 Submerged-leaved aquatics
8 >75–85%	
9 >85–95%	
10 >95%	

The vegetation plots collected in 2009 were classified in the field using vegetation field keys designed for the section of NATR in which the vegetation plot was located. Upon reaching the plot location, the vegetation was classified to ensure that the vegetation did represent an undersampled USNVC association. Undersampled vegetation associations are those that had fewer than eight plots prior to the 2009 field season. As the 2009 field season progressed, the number of undersampled associations declined, and the plot location placement became more selective. With the completion of the 2009 plot data collection, data analysis, and classification work, the average number of vegetation plots per USNVC association was six with a median of four (Nordman et al. 2011).

Data Entry and Quality Control

Data from the field forms were checked and then entered into the PLOTS Database Version 2.0 (NatureServe 2005). In cases where writing was unclear, fields were highlighted and checked again. Species and cover data entered into the database were subjected to several quality control processes

to ensure accuracy in the vegetation dataset. Near the close of the NATR vegetation mapping project, these data were converted to the NPS PLOTS version 4.0 (National Park Service 2015) database.

Data Preparation

After completing the additional 2009 field data collection, entering the data into the PLOTS Database Version 2.0, and performing data quality control measures, the plot data collected in 1995, 2004, 2005, and 2009 were prepared for analysis. For this analysis, the vegetation data collected in 1995, 2004, and 2005 were considered legacy data. Species entries with taxa blanks, species cover blanks, and taxa anomalies were deleted from the species list. All taxa names were standardized to the U.S. Department of Agriculture PLANTS 3.5 database (U.S. Department of Agriculture, Natural Resource Conservation Service 2011), which is in accordance with the NatureServe Ecology vascular plant taxonomic standard (Kartesz 1999). Taxa were deleted if they were too vague to aid in classification or if they used common names (e.g., lichens, unknown mosses, or rocks). Duplicate species entries within a single plot, which is caused by entering the same species in multiple strata, were removed prior to data analysis. As a result of data preparation and cleanup, 167 individual entries were deleted from the analysis dataset. The remaining species were unique to the plot and contained the pertinent total cover values needed for analysis. After the data clean up, 8 plots were removed from the set of 597 plots, and 589 plots were used in the data analysis. The 589 plots included the 2009 data in addition to the 1995, 2004, and 2005 legacy data.

Because there were 589 plots in the analysis dataset, vegetation subsets (broad groupings) of the vegetation plot data were used for ease of interpretation and analysis. The subsets were created based on USNVC division codes associated with each USNVC association and each vegetation plot. The codes are listed in Table 10 and the locations of vegetation plots used to develop the vegetation classification that was used for the NATR vegetation mapping project are shown in Figure 17.

Table 10. Vegetation subsets (broad groupings) used for the analyses of vegetation plot data that were collected in the Natchez Trace Parkway during 1995, 2004, 2005, and 2009.

Vegetation Subset Name	Assigned Subset Code for PC-ORD	Division Code
Grassland & Shrubland	3	D102, D024
Cliff, Scree, and Rock Vegetation	4	D051
Freshwater Aquatic Vegetation	5	D049
Wetland Forest I	11	D011
Wetland Forest II	62	D062
Wetland Forest III	30	D030
Upland Forest I	6	D006
Upland Forest II	8	D008

Data Analyses

For the vegetation-plot subsets based on USNVC divisions, first and second order jackknife estimates of species diversity and species area curves were created (Heltshe and Forrester 1983, Palmer 1990). Although these techniques are generally applied to a particular park unit, they were applied to the broad habitats (USNVC divisions) for NATR. The results serve as estimates of the plant diversity within these eight broad habitats that make up the vegetation of the Parkway.

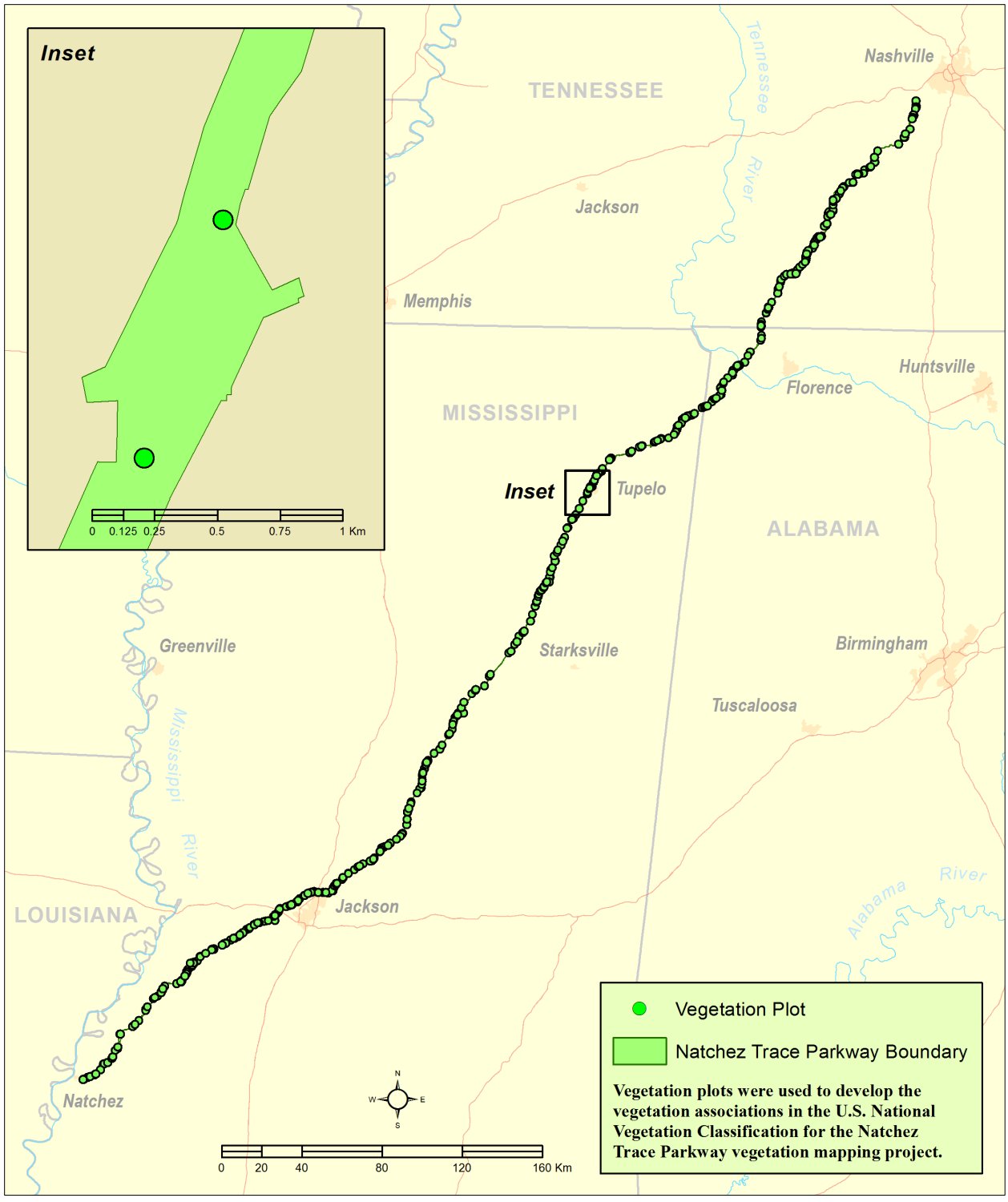


Figure 17. Locations of vegetation plots that supported the vegetation classification that was used for the Natchez Trace Parkway vegetation mapping project.

Groups of compositionally similar samples were identified using cluster analysis and ordination methods performed using the program PC-ORD v.5.32 (McCune and Mefford 2006). Clustering and ordination analyses are complementary data analysis techniques. Clustering creates groups of species along gradients, and ordination indicates change across continuous gradients. Plots were analyzed to determine outliers, and the plots were removed if the outliers were compositional outliers that possibly could have undesirable influences on the clustering results. These outliers were later analyzed qualitatively and placed within the USNVC framework.

Distance matrices were generated using a grouped average linkage method and Sorensen's Bray-Curtis Dissimilarity index (Bray and Curtis 1957) measure to achieve a hierarchical, agglomerative clustering technique. If there was a significant amount of chaining (where points are added one at a time to groups, making interpretation difficult), alternative linkage methods and distance measures were chosen. Dendrograms were generated that clustered the samples within the dataset to help with interpretation of the data. Ordination diagrams were also used to quantify and visualize the many dimensional relations in a small number of dimensions (1–3 axes). Ordination diagrams were useful for detecting compositional variation and trends that were otherwise obscured in the cluster analysis. Ordinations were used to further examine the compositional patterns within the dataset.

Determining the scale (number of branches in a given group) of the groups within the dendrograms was subjective and required an informed interpretation of the dendrograms. Using the ordination diagrams, the results of the cluster analysis, and the prior experience of ecological communities along NATR, samples were placed into compositionally similar groups approximating the scale of the community association.

After evaluating the compositional and environmental summaries, each association-scale group of plots was either left within its already field-assigned vegetation association within the USNVC or reassigned to another association more compositionally similar. In some cases, a new USNVC association was defined from the available data.

Vegetation Classification Results

Initial results of Nordman et al 2011 determined 99 USNVC associations along the Parkway. As a result of the field reconnaissance for mapping in 2014 and the field data collection for accuracy assessment (AA) in 2015, 23 additional USNVC associations were documented for NATR. Those additional 23 associations brought the number of associations from 99 to 122; 22 of these associations were discovered during the field reconnaissance effort and 1 was established from the AA field data. Table 11 lists the 122 vegetation associations for the NATR vegetation mapping project, positioned hierarchically in the USNVC. (Additional quick plots were collected during the map reconnaissance in 2014 to support some of these newly discovered associations in the Parkway.) Of these 122 USNVC associations, 119 are global associations (with codes in the format "CEGL00####" and "global" referring to the associations classification scale) and 3 are park-special associations for the Parkway (with codes in the format "CEPS00####").

Table 11. List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
1. FOREST & WOODLAND CLASS	
1.B. Temperate & Boreal Forest & Woodland Subclass	
1.B.1. Warm Temperate Forest & Woodland Formation	
1.B.1.Na. Southeastern North American Forest & Woodland Division	
M305. Southeastern North American Ruderal Forest Macrogroup	
G029. Southeastern Exotic Ruderal Forest Group	
A3233. *Albizia julibrissin* - *Broussonetia papyrifera* - *Triadica sebifera* Ruderal Forest Alliance	
Melia azedarach Ruderal Forest [Park Special] (CEPS004837)	1
Triadica sebifera Ruderal Forest (CEGL007037)	2
G031. Southeastern Native Ruderal Forest Group	
Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809)	37
A3232. *Liquidambar styraciflua* - *Celtis laevigata* - *Quercus nigra* Ruderal Forest Alliance	
Liquidambar styraciflua - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217)	40
Liquidambar styraciflua Ruderal Forest (CEGL007216)	13
Quercus nigra Ruderal Forest (CEGL004638)	30
A3231. *Pinus taeda* - *Liriodendron tulipifera* - *Liquidambar styraciflua* Ruderal Forest Alliance	
Pinus taeda - *Liquidambar styraciflua* Ruderal Forest (CEGL008462)	35
Pinus taeda - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450)	31
Pinus taeda / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011)	70
M008. Southern Mesic Mixed Broadleaf Forest Macrogroup	
G007. Southern Mesic Beech - Magnolia - Oak Forest Group	
A0369. *Fagus grandifolia* - *Magnolia grandiflora* Forest Alliance	
Fagus grandifolia - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458)	6
Fagus grandifolia - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest (CEGL007460)	3
Fagus grandifolia - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963)	6
G166. Southern Mesic Beech - Oak - Mixed Deciduous Forest Group	
A3236. *Acer barbatum* - *Quercus shumardii* - *Fraxinus americana* Coastal Plain Forest Alliance	
Acer barbatum - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671)	2
A2059. *Fagus grandifolia* - *Quercus alba* - *Quercus nigra* Coastal Plain Forest Alliance	
Fagus grandifolia - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest (CEGL004745)	4
Fagus grandifolia - *Quercus alba* - *Liquidambar styraciflua* / *Magnolia grandiflora* / *Smilax pumila* Forest (CEGL007210)	22
Pinus taeda - *Quercus alba* / *Chasmanthium sessiliflorum* Forest (CEGL004763)	10

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
A3234. *Quercus alba* - *Carya alba* Mesic Coastal Plain Forest Alliance	
Liquidambar styraciflua - *Carya illinoinensis* - *Quercus nigra* Loess Bluff Forest (CEGL004122)	18
Quercus alba - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225)	16
A3235. *Quercus shumardii* - *Quercus pagoda* - *Fraxinus americana* Coastal Plain Forest Alliance	
Quercus pagoda - *Quercus nigra* Forest (CEGL004109)	56
1.B.2. Cool Temperate Forest & Woodland Formation	
1.B.2.Na. Eastern North American Forest & Woodland Division	
M883. Appalachian-Interior-Northeastern Mesic Forest Macrogroup	
G020. Appalachian-Central Interior Mesic Forest Group	
A2033. *Fagus grandifolia* - *Liriodendron tulipifera* - *Carya cordiformis* Forest Alliance	
Fagus grandifolia - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411)	37
Fagus grandifolia - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)	4
Fagus grandifolia - *Quercus alba* / *Cornus florida* Forest (CEGL007881)	24
M013. Eastern North American Ruderal Forest Macrogroup	
G032. Eastern North American Exotic Ruderal Forest Group	
A3230. *Acer platanoides* - *Ailanthus altissima* - *Pinus* spp. Exotic Ruderal Forest Alliance	
Ailanthus altissima Ruderal Forest (CEGL007191)	4
Paulownia tomentosa Ruderal Woodland (CEGL003687)	1
G030. Eastern North American Native Ruderal Forest Group	
A3227. *Juniperus virginiana* - *Pinus virginiana* - *Pinus echinata* Ruderal Forest Alliance	
Juniperus virginiana var. *virginiana* - (*Quercus* spp.) Ruderal Forest (CEGL007124)	24
Pinus echinata Ruderal Forest (CEGL006327)	4
Pinus strobus Ruderal Forest (CEGL007944)	3
Pinus virginiana Ruderal Forest (CEGL002591)	3
A3228. *Liriodendron tulipifera* - *Juglans nigra* - *Robinia pseudoacacia* Ruderal Forest Alliance	
Celtis (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697)	10
Gleditsia triacanthos - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686)	0
Liriodendron tulipifera - *Quercus* spp. Ruderal Forest (CEGL007221)	2
Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220)	31
Robinia pseudoacacia Ruderal Forest (CEGL007279)	2
M016. Southern & South-Central Oak - Pine Forest & Woodland Macrogroup	
G601. Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland Group	
A2060. *Quercus muehlenbergii* - *Acer saccharum* - *Fraxinus americana* Forest Alliance	
Quercus alba - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070)	19

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
Quercus muehlenbergii - *Quercus shumardii* - *Carya* (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808)	10
Quercus shumardii - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442)	14
A3273. *Quercus muehlenbergii* - *Fraxinus quadrangulata* - *Juniperus virginiana* Woodland Alliance	
Juniperus virginiana var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland (CEGL007747)	25
Quercus muehlenbergii - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland (CEGL004267)	2
G165. Piedmont-Central Atlantic Coastal Plain Oak Forest Group	
A3294. *Quercus stellata* - *Carya* spp. - *Pinus echinata* Piedmont Woodland Alliance	
Quercus falcata - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246)	41
G012. Shortleaf Pine - Oak Forest & Woodland Group	
A3270. *Pinus echinata* - *Quercus falcata* Upper Coastal Plain Alliance	
Pinus (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834)	7
Pinus echinata - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050)	6
Pinus echinata - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052)	28
Pinus echinata - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053)	6
G159. South-Central Interior Oak Forest & Woodland Group	
A3288. *Quercus alba* - *Quercus falcata* - *Quercus stellata* Ozark-Ouachita Forest Alliance	
Quercus alba - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067)	15
A3289. *Quercus prinus* - *Quercus falcata* Forest Alliance	
Quercus prinus - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261)	31
Quercus prinus - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700)	21
A3291. *Quercus stellata* - *Quercus falcata* - *Quercus alba* Interior Low Plateau Woodland Alliance	
Quercus alba - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795)	38
Quercus alba - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest (CEGL007709)	36
Quercus falcata - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest (CEGL007244)	53
Quercus stellata / *Viburnum rufidulum* / *Schizachyrium scoparium* - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686)	6
G651. South-Central Interior Oak Savanna & Barrens Group	
A3315. *Quercus marilandica* - *Quercus stellata* Clay/Loess Woodland Alliance	
Quercus marilandica / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756)	3

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
1.B.3. Temperate Flooded & Swamp Forest Formation	
1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest Division	
M029. Central Hardwood Floodplain Forest Macrogroup	
G652. Silver Maple - Green Ash - Sycamore Floodplain Forest Group	
A3712. *Platanus occidentalis* - *Betula nigra* Floodplain Forest Alliance	
Platanus occidentalis - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Floodplain Forest (CEGL007334)	18
G673. Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group	
A3699. *Betula nigra* - *Platanus occidentalis* Appalachian-Piedmont Floodplain Forest Alliance	
Betula nigra - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest (CEGL007312)	20
A3700. *Fraxinus pennsylvanica* - *Platanus occidentalis* - *Acer saccharinum* Ozark-Ouachita Floodplain Forest Alliance	
Acer negundo - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690)	17
Acer saccharinum - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431)	8
Fraxinus pennsylvanica - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427)	18
M503. Central Hardwood Swamp Forest Macrogroup	
G044. Central Interior-Appalachian Seepage Swamp Group	
A3359. *Acer rubrum* - *Nyssa sylvatica* Ozark-Interior Seepage Forest Alliance	
Acer rubrum var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest (CEGL004425)	5
G654. South-Central Flatwoods & Pond Forest Group	
A3429. *Quercus phellos* - *Quercus lyrata* - *Quercus nigra* Interior Pond Forest Alliance	
Quercus phellos - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102)	11
M302. Eastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G552. Eastern North American Ruderal Flooded & Swamp Forest Group	
A4099. *Acer negundo* - *Betula nigra* / *Alliaria petiolata* Ruderal Floodplain Forest Alliance	
Acer negundo Ruderal Floodplain Forest (CEGL005033)	18
1.B.3.Nb. Southeastern North American Flooded & Swamp Forest Division	
M161. Pond-cypress Basin Swamp Macrogroup	
G036. Pond-cypress Basin Swamp Group	
A0652. *Taxodium distichum* - *Taxodium ascendens* / *Panicum hemitomon* Lakeshore Swamp Forest Alliance	
Taxodium distichum East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)	3

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
M310. Southeastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G762. Southeastern Exotic Ruderal Flooded & Swamp Forest Group	
A3339. *Triadica sebifera* - *Melaleuca quinquenervia* - *Schinus terebinthifolius* Ruderal Flooded & Swamp Forest Alliance	
Triadica sebifera Ruderal Wet Forest (CEGL007412)	3
G553. Southeastern Native Ruderal Flooded & Swamp Forest Group	
A3343. *Acer rubrum* - *Liriodendron tulipifera* Ruderal Flooded & Swamp Forest Alliance	
Liquidambar styraciflua - (*Liriodendron tulipifera*) Ruderal Wet Forest (CEGL007330)	81
A3345. *Pinus taeda* - *Liquidambar styraciflua* Ruderal Flooded & Swamp Forest Alliance	
Pinus taeda - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Ruderal Wet Forest (CEGL007546)	4
Pinus taeda - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560)	1
M033. Southern Coastal Plain Basin Swamp & Flatwoods Macrogroup	
G130. Hardwood - Loblolly Pine Nonriverine Wet Flatwoods Group	
A3445. *Quercus stellata* - *Quercus falcata* Wet Flatwoods Forest Alliance	
Quercus falcata Wet Flatwoods Forest (CEGL004412)	17
M032. Southern Coastal Plain Evergreen Hardwood - Conifer Swamp Macrogroup	
G037. Coastal Plain Mixed Evergreen Swamp Group	
A0378. *Magnolia virginiana* - *Nyssa biflora* - *Quercus laurifolia* Swamp Forest Alliance	
Nyssa biflora - *Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana* - *Viburnum nudum* Swamp Forest (CEGL008477)	6
M031. Southern Coastal Plain Floodplain Forest Macrogroup	
G033. Bald-cypress - Tupelo Floodplain Forest Group	
A0345. *Nyssa aquatica* Swamp Forest Alliance	
Nyssa aquatica Swamp Forest (CEGL002419)	10
A3594. *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* Floodplain Forest Alliance	
Planera aquatica Floodplain Forest (CEGL007394)	3
Taxodium distichum / *Lemna minor* Floodplain Forest (CEGL002420)	9
G034. Oak - Sweetgum Floodplain Forest Group	
A3625. *Liquidambar styraciflua* - *Fraxinus pennsylvanica* - *Acer rubrum* Flooded & Swamp Forest Alliance	
Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest (CEGL007380)	17
Platanus occidentalis - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest (CEGL007335)	27
A3628. *Quercus laurifolia* - *Quercus phellos* - *Pinus taeda* Coastal Plain Riparian Forest Alliance	
Quercus laurifolia / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348)	3
A3629. *Quercus lyrata* - *Quercus phellos* - *Carya aquatica* Swamp Forest Alliance	
Quercus lyrata - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424)	5

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
A3630. *Quercus michauxii* - *Carya laciniosa* - *Liquidambar styraciflua* Interior Floodplain Forest Alliance	
Quercus michauxii - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099)	12
A3631. *Quercus michauxii* - *Quercus pagoda* Coastal Plain Floodplain Forest Alliance	
Liquidambar styraciflua - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353)	12
Quercus pagoda - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354)	14
A3632. *Quercus phellos* - *Quercus nigra* Coastal Plain Floodplain Forest Alliance	
Quercus phellos - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771)	32
A3633. *Quercus phellos* Piedmont Floodplain Forest Alliance	
Pinus taeda - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551)	4
G759. Southern Ash - Elm - Willow Floodplain Forest Group	
A1914. *Salix caroliniana* - *Salix nigra* Coastal Plain Swamp Forest Alliance	
Salix nigra - *Acer (rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest (CEGL007703)	0
A3709. *Ulmus americana* - *Ulmus crassifolia* - *Celtis laevigata* West Gulf Coastal Plain Floodplain Forest Alliance	
Quercus texana - *Celtis laevigata* - *Ulmus* (*americana*, *crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619)	8
2. SHRUB & HERB VEGETATION CLASS	
2.B. Temperate & Boreal Grassland & Shrubland Subclass	
2.B.2. Temperate Grassland & Shrubland Formation	
2.B.2.Nc. Eastern North American Grassland & Shrubland Division	
M508. Central Interior Calcareous Scrub & Grassland Macrogroup	
G174. South-Central Patch Prairie Group	
A3889. *Andropogon gerardii* - *Panicum virgatum* - *Sporobolus clandestinus* Southeastern Patch Prairie Alliance	
Andropogon gerardii - *Schizachyrium scoparium* - *Dichanthelium scoparium* - *Rhynchospora glomerata* Grassland (CEGL004006)	1
M123. Eastern North American Ruderal Grassland & Shrubland Macrogroup	
G059. Eastern North American Ruderal Meadow & Shrubland Group	
A3934. *Poa compressa* - *Solidago nemoralis* - *Centaurea biebersteinii* Ruderal Dry Meadow & Shrubland Alliance	
Schizachyrium scoparium - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333)	5

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
2.B.2.Ne. Southeastern North American Grassland & Shrubland Division	
M309. Southeastern Coastal Plain Patch Prairie Macrogroup	
G175. Southeastern Coastal Plain Patch Prairie Group	
A3318. *Schizachyrium scoparium* - *Sorghastrum nutans* Coastal Plain Prairie Alliance	
Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland (CEGL004664)	10
Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland (CEGL004020)	10
M307. Southeastern Ruderal Grassland & Shrubland Macrogroup	
G583. Southeastern Ruderal Grassland & Shrubland Group	
A3321. *Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland Alliance	
Andropogon virginicus var. *virginicus* Ruderal Grassland (CEGL004044)	7
Axonopus fissifolius Ruderal Herbaceous Vegetation [Park Special] (CEPS004833)	1
Imperata cylindrica Ruderal Grassland (CEGL004673)	0
Lolium (*arundinaceum*, *pratens*e) Ruderal Grassland (CEGL004048)	10
Paspalum notatum Ruderal Grassland (CEGL004700)	14
Rhus copallinum - *Andropogon virginicus* Ruderal Grassland (CEGL004035)	8
*Sorghum halepens*e Ruderal Grassland (CEGL004108)	7
A4084. *Ligustrum* spp. Eastern Exotic Ruderal Shrubland Alliance	
Ligustrum sinense Ruderal Upland Shrubland (CEGL003807)	9
A4082. *Pueraria montana* - *Wisteria sinensis* Exotic Ruderal Vine-Shrubland Alliance	
Pueraria montana var. *lobata* Ruderal Vine-Shrubland (CEGL003882)	7
Wisteria sinensis Ruderal Vine-Shrubland (CEGL008568)	1
A3322. *Rubus* spp. - *Prunus* spp. - *Cornus drummondii* Eastern Ruderal Shrubland Alliance	
Baccharis halimifolia Ruderal Shrubland (CEGL004657)	9
Rubus (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland (CEGL004732)	7
2.C. Shrub & Herb Wetland Subclass	
2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland Formation	
2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division	
M061. Eastern North American Cool Temperate Seep Macrogroup	
G182. Central Interior Seepage Fen Group	
A3390. *Carex lurida* - *Carex interior* - *Parnassia grandifolia* Southern Interior Seepage Fen Alliance	
Carex lurida - *Carex leptalea* - *Parnassia grandifolia* - *Juncus brachycephalus* - (*Xyris tennesseensis*) Seepage Fen (CEGL004161)	0
M069. Eastern North American Marsh, Wet Meadow & Shrubland Macrogroup	
G125. Eastern North American Freshwater Marsh Group	
A3669. *Peltandra virginica* - *Pontederia cordata* - *Sagittaria* spp. Marsh Alliance	
Pontederia cordata - *Peltandra virginica* Marsh (CEGL004291)	2

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
G167. Eastern North American Shrub Swamp Group	
A3685. *Alnus* spp. - *Salix* spp. Lakeshore & Depression Shrub Swamp Alliance	
Alnus serrulata Southeastern Shrub Swamp (CEGL008474)	12
A0795. *Arundinaria gigantea* Shrub Swamp Alliance	
Arundinaria gigantea ssp. *gigantea* Shrub Swamp (CEGL003836)	2
A3670. *Cephalanthus occidentalis* - *Decodon verticillatus* Shrub Swamp Alliance	
Cephalanthus occidentalis / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp (CEGL002191)	6
M880. Eastern North American Wet Shoreline Vegetation Macrogroup	
G755. Eastern North American Riverine Wetland Vegetation Group	
A1657. *Justicia americana* Riverbed Alliance	
Justicia americana Riverbed Vegetation (CEGL004286)	1
A0948. *Salix nigra* Riverscour Scrub Alliance	
Salix nigra Wet Shrubland (CEGL003901)	7
G756. Eastern North American Wet Shoreline Vegetation Group	
A1881. *Polygonum* spp. Wet Meadow Shoreline Alliance	
Polygonum (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290)	5
Polygonum amphibium - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699)	3
Polygonum spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555)	3
M303. Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup	
G557. Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group	
A3412. *Juncus effusus* - *Andropogon glomeratus* var. *pumilus* - *Saccharum giganteum* Ruderal Marsh Alliance	
Juncus effusus Marsh (CEGL004112)	6
Scirpus cyperinus - *Panicum rigidulum* - *Rhynchospora corniculata* - (*Dulichium arundinaceum*) Marsh (CEGL004719)	1
Scirpus cyperinus Southern Ruderal Marsh (CEGL003866)	0
A3409. *Ligustrum sinense* - *Tamarix* spp. Southern Ruderal Wet Shrubland Alliance	
Ligustrum sinense Ruderal Wet Shrubland (CEGL003837)	1
A4151. *Vitis rotundifolia* - *Ampelopsis arborea* - *Campsis radicans* Ruderal Vine-Shrubland Alliance	
Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620)	3
2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division	
M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup	
G188. Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh Group	
A3404. *Zizaniopsis miliacea* - *Zizania aquatica* - *Pontederia cordata* Southeastern Floodplain Marsh Alliance	
Zizaniopsis miliacea Coastal Plain Slough Marsh (CEGL004139)	6

Table 11 (continued). List of vegetation associations for the Natchez Trace Parkway vegetation mapping project, positioned hierarchically in U.S. National Vegetation Classification.

[The number of field observations from vegetation plots and accuracy assessment sites are included in the right column. Field observations include vegetation plots and AA sites (as per the primary classification call). Vegetation associations with likely anthropogenic origin are underlined. USNVC, U.S. National Vegetation Classification; Obs, Observation; CEPS, Community Element Park Special; CEGL, Community Element Global]

USNVC Hierarchical Code and Name	Obs
5. AQUATIC VEGETATION CLASS	
5.B. Freshwater Aquatic Vegetation Subclass	
5.B.2. Temperate & Boreal Freshwater Aquatic Vegetation Formation	
5.B.2.Na. North American Freshwater Aquatic Vegetation Division	
M108. Eastern North American Freshwater Aquatic Vegetation Macrogroup	
G114. Eastern North American Freshwater Aquatic Vegetation Group	
A4064. *Nymphaea odorata* - *Nuphar* spp. - *Brasenia schreberi* Aquatic Vegetation Alliance	
Hydrocotyle ranunculoides - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305)	1
Nelumbo lutea Aquatic Vegetation (CEGL004323)	4
Nuphar advena - *Nymphaea odorata* Aquatic Vegetation (CEGL002386)	2
A4066. *Potamogeton* spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation Alliance	
Potamogeton spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation (CEGL004725)	3
M401. North American Temperate Ruderal Aquatic Vegetation Macrogroup	
G595. Eastern North American Ruderal Aquatic Vegetation Group	
A4219. *Eichhornia crassipes* - *Alternanthera philoxeroides* Ruderal Aquatic Vegetation Alliance	
Alternanthera philoxeroides Ruderal Aquatic Vegetation (CEGL003858)	0
Eichhornia crassipes Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671)	3
Ludwigia peploides Aquatic Vegetation (CEGL007835)	1
6. OPEN ROCK VEGETATION CLASS	
6.B. Temperate & Boreal Open Rock Vegetation Subclass	
6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation Formation	
6.B.1.Na. Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation Division	
M111. Eastern North American Cliff & Rock Vegetation Macrogroup	
G840. Appalachian Cliff & Rock Vegetation Group	
A2076. *Pellaea atropurpurea* - *Cystopteris bulbifera* Appalachian Circumneutral Cliff Alliance	
Cystopteris bulbifera - (*Asplenium rhizophyllum*) Cliff Sparse Vegetation (CEGL004394)	1
A3915. Appalachian Wet Cliff Alliance	
Heuchera parviflora var. *parviflora* - *Trichomanes boschianum* - *Thalictrum mirabile* - (*Ageratina luciae-brauniae*, *Solidago albopilosa*) Cliff Vegetation (CEGL004301)	2
G841. Central Midwest-Interior Cliff & Rock Vegetation Group	
A2073. *Hydrangea arborescens* / *Heuchera villosa* Interior Circumneutral Cliff Alliance	
Hydrangea arborescens / *Impatiens* (*capensis*, *pallida*) - *Heuchera villosa* Cliff Shrubland (CEGL004708)	1

Vegetation Descriptions

All USNVC associations identified with the NATR vegetation mapping project are described in "Appendix B: Descriptions of Vegetation Associations." Edits and updates to the association vegetation descriptions were made based on the data analysis following plot classification. These descriptions list the position of each vegetation association hierarchically placed in the USNVC, followed by a concept summary, information about environmental characteristics, vegetation, important species, classification issues, relation to other classification systems, and distribution. Most fields in the descriptions have separate sections with information on the global characteristics (prefaced by "Global" and referring to its range-wide characteristics) and on the local characteristics (prefaced by "Natchez Trace Parkway" and referring to its Parkway-specific characteristics).

The global information applies to the vegetation association across its entire range; this information has been gathered from scientific literature and other field data and is stored in NatureServe's central database. For the descriptive text fields, global information (listed as "Global") can be thought of as an average or modal expression of a relatively natural stand of the association throughout its range. The local information (listed as "Natchez Trace Parkway") is derived from data from the classification phases of the NATR vegetation mapping project, which consisted mostly of plot data from the plots sampled before and during this project; however, some information from AA field data and less formal field observations is also included.

For each USNVC association, Local and Global fields describe the Environment, Vegetation, and Range. In the local descriptive text for NATR, the milepost markers for every 5 miles were referenced to indicate general areas along NATR where associations were known. The general location by milepost markers was included in the field called "Natchez Trace Parkway Range". In addition, there are fields pertaining to the geographic distribution of the association, including the U.S. Department of Agriculture Forest Service ecoregions (section and subsection). Additional fields in the database were updated as needed, including "Other Noteworthy Species" (such as rare or exotic taxa) and "Summary". For each association, the most abundant species were listed according to stratum (such as canopy and subcanopy) and lifeform (such as forb and graminoid).

Vegetation associations without plot data—including those associations that were discovered after the plot sampling was finished—do have descriptions, but any local information is based on general or cursory field observations or notes on abundant species. These data were drawn from quick plots taken during the 2014 map reconnaissance, from 2014 map reconnaissance notes, and 2015 AA field data; not from more comprehensive vegetation plot data. In "Appendix B: Descriptions of Vegetation Associations," all the USNVC associations documented for NATR are described, with both the "Global" and the "Natchez Trace Parkway" information.

A field key to vegetation associations of NATR is provided in "Appendix C: Field Key to Vegetation Associations," which can be used in concert with the vegetation descriptions. A listing of plant species identified from the vegetation plot samples and AA sites are provided in "Appendix D: List of Plant Species."

Vegetation Mapping

Methods

Mapping vegetation of the Natchez Trace Parkway (NATR) involved five primary steps: (1) preliminary map classification with a vegetation primer, (2) field reconnaissance, (3) map classification, (4) aerial image interpretation and mapping, and (5) database development. Although these steps proceeded sequentially, they overlap to some degree.

Preliminary Map Classification

Prior to field reconnaissance, mappers needed to become familiar with the vegetation types expected to exist in NATR. To accomplish this for the Parkway, the mappers met with vegetation classifiers, Parkway staff, and local experts and reviewed the vegetation classification and the field key to vegetation associations that had been previously developed of the Parkway for the National Park Service (NPS). During this meeting, each vegetation association was discussed. The discussion included what defines each association, where each association exists in the Parkway, which other associations are likely to be confused with each association, and any other aspects that could help define each association location or signature on the landscape.

The mappers formed an initial map classification crosswalked (cross-referenced) to the vegetation classification to promote continuity from the classifiers to the mappers at the onset of the vegetation mapping process. Additionally, this preliminary step put in the hands of the mappers the foundations of a working map classification, one that would go through many updates and revisions throughout the vegetation mapping process.

Field Reconnaissance

Field reconnaissance efforts were initiated to prepare for mapping vegetation types in NATR. Mappers visited numerous locations along much of the Parkway, joined by a classifier to assist in field classification of vegetation. The mappers compared, with the aid of weatherized field computers, the ground conditions to their signatures (appearances) on the digital 4-band (true-color and color infrared) aerial imagery set that was obtained for the NATR vegetation mapping project. Vegetation types were determined by a vegetation field key and the classifier. This process was necessary, as Hershey and Befort (1995) explain, because color infrared photography (or imagery) is not consistent among image sets to allow a species to be depicted precisely. Sun angle, light intensity, shadow, exposure, and difference in digital post-capture processing can all affect image appearance. Differences in site history, hydrologic regime, intraspecific variation, and seasonality can all vary the appearance of a single species across a single image. Hence, ground exploration of the imagery is a critical endeavor. The field reconnaissance effort at the Parkway helped correlate the aerial imagery signatures of the vegetation with the vegetation classification on the ground (Figure 18).

Field reconnaissance also allowed mappers to become more familiar with the local ecology of vegetation types, which is always important when applying ecologic concepts to mapping. Where mappers discovered limitations to interpreting vegetation types using digital aerial imagery, environmental models were tested to determine if vegetation types could be consistently separated by

environmental elements. In NATR, the history of disturbance (both man-made and natural) that pervades the Parkway has prevented geospatial-based models from being a reliable tool for aerial imagery interpretation.



Figure 18. Field reconnaissance to correlate aerial image signatures with ground vegetation for the Natchez Trace Parkway vegetation mapping project.

The mappers and classifier performed field reconnaissance at NATR during 2014. The field efforts for mapping were completed during three trips in 2014. The first trip, in May, included the classification meeting and focused on the northern half of the Parkway; the second trip, in June, focused on the southern half of the Parkway; and the third trip, in August, examined the entire Parkway and included the verification process. The mappers and classifier worked as a team, rather than as individuals, to ensure correct assessment of vegetation types and, subsequently, to promote correct classification during mapping. The team became familiar with the vegetation and local ecology as they discussed the structural, floristic, and habitat characteristics of the vegetation encountered in the field and compared the vegetation types to their appearance in the imagery. Through this process, the team built an understanding of how to map the vegetation types, established a working map classification with mapping protocols, and helped the classifier to refine the vegetation classification and the field key to vegetation associations. A representative sample of

the natural landscape of NATR was visited by the mappers during the field reconnaissance, and much variability in the vegetation types was realized. In some cases, the classifier determined that some vegetation types existed that had not been represented by the vegetation plots. These vegetation types were accordingly added to the vegetation and map classifications. During the three field reconnaissance efforts, 22 vegetation associations new to the Parkway were identified.

Orthoimagery mosaic sets of the 4-band digital aerial imagery collected for the NATR vegetation mapping project allowed for easy in-field use resulting from their much smaller file sizes, while maintaining the majority of the imagery signature. This imagery was accessed using ArcMap in ArcGIS (Version 10.2, Esri), which also allowed the mapping team to digitally collect notes on vegetation and imagery signatures in the field. Field notes might consist of the map-class assignment, if known. Other notes, to promote proper perspective of species composition (e.g., heterogeneous versus monotypic forest stand), might include comments regarding significant species.

Verification

Between the second and third field reconnaissance efforts, areas of NATR with both familiar and novel signatures were mapped. The 4-band digital aerial imagery from fall 2011 was interpreted by the mappers, who applied the mapping conventions established from the earlier field reconnaissance efforts. During the third field reconnaissance effort, the mappers and classifier visited 120 sites to verify that the mapping was correct and that the field key to vegetation associations functioned correctly. These locations were chosen in an attempt to cover the suite of vegetation types encountered across the Parkway's 715 kilometer extent. The vegetation field key, map classification, and mapping conventions were adjusted as needed.

Specific map verification sites were selected in the field during the third field reconnaissance effort. Locations of the individual map verification sites are shown in Figure 19. The mappers and classifier collected coordinate location information using field computers equipped with global positioning system (GPS) in conjunction with the digital aerial imagery. A field key to vegetation associations of NATR (an August 2014 draft) was used to determine the vegetation association of the area greater than a minimum mapping unit (MMU). The vegetation association was compared to the map class assigned by the mappers, and an electronic data sheet was completed for each verification site. These data were entered into a feature-class layer with relate tables and incorporated into the geodatabase for the NATR vegetation mapping project. The field data were also imported into a NPS PLOTS version 4.0 (National Park Service 2015) database for the mapping project.

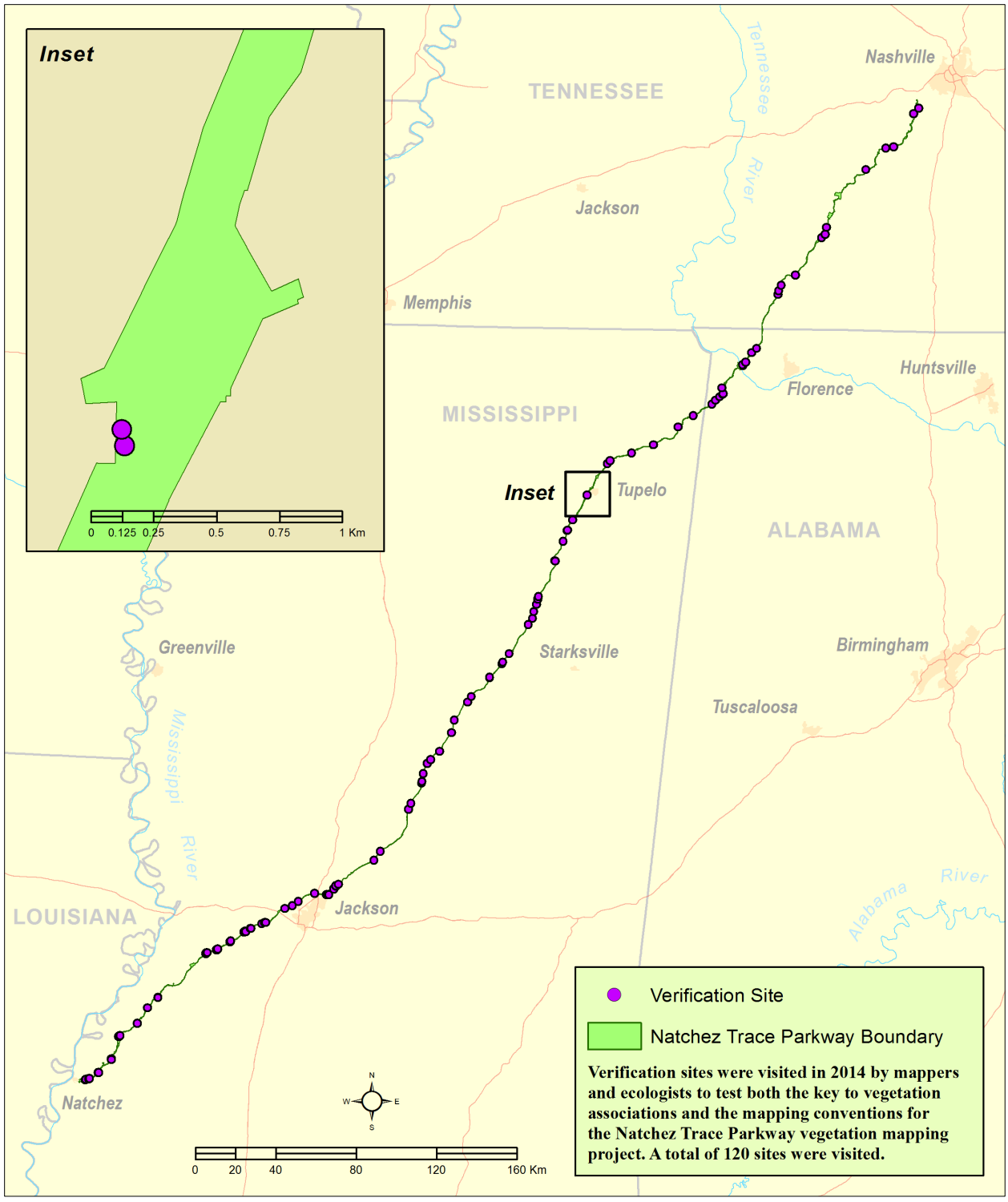


Figure 19. Locations of verification sites for the Natchez Trace Parkway vegetation mapping project.

Map Classification

A map class represents a definable feature (e.g., a vegetation type, a nonvegetated feature, an anthropogenic area) that can be consistently distinguished on aerial imagery and/or by use of an environmental model. The set of map classes that represents all the mapped features defines the map classification. The map classification and protocols that define the mappable features are based on existing classification systems. All map classes for the NATR vegetation mapping project, except those representing open water types, were linked to the U.S. National Vegetation Classification (USNVC) as identified by NatureServe. For natural (including ruderal) vegetation, map classes were linked to natural types in the USNVC at the finest level, association. For cultural vegetation, map classes were linked to cultural types in the USNVC at the lowest applicable level.

After a draft of the map classification was developed, a "mapping tree" was created to facilitate the mapping process (Figure 20). A mapping tree is a diagram that divides the map classes into logical groups (e.g., Hardwood Forest, Herbaceous Wetland, Shrub Dominated) and then further divides the groups into subgroups (e.g., Grass Dominated, Agriculture, Oak Upland), with a final dichotomous tree of choices among the similar map classes in each subgroup. The choices in a mapping tree are meant to present the mappers with a limited and consistent set of options as they map and to remind the mappers of possible alternative map classes to consider.

To develop map-class names, for those map classes representing a single vegetation association in the USNVC, the association's colloquial name was used (e.g., East Gulf Coastal Plain Beech Floodplain Forest). For those map classes representing more than one association in the USNVC, a comparable name (e.g., the Northern Chestnut Oak Forest map class for the collective associations of Lower Piedmont Chestnut Oak Forest and the Interior Low Plateau Chestnut Oak - Mixed Oak Forest) was derived. For those map classes representing cultural vegetation, either the colloquial name at the lowest level mapped in the USNVC (e.g., Loblolly Pine Plantation) was used or a generic name (e.g., Developed Area) was derived. For those map classes representing nonvegetation features, a generic name (e.g., Open Water Lake) was derived.

Throughout the project, the map classification remained fluid. Each field endeavor, including the accuracy assessment (AA) effort, revealed new information that prompted modifications to the map classes and their definitions. Revisions were also made to the map classification as the vegetation classification matured. Furthermore, as aerial images were interpreted, new problems forced redefinition, expansion, conjunction, or minor adjustment to map-class definitions. As individual map classes changed, these changes were consistently reapplied to areas that previously had been mapped to ensure consistent mapping across the Parkway.

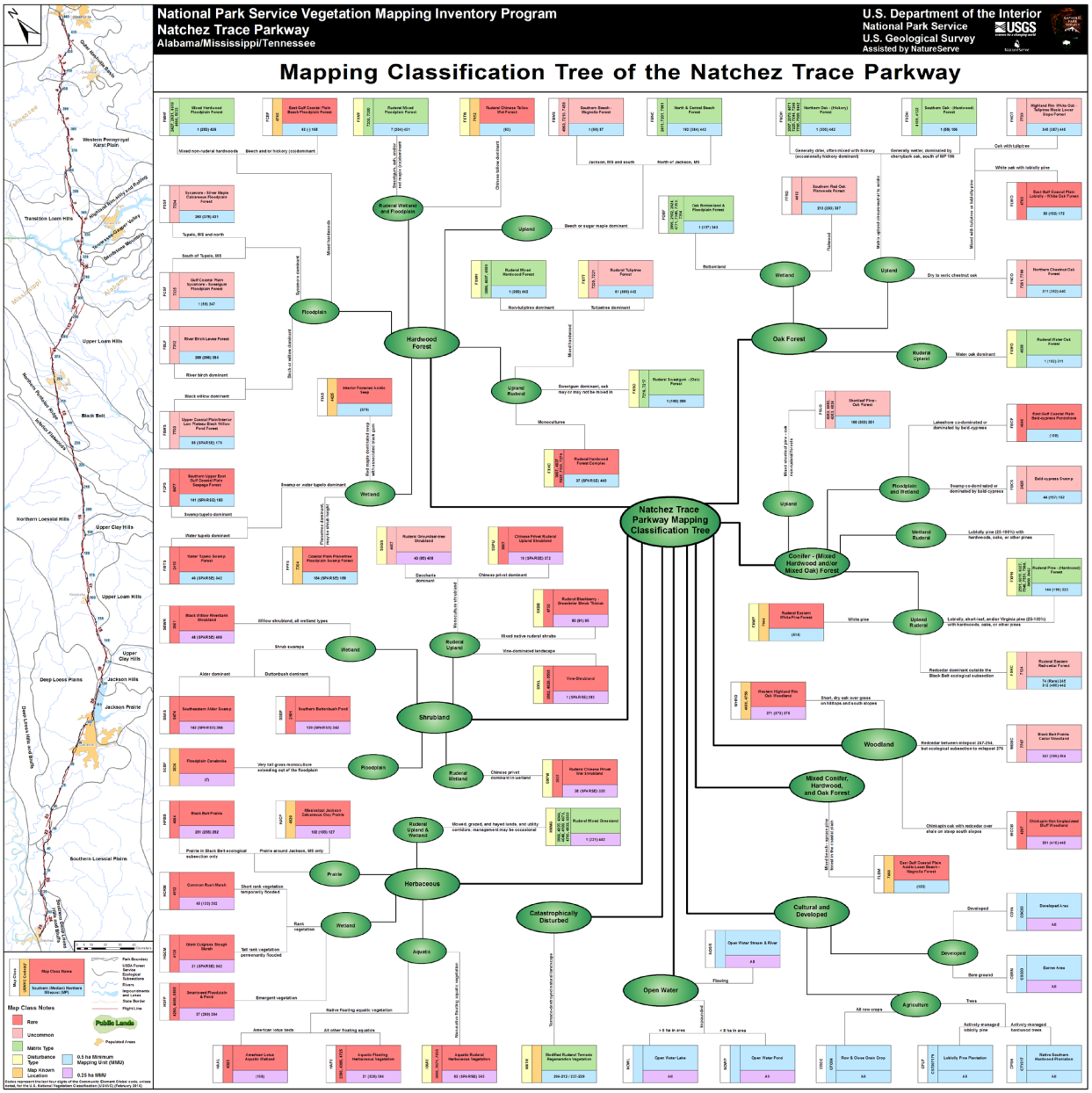


Figure 20. Vegetation mapping decision tree for the Natchez Trace Parkway vegetation mapping project.

A map-class code was derived for each map class for ease of assigning information to map polygons. Each map-class code was made using four alpha characters and was to represent an independent map class; each code was to begin with one of the following first alpha characters to represent the major physiognomic characteristic:

- F—Forest (typically >60% tree cover),
- W—Woodland (>25% tree cover),
- S—Shrubland (>25% shrub cover and <25% tree cover),

- H—Herbaceous Vegetation (>10% herbaceous cover and <25% tree and/or <25% shrub cover),
- C—Cultural (agricultural and developed landscapes),
- M—Catastrophically modified landscapes, and
- N—Non-USNVC (open water with <10% vegetation cover).

The second character was to represent one of two scenarios. The first scenario was to denote a ruderal map class with an "X", and the second scenario to denote the first significant term in the map-class name. The subsequent two scenarios were to loosely represent latter significant terms in the map-class name (e.g., FOBF for Oak Bottomland & Floodplain Forest, SXBB for Ruderal Blackberry - Greenbrier Shrub Thicket, NOWL for Open Water Lake, CRCC for Row & Close Grain Crop).

Aerial Image Interpretation and Mapping

The vegetation of NATR was mapped by staff at the U.S. Geological Survey Upper Midwest Environmental Sciences Center using digital-onscreen three-dimensional (3D) mapping systems running geographic information system (GIS) software. The mapping team performed onscreen interpretation of digital imagery that was spatially referenced in GIS. The mapping tree was used to further assist the mapping process and enforce consistent application of the map classification. A draft version of the vegetation map—a spatial-database layer—was then prepared for AA. The vegetation map was then adjusted according to the results from the analysis of the AA to meet accuracy criteria set by the NPS Vegetation Mapping Inventory (VMI) Program.

The digital aerial imagery used for the onscreen mapping was collected during the fall of 2011 using a plane-mounted digital camera. (Refer to the "Project Overview" section in this report for more information on the digital aerial imagery collected for the NATR vegetation mapping project.) The mapping for the NATR vegetation mapping project was completed by two individuals. These individuals reviewed each other's work for the quality assurance/quality control (QA/QC). The individuals used systems that incorporated passive stereo technology that uses polarized glasses to produce a 3D image on a liquid-crystal-display monitor for a computer. The stereo models were imported into Stereo Analyst for ArcGIS (ERDAS, Inc.) for 3D viewing and editing.

Mapping was completed during fall 2014 to spring 2015. A mapper would map a single flight line and then give this draft work to the other mapper for QA/QC. The other mapper would assess the draft work for errors in mapping and return it for review and modification. Areas of high complexity could be revised more than once. This QA/QC process ensured that all portions of NATR were examined at least twice and by different individuals.

ArcGIS software was used as the GIS platform for the onscreen digital mapping. Because the 3D images were viewed directly in the GIS environment, vegetation could be mapped directly in ArcGIS. The polygon vector data were stored using an ArcGIS file geodatabase, which was projected in Universal Transverse Mercator, Zone 16 North, by using the North American Datum of 1983.

Standard image signature characteristics were applied—including texture, color, pattern, and position in the landscape—to guide placement of polygons during mapping. In addition to image signature characteristics, mappers needed to understand the environmental distribution of the vegetation types across the landscape to help them identify those vegetation types and properly place polygon boundaries. For each polygon, the appropriate codes for map classes were applied.

Many supplemental imagery and datasets were also used by the mappers to visualize and understand the landscape. These layers increased the mappers' ability to understand historical landscape change and use, determine wet and dry areas, and better visualize conifers. The supplemental imagery and datasets included digital aerial imagery and field data from the field reconnaissance efforts and vegetation plot and verification site data.

The NPS VMI Program's standard MMU of 0.5 hectares (ha) was applied to mapping forest and cultural types. For woodland, shrubland, and herbaceous vegetation types, as well as nonvegetated open water, a MMU of 0.25 ha was applied. This smaller MMU was applied to woodland types because they were comparatively rare throughout NATR. The smaller MMU was also applied to shrubland and herbaceous vegetation types because of their frequent interface with the Parkway's road system. Furthermore, when forest types represented by the same map class were intersected by road structures, a MMU of 0.25 ha was applied to each side of the road to reach at least a 0.5 ha MMU collectively.

An allowance was also made for polygons that represent vegetation units crossing outside the Parkway boundary—and there are many—to be mapped less than the MMU if the vegetation continued across the boundary, was contiguous, and covered at least the standard MMU for that map class. In these instances, map classes with a 0.5 ha MMU were mapped down to 0.1 ha, and map classes with a 0.25 ha MMU were mapped down to 0.05 ha. For example, a 0.18 ha polygon of the Northern Oak - (Hickory) Forest (FNOH) map class would be mapped inside the boundary if there was at least 0.32 ha of contiguous connected FNOH outside the boundary.

Database Development

At this stage, the map layer would have only map-attribute codes assigned to each polygon. To assign meaningful information to each polygon (e.g., map-class names and links to USNVC types), a feature-class table and other supportive tables were produced and ArcGIS was used to relate the tables of polygon information within a geodatabase. A geodatabase provides access to a variety of interrelated datasets, is expandable, and can equip resource managers and researchers with a powerful GIS tool. The geodatabase developed for the NATR vegetation mapping project includes many feature-class layers produced from this project, including the map layer, vegetation sample plots, map verification sites, AA sites, aerial image locations, and project boundary extent. All geospatial products for the NATR vegetation mapping project have been projected in Universal Transverse Mercator, Zone 16 North, by using the North American Vertical Datum of 1988.

Results

Map Classes

After the AA analysis, 63 map classes represent NATR; 59 of the 63 map classes represent vegetation types in the USNVC. At the time of mapping, 71 map classes existed to map the Parkway, of which 67 map classes represented vegetation types in the USNVC. The AA study determined that confusion in mapping existed among some map classes; these map classes were listed with accuracy levels <80% (in the 90% confidence interval), as set by the NPS VMI Program. Map classes with low accuracy were examined for consistent sources of error and then the Parkway staff was consulted to determine if map classes should be merged to reduce error rates. The map classes with low accuracies were merged with the map class(es) that they were most often confused with during the mapping, unless the lower accuracy was accepted by the Parkway. Various reasons are recognized for where confusion in mapping existed among the map classes, including a breakdown of the mapping tree or ecological mapping conventions, inconsistent signatures on the aerial imagery across and among map classes, and disagreement in classification between field reconnaissance and AA. Further details regarding the mapping confusion are provided in the "Accuracy Assessment" section of this report and in individual map-class descriptions in "Appendix E: Descriptions of Map Classes." These descriptions also explain the link among map classes and the vegetation types they represent. Ground photos showing representations of the map classes are provided where possible.

A total of 54 map classes represent 114 vegetation associations in the USNVC. From this vegetation mapping project, 122 vegetation associations in the USNVC are recognized for NATR; however, 8 associations were not directly mapped within the Parkway. Because these associations exist below the MMU across the Parkway and are otherwise integrated into other overarching map classes in no consistent manner, the associations are not represented by any one map class. Of the 54 map classes representing vegetation associations, 34 represent a single association (when it exists above a MMU), 13 represent two or three associations mapped together, and 7 represents four or more associations mapped together.

Nine map classes are not specifically tagged to natural vegetation types in the USNVC. Among these nine map classes, five represent cultural types in the USNVC. Of these five map classes, two represent developed areas and three represent agricultural landscapes, including agroforestry. One of the remaining four map classes represents natural landscapes that had undergone catastrophic disturbance from tornadoes only a few months prior to the time of aerial imagery collection—the classification placement in the USNVC could not be established for these areas. The three remaining map classes represent nonvegetated water (non-USNVC).

The map classification for the NATR vegetation mapping project is listed in Tables 12 and 13. Table 12 lists the map classification from a map class perspective and lists the vegetation types in the USNVC that are assigned to each map class. Table 13 lists the map classification from a vegetation classification perspective and lists how the map classes relate to the USNVC in hierarchical order. Note that map classes representing more than one vegetation type are listed multiple times in Table 13 and are noted with an asterisk (*).

Table 12. Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Oak & Conifer Woodland	
WBBC - Black Belt Prairie Cedar Woodland	*Juniperus virginiana* var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland (CEGL007747)
WCOB - Chinquapin Oak Unglaciated Bluff Woodland	*Quercus muehlenbergii* - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland (CEGL004267)
WHRO - Western Highland Rim Oak Woodland	*Quercus stellata* / *Viburnum rufidulum* / *Schizachyrium scoparium* - (S*orghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686)
	Quercus marilandica / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756)
Yellow Pine - Oak/Beech Forest	
FSLO - Shortleaf Pine - Oak Forest	*Pinus echinata* - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050)
	Pinus echinata - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052)
	Pinus echinata - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053)
	Pinus (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834)
FLWO - East Gulf Coastal Plain Loblolly - White Oak Forest	*Pinus taeda* - *Quercus alba* / *Chasmanthium sessiliflorum* Forest (CEGL004763)
FLBM - East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest	*Fagus grandifolia* - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest (CEGL007460)
Northern Oak - (Hardwood) Forest	
FNCO - Northern Chestnut Oak Forest	*Quercus prinus* - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261)
	Quercus prinus - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700)
FNOH - Northern Oak - (Hickory) Forest	*Quercus alba* - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067)
	Quercus alba - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070)
	Acer barbatum - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671)
	Quercus alba - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225)
	Quercus falcata - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest (CEGL007244)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Quercus falcata - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246)
	Quercus alba - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795)
	Quercus muehlenbergii - *Quercus shumardii* - *Carya* (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808)
	Quercus shumardii - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442)
FHOT - Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest	
	Quercus alba - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest (CEGL007709)
Southern Oak - (Hardwood) Forest	
FSOH - Southern Oak - (Hardwood) Forest	
	Quercus pagoda - *Quercus nigra* Forest (CEGL004109)
	Liquidambar styraciflua - *Carya illinoinensis* - *Quercus nigra* Loess Bluff Forest (CEGL004122)
Beech - Hardwood Forest	
FBNC - Northern & Central Beech Forest	
	Fagus grandifolia - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
	Fagus grandifolia - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)
	Fagus grandifolia - *Quercus alba* / *Cornus florida* Forest (CEGL007881)
FBMS - Southern Beech - Magnolia Forest	
	Fagus grandifolia - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963)
	Fagus grandifolia - *Quercus alba* - *Liquidambar styraciflua* / *Magnolia grandiflora* / *Smilax pumila* Forest (CEGL007210)
	Fagus grandifolia - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458)
Ruderal Conifer - (Hardwood) Forest	
FXRC - Ruderal Eastern Red-cedar Forest	
	Juniperus virginiana var. *virginiana* - (*Quercus* spp.) Ruderal Forest (CEGL007124)
FXWP - Ruderal Eastern White Pine Forest	
	Pinus strobus Ruderal Forest (CEGL007944)
FXPN - Ruderal Pine - (Hardwood) Forest	
	Pinus virginiana Ruderal Forest (CEGL002591)
	Pinus taeda / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011)
	Pinus echinata Ruderal Forest (CEGL006327)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Pinus taeda - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Ruderal Wet Forest (CEGL007546)
	Pinus taeda - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551)
	Pinus taeda - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560)
	Pinus taeda - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450)
	Pinus taeda - *Liquidambar styraciflua* Ruderal Forest (CEGL008462)
Ruderal Hardwood Forest	
FXHC - Ruderal Hardwood Forest Complex	
	Paulownia tomentosa Ruderal Woodland (CEGL003687)
	Melia azedarach Ruderal Forest [Park Special] (CEPS004837)
	Triadica sebifera Ruderal Forest (CEGL007037)
	Ailanthus altissima Ruderal Forest (CEGL007191)
	Robinia pseudoacacia Ruderal Forest (CEGL007279)
FXMH - Ruderal Mixed Hardwood Forest	
	Gleditsia triacanthos - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686)
	Celtis (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697)
	Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809)
FXSO - Ruderal Sweetgum - (Oak) Forest	
	Liquidambar styraciflua Ruderal Forest (CEGL007216)
	Liquidambar styraciflua - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217)
FXTT - Ruderal Tuliptree Forest	
	Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220)
	Liriodendron tulipifera - *Quercus* spp. Ruderal Forest (CEGL007221)
FXWO - Ruderal Water Oak Forest	
	Quercus nigra Ruderal Forest (CEGL004638)
Oak Bottomland & Floodplain Forest	
FFRO - Southern Red Oak Flatwoods Forest	
	Quercus falcata Wet Flatwoods Forest (CEGL004412)
FOBF - Oak Bottomland & Floodplain Forest	
	Quercus michauxii - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099)
	Quercus phellos - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102)
	Quercus lyrata - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Quercus phellos - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771)
	Quercus laurifolia / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348)
	Liquidambar styraciflua - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353)
	Quercus pagoda - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354)
Hardwood Bottomland & Floodplain Forest	
FCBF - East Gulf Coastal Plain Beech Floodplain Forest	
	Fagus grandifolia - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest (CEGL004745)
FBLF - River Birch Levee Forest	
	Betula nigra - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest (CEGL007312)
FMHF - Mixed Hardwood Floodplain Forest	
	Fraxinus pennsylvanica - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427)
	Acer saccharinum - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431)
	Quercus texana - *Celtis laevigata* - *Ulmus* (*americana, crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619)
	Acer negundo - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690)
	Acer negundo Ruderal Floodplain Forest (CEGL005033)
FCSF - Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest	
	Platanus occidentalis - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest (CEGL007335)
FSSF - Sycamore - Silver Maple Calcareous Floodplain Forest	
	Platanus occidentalis - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Floodplain Forest (CEGL007334)
FBWS - Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest	
	Salix nigra - *Acer* (*rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest (CEGL007703)
Swamp Forest	
FBCP - East Gulf Coastal Plain Bald-cypress Pondshore	
	Taxodium distichum East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)
FBCS - Bald-cypress Swamp	
	Taxodium distichum / *Lemna minor* Floodplain Forest (CEGL002420)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
FWTS - Water Tupelo Swamp Forest	*Nyssa aquatica* Swamp Forest (CEGL002419)
FCPS - Southern Upper East Gulf Coastal Plain Seepage Forest	*Nyssa biflora* - *Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana* - *Viburnum nudum* Swamp Forest (CEGL008477)
FPFS - Coastal Plain Planertree Floodplain Swamp Forest	*Planera aquatica* Floodplain Forest (CEGL007394)
FIAS - Interior Forested Acidic Seep	*Acer rubrum* var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest (CEGL004425)
Ruderal Hardwood Flooded Forest	
FXMF - Ruderal Mixed Floodplain Forest	*Liquidambar styraciflua* - (*Liriodendron tulipifera*) Ruderal Wet Forest (CEGL007330)
	Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest (CEGL007380)
FXTW - Ruderal Chinese Tallow Wet Forest	*Triadica sebifera* Ruderal Wet Forest (CEGL007412)
Herbaceous Prairie	
HPBB - Black Belt Prairie	*Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland (CEGL004664)
HJCP - Mississippi Jackson Calcareous Clay Prairie	*Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland (CEGL004020)
Ruderal Shrubland	
SXBB - Ruderal Blackberry - Greenbrier Shrub Thicket	*Rubus* (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland (CEGL004732)
SXGS - Ruderal Groundsel-tree Shrubland	*Baccharis halimifolia* Ruderal Shrubland (CEGL004657)
SXPU - Ruderal Chinese Privet Upland Shrubland	*Ligustrum sinense* Ruderal Upland Shrubland (CEGL003807)
SXVL - Ruderal Vine-Shrubland	*Pueraria montana* var. *lobata* Ruderal Vine-Shrubland (CEGL003882)
	Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620)
	Wisteria sinensis Ruderal Vine-Shrubland (CEGL008568)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Ruderal Herbaceous	
HXMG - Ruderal Mixed Grassland	*Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland Alliance (A3321)
	Scirpus cyperinus Southern Ruderal Marsh (CEGL003866)
	Rhus copallinum - *Andropogon virginicus* Ruderal Grassland (CEGL004035)
	Andropogon virginicus var. *virginicus* Ruderal Grassland (CEGL004044)
	Lolium (*arundinaceum*, *pratense*) Ruderal Grassland (CEGL004048)
	Sorghum halepense Ruderal Grassland (CEGL004108)
	Imperata cylindrica Ruderal Grassland (CEGL004673)
	Paspalum notatum Ruderal Grassland (CEGL004700)
	Axonopus fissifolius Ruderal Herbaceous Vegetation [Park Special] (CEPS004833)
	Schizachyrium scoparium - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333)
Herbaceous Shoreline & Canebrake	
SCBF - Floodplain Canebrake	*Arundinaria gigantea* ssp. *gigantea* Shrub Swamp (CEGL003836)
HSFP - Smartweed Floodplain & Pond	*Polygonum* (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290)
	Polygonum amphibium - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699)
	Polygonum spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555)
Shrub & Herbaceous Marsh	
SBWR - Black Willow Riverbank Shrubland	*Salix nigra* Wet Shrubland (CEGL003901)
SSAS - Southeastern Alder Swamp	*Alnus serrulata* Southeastern Shrub Swamp (CEGL008474)
SSBP - Southern Buttonbush Pond	*Cephalanthus occidentalis* / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp (CEGL002191)
HCRM - Common Rush Marsh	*Juncus effusus* Marsh (CEGL004112)
HGCM - Giant Cutgrass Slough Marsh	*Zizaniopsis miliacea* Coastal Plain Slough Marsh (CEGL004139)
Ruderal Shrub Wetland	
SXPW - Ruderal Chinese Privet Wet Shrubland	*Ligustrum sinense* Ruderal Wet Shrubland (CEGL003837)

Table 12 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Floating Aquatic Vegetation	
HAFV - Aquatic Floating Herbaceous Vegetation	*Nuphar advena* - *Nymphaea odorata* Aquatic Vegetation (CEGL002386)
	Hydrocotyle ranunculoides - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305)
	Potamogeton spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation (CEGL004725)
HAAL - American Lotus Aquatic Wetland	*Nelumbo lutea* Aquatic Vegetation (CEGL004323)
Ruderal Floating Aquatic Vegetation	
HXAV - Aquatic Ruderal Herbaceous Vegetation	*Alternanthera philoxeroides* Ruderal Aquatic Vegetation (CEGL003858)
	Eichhornia crassipes Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671)
	Ludwigia peploides Aquatic Vegetation (CEGL007835)
Ruderal Catastrophic Vegetation	
MXTR - Modified Ruderal Tornado Regeneration Vegetation	Not applicable
Cultural Agriculture	
CPLP - Loblolly Pine Plantation	*Pinus taeda* Forest Plantation Cultural Subtype (CST007179)
CPSH - Native Southern Hardwood Plantation	Native Southern Hardwood Plantation Cultural Type (CTY017)
CRCC - Row & Close Grain Crop	Row & Close Grain Crop Cultural Formation (CFO04)
Cultural Developed	
CDVA - Developed Area	Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03)
CBRN - Barren Land	Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03)
Open Water (Non-USNVC)	
NOSR - Open Water Stream & River	Not applicable
NOWL - Open Water Lake	Not applicable
NOWP - Open Water Pond	Not applicable

*Or the classification name of the lowest hierarchical level mapped in the USNVC.

Table 13. Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
1. FOREST & WOODLAND CLASS	
1.B. Temperate & Boreal Forest & Woodland Subclass	
1.B.1. Warm Temperate Forest & Woodland Formation	
1.B.1.Na. Southeastern North American Forest & Woodland Division	
M305. Southeastern North American Ruderal Forest Macrogroup	
G029. Southeastern Exotic Ruderal Forest Group	
A3233. *Albizia julibrissin* - *Broussonetia papyrifera* - *Triadica sebifera* Ruderal Forest Alliance	
Melia azedarach Ruderal Forest [Park Special] (CEPS004837)	
FXHC*	Ruderal Hardwood Forest Complex
Triadica sebifera Ruderal Forest (CEGL007037)	
FXHC*	Ruderal Hardwood Forest Complex
G031. Southeastern Native Ruderal Forest Group	
Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809)	
FXMH*	Ruderal Mixed Hardwood Forest
A3232. *Liquidambar styraciflua* - *Celtis laevigata* - *Quercus nigra* Ruderal Forest Alliance	
Liquidambar styraciflua - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217)	
FXSO*	Ruderal Sweetgum - (Oak) Forest
Liquidambar styraciflua Ruderal Forest (CEGL007216)	
FXSO*	Ruderal Sweetgum - (Oak) Forest
Quercus nigra Ruderal Forest (CEGL004638)	
FXWO	Ruderal Water Oak Forest
A3231. *Pinus taeda* - *Liriodendron tulipifera* - *Liquidambar styraciflua* Ruderal Forest Alliance	
Pinus taeda - *Liquidambar styraciflua* Ruderal Forest (CEGL008462)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011)	
FXPN*	Ruderal Pine - (Hardwood) Forest
M008. Southern Mesic Mixed Broadleaf Forest Macrogroup	
G007. Southern Mesic Beech - Magnolia - Oak Forest Group	
A0369. *Fagus grandifolia* - *Magnolia grandiflora* Forest Alliance	
Fagus grandifolia - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458)	
FBMS*	Southern Beech - Magnolia Forest
Fagus grandifolia - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest (CEGL007460)	
FLBM	East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest
Fagus grandifolia - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963)	
FBMS*	Southern Beech - Magnolia Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	G166. Southern Mesic Beech - Oak - Mixed Deciduous Forest Group
	A3236. *Acer barbatum* - *Quercus shumardii* - *Fraxinus americana* Coastal Plain Forest Alliance
	Acer barbatum - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671)
FNOH*	Northern Oak - (Hickory) Forest
	A2059. *Fagus grandifolia* - *Quercus alba* - *Quercus nigra* Coastal Plain Forest Alliance
	Fagus grandifolia - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest (CEGL004745)
FCBF	East Gulf Coastal Plain Beech Floodplain Forest
	Fagus grandifolia - *Quercus alba* - *Liquidambar styraciflua* / *Magnolia grandiflora* / *Smilax pumila* Forest (CEGL007210)
FBMS*	Southern Beech - Magnolia Forest
	Pinus taeda - *Quercus alba* / *Chasmanthium sessiliflorum* Forest (CEGL004763)
FLWO	East Gulf Coastal Plain Loblolly - White Oak Forest
	A3234. *Quercus alba* - *Carya alba* Mesic Coastal Plain Forest Alliance
	Liquidambar styraciflua - *Carya illinoinensis* - *Quercus nigra* Loess Bluff Forest (CEGL004122)
FSOH*	Southern Oak - (Hardwood) Forest
	Quercus alba - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225)
FNOH*	Northern Oak - (Hickory) Forest
	A3235. *Quercus shumardii* - *Quercus pagoda* - *Fraxinus americana* Coastal Plain Forest Alliance
	Quercus pagoda - *Quercus nigra* Forest (CEGL004109)
FSOH*	Southern Oak - (Hardwood) Forest
1.B.2. Cool Temperate Forest & Woodland Formation	
1.B.2.Na. Eastern North American Forest & Woodland Division	
	M883. Appalachian-Interior-Northeastern Mesic Forest Macrogroup
	G020. Appalachian-Central Interior Mesic Forest Group
	A2033. *Fagus grandifolia* - *Liriodendron tulipifera* - *Carya cordiformis* Forest Alliance
	Fagus grandifolia - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
FBNC*	Northern & Central Beech Forest
	Fagus grandifolia - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)
FBNC*	Northern & Central Beech Forest
	Fagus grandifolia - *Quercus alba* / *Cornus* florida Forest (CEGL007881)
FBNC*	Northern & Central Beech Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M013. Eastern North American Ruderal Forest Macrogroup	
G032. Eastern North American Exotic Ruderal Forest Group	
A3230. *Acer platanoides* - *Ailanthus altissima* - *Pinus* spp. Exotic Ruderal Forest Alliance	
Ailanthus altissima Ruderal Forest (CEGL007191)	
FXHC*	Ruderal Hardwood Forest Complex
Paulownia tomentosa Ruderal Woodland (CEGL003687)	
FXHC*	Ruderal Hardwood Forest Complex
G030. Eastern North American Native Ruderal Forest Group	
A3227. *Juniperus virginiana* - *Pinus virginiana* - *Pinus echinata* Ruderal Forest Alliance	
Juniperus virginiana var. *virginiana* - (*Quercus* spp.) Ruderal Forest (CEGL007124)	
FXRC	Ruderal Eastern Red-cedar Forest
Pinus echinata Ruderal Forest (CEGL006327)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus strobus Ruderal Forest (CEGL007944)	
FXWP	Ruderal Eastern White Pine Forest
Pinus virginiana Ruderal Forest (CEGL002591)	
FXPN*	Ruderal Pine - (Hardwood) Forest
A3228. *Liriodendron tulipifera* - *Juglans nigra* - *Robinia pseudoacacia* Ruderal Forest Alliance	
Celtis (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697)	
FXMH*	Ruderal Mixed Hardwood Forest
Gleditsia triacanthos - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686)	
FXMH*	Ruderal Mixed Hardwood Forest
Liriodendron tulipifera - *Quercus* spp. Ruderal Forest (CEGL007221)	
FXTT*	Ruderal Tuliptree Forest
Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220)	
FXTT*	Ruderal Tuliptree Forest
Robinia pseudoacacia Ruderal Forest (CEGL007279)	
FXHC*	Ruderal Hardwood Forest Complex
M016. Southern & South-Central Oak - Pine Forest & Woodland Macrogroup	
G601. Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland Group	
A2060. *Quercus muehlenbergii* - *Acer saccharum* - *Fraxinus americana* Forest Alliance	
Quercus alba - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070)	
FNOH*	Northern Oak - (Hickory) Forest
Quercus muehlenbergii - *Quercus shumardii* - *Carya* (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808)	
FNOH*	Northern Oak - (Hickory) Forest
Quercus shumardii - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442)	
FNOH*	Northern Oak - (Hickory) Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3273. *Quercus muehlenbergii* - *Fraxinus quadrangulata* - *Juniperus virginiana* Woodland Alliance
	Juniperus virginiana var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland (CEGL007747)
WBBC	Black Belt Prairie Cedar Woodland
	Quercus muehlenbergii - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland (CEGL004267)
WCOB	Chinquapin Oak Unglaciated Bluff Woodland
	G165. Piedmont-Central Atlantic Coastal Plain Oak Forest Group
	A3294. *Quercus stellata* - *Carya* spp. - *Pinus echinata* Piedmont Woodland Alliance
	Quercus falcata - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246)
FNOH*	Northern Oak - (Hickory) Forest
	G012. Shortleaf Pine - Oak Forest & Woodland Group
	A3270. *Pinus echinata* - *Quercus falcata* Upper Coastal Plain Alliance
	Pinus (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053)
FSLO*	Shortleaf Pine - Oak Forest
	G159. South-Central Interior Oak Forest & Woodland Group
	A3288. *Quercus alba* - *Quercus falcata* - *Quercus stellata* Ozark-Ouachita Forest Alliance
	Quercus alba - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067)
FNOH*	Northern Oak - (Hickory) Forest
	A3289. *Quercus prinus* - *Quercus falcata* Forest Alliance
	Quercus prinus - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261)
FNCO*	Northern Chestnut Oak Forest
	Quercus prinus - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700)
FNCO*	Northern Chestnut Oak Forest
	A3291. *Quercus stellata* - *Quercus falcata* - *Quercus alba* Interior Low Plateau Woodland Alliance
	Quercus alba - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795)
FNOH*	Northern Oak - (Hickory) Forest
	Quercus alba - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest (CEGL007709)
FHOT	Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	Quercus falcata - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest (CEGL007244)
FNOH*	Northern Oak - (Hickory) Forest
	Quercus stellata / *Viburnum rufidulum* / *Schizachyrium scoparium* - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686)
WHRO*	Western Highland Rim Oak Woodland
	G651. South-Central Interior Oak Savanna & Barrens Group
	A3315. *Quercus marilandica* - *Quercus stellata* Clay/Loess Woodland Alliance
	Quercus marilandica / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756)
WHRO*	Western Highland Rim Oak Woodland
1.B.3. Temperate Flooded & Swamp Forest Formation	
1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest Division	
	M029. Central Hardwood Floodplain Forest Macrogroup
	G652. Silver Maple - Green Ash - Sycamore Floodplain Forest Group
	A3712. *Platanus occidentalis* - *Betula nigra* Floodplain Forest Alliance
	Platanus occidentalis - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Floodplain Forest (CEGL007334)
FSSF	Sycamore - Silver Maple Calcareous Floodplain Forest
	G673. Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group
	A3699. *Betula nigra* - *Platanus occidentalis* Appalachian-Piedmont Floodplain Forest Alliance
	Betula nigra - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest (CEGL007312)
FBLF	River Birch Levee Forest
	A3700. *Fraxinus pennsylvanica* - *Platanus occidentalis* - *Acer saccharinum* Ozark-Ouachita Floodplain Forest Alliance
	Acer negundo - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690)
FMHF*	Mixed Hardwood Floodplain Forest
	Acer saccharinum - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431)
FMHF*	Mixed Hardwood Floodplain Forest
	Fraxinus pennsylvanica - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427)
FMHF*	Mixed Hardwood Floodplain Forest
	M503. Central Hardwood Swamp Forest Macrogroup
	G044. Central Interior-Appalachian Seepage Swamp Group
	A3359. *Acer rubrum* - *Nyssa sylvatica* Ozark-Interior Seepage Forest Alliance
	Acer rubrum var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest (CEGL004425)
FIAS	Interior Forested Acidic Seep
	G654. South-Central Flatwoods & Pond Forest Group
	A3429. *Quercus phellos* - *Quercus lyrata* - *Quercus nigra* Interior Pond Forest Alliance
	Quercus phellos - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102)
FOBF*	Oak Bottomland & Floodplain Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M302. Eastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G552. Eastern North American Ruderal Flooded & Swamp Forest Group	
A4099. *Acer negundo* - *Betula nigra* / *Alliaria petiolata* Ruderal Floodplain Forest Alliance	
Acer negundo Ruderal Floodplain Forest (CEGL005033)	
FMHF*	Mixed Hardwood Floodplain Forest
1.B.3.Nb. Southeastern North American Flooded & Swamp Forest Division	
M161. Pond-cypress Basin Swamp Macrogroup	
G036. Pond-cypress Basin Swamp Group	
A0652. *Taxodium distichum* - *Taxodium ascendens* / *Panicum hemitomon* Lakeshore Swamp Forest Alliance	
Taxodium distichum East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)	
FBCP	East Gulf Coastal Plain Bald-cypress Pondshore
M310. Southeastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G762. Southeastern Exotic Ruderal Flooded & Swamp Forest Group	
A3339. *Triadica sebifera* - *Melaleuca quinquenervia* - *Schinus terebinthifolius* Ruderal Flooded & Swamp Forest Alliance	
Triadica sebifera Ruderal Wet Forest (CEGL007412)	
FXTW	Ruderal Chinese Tallow Wet Forest
G553. Southeastern Native Ruderal Flooded & Swamp Forest Group	
A3343. *Acer rubrum* - *Liriodendron tulipifera* Ruderal Flooded & Swamp Forest Alliance	
Liquidambar styraciflua - (*Liriodendron tulipifera*) Ruderal Wet Forest (CEGL007330)	
FXMF*	Ruderal Mixed Floodplain Forest
A3345. *Pinus taeda* - *Liquidambar styraciflua* Ruderal Flooded & Swamp Forest Alliance	
Pinus taeda - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Ruderal Wet Forest (CEGL007546)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560)	
FXPN*	Ruderal Pine - (Hardwood) Forest
M033. Southern Coastal Plain Basin Swamp & Flatwoods Macrogroup	
G130. Hardwood - Loblolly Pine Nonriverine Wet Flatwoods Group	
A3445. *Quercus stellata* - *Quercus falcata* Wet Flatwoods Forest Alliance	
Quercus falcata Wet Flatwoods Forest (CEGL004412)	
FFRO	Southern Red Oak Flatwoods Forest
M032. Southern Coastal Plain Evergreen Hardwood - Conifer Swamp Macrogroup	
G037. Coastal Plain Mixed Evergreen Swamp Group	
A0378. *Magnolia virginiana* - *Nyssa biflora* - *Quercus laurifolia* Swamp Forest Alliance	
Nyssa biflora - *Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana* - *Viburnum nudum* Swamp Forest (CEGL008477)	
FCPS	Southern Upper East Gulf Coastal Plain Seepage Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M031. Southern Coastal Plain Floodplain Forest Macrogroup	
G033. Bald-cypress - Tupelo Floodplain Forest Group	
A0345. *Nyssa aquatica* Swamp Forest Alliance	
Nyssa aquatica Swamp Forest (CEGL002419)	
FWTS	Water Tupelo Swamp Forest
A3594. *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* Floodplain Forest Alliance	
Planera aquatica Floodplain Forest (CEGL007394)	
FPFS	Coastal Plain Planertree Floodplain Swamp Forest
Taxodium distichum / *Lemna minor* Floodplain Forest (CEGL002420)	
FBCS	Bald-cypress Swamp
G034. Oak - Sweetgum Floodplain Forest Group	
A3625. *Liquidambar styraciflua* - *Fraxinus pennsylvanica* - *Acer rubrum* Flooded & Swamp Forest Alliance	
Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest (CEGL007380)	
FXMF*	Ruderal Mixed Floodplain Forest
Platanus occidentalis - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest (CEGL007335)	
FCSF	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest
A3628. *Quercus laurifolia* - *Quercus phellos* - *Pinus taeda* Coastal Plain Riparian Forest Alliance	
Quercus laurifolia / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348)	
FOBF*	Oak Bottomland & Floodplain Forest
A3629. *Quercus lyrata* - *Quercus phellos* - *Carya aquatica* Swamp Forest Alliance	
Quercus lyrata - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424)	
FOBF*	Oak Bottomland & Floodplain Forest
A3630. *Quercus michauxii* - *Carya laciniosa* - *Liquidambar styraciflua* Interior Floodplain Forest Alliance	
Quercus michauxii - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099)	
FOBF*	Oak Bottomland & Floodplain Forest
A3631. *Quercus michauxii* - *Quercus pagoda* Coastal Plain Floodplain Forest Alliance	
Liquidambar styraciflua - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353)	
FOBF*	Oak Bottomland & Floodplain Forest
Quercus pagoda - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354)	
FOBF*	Oak Bottomland & Floodplain Forest
A3632. *Quercus phellos* - *Quercus nigra* Coastal Plain Floodplain Forest Alliance	
Quercus phellos - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771)	
FOBF*	Oak Bottomland & Floodplain Forest

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3633. *Quercus phellos* Piedmont Floodplain Forest Alliance
	Pinus taeda - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551)
FXPN*	Ruderal Pine - (Hardwood) Forest
	G759. Southern Ash - Elm - Willow Floodplain Forest Group
	A1914. *Salix caroliniana* - *Salix nigra* Coastal Plain Swamp Forest Alliance
	Salix nigra - *Acer (rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest (CEGL007703)
FBWS	Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest
	A3709. *Ulmus americana* - *Ulmus crassifolia* - *Celtis laevigata* West Gulf Coastal Plain Floodplain Forest Alliance
	Quercus texana - *Celtis laevigata* - *Ulmus* (*americana*, *crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619)
FMHF*	Mixed Hardwood Floodplain Forest
2. SHRUB & HERB VEGETATION CLASS	
2.B. Temperate & Boreal Grassland & Shrubland Subclass	
2.B.2. Temperate Grassland & Shrubland Formation	
2.B.2.Nc. Eastern North American Grassland & Shrubland Division	
	M508. Central Interior Calcareous Scrub & Grassland Macrogroup
	G174. South-Central Patch Prairie Group
	A3889. *Andropogon gerardii* - *Panicum virgatum* - *Sporobolus clandestinus* Southeastern Patch Prairie Alliance
	Andropogon gerardii - *Schizachyrium scoparium* - *Dichanthelium scoparium* - *Rhynchospora glomerata* Grassland (CEGL004006)
N/A	
	M123. Eastern North American Ruderal Grassland & Shrubland Macrogroup
	G059. Eastern North American Ruderal Meadow & Shrubland Group
	A3934. *Poa compressa* - *Solidago nemoralis* - *Centaurea biebersteinii* Ruderal Dry Meadow & Shrubland Alliance
	Schizachyrium scoparium - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333)
HXMG*	Ruderal Mixed Grassland
2.B.2.Ne. Southeastern North American Grassland & Shrubland Division	
	M309. Southeastern Coastal Plain Patch Prairie Macrogroup
	G175. Southeastern Coastal Plain Patch Prairie Group
	A3318. *Schizachyrium scoparium* - *Sorghastrum nutans* Coastal Plain Prairie Alliance
	Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland (CEGL004664)
HPBB	Black Belt Prairie
	Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland (CEGL004020)
HJCP	Mississippi Jackson Calcareous Clay Prairie

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M307. Southeastern Ruderal Grassland & Shrubland Macrogroup	
G583. Southeastern Ruderal Grassland & Shrubland Group	
A3321. *Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland Alliance	
HXMG*	Ruderal Mixed Grassland
Andropogon virginicus var. *virginicus* Ruderal Grassland (CEGL004044)	
HXMG*	Ruderal Mixed Grassland
Axonopus fissifolius Ruderal Herbaceous Vegetation [Park Special] (CEPS004833)	
HXMG*	Ruderal Mixed Grassland
Imperata cylindrica Ruderal Grassland (CEGL004673)	
HXMG*	Ruderal Mixed Grassland
Lolium (*arundinaceum*, *pratense*) Ruderal Grassland (CEGL004048)	
HXMG*	Ruderal Mixed Grassland
Paspalum notatum Ruderal Grassland (CEGL004700)	
HXMG*	Ruderal Mixed Grassland
Rhus copallinum - *Andropogon virginicus* Ruderal Grassland (CEGL004035)	
HXMG*	Ruderal Mixed Grassland
Sorghum halepense Ruderal Grassland (CEGL004108)	
HXMG*	Ruderal Mixed Grassland
A4084. *Ligustrum* spp. Eastern Exotic Ruderal Shrubland Alliance	
Ligustrum sinense Ruderal Upland Shrubland (CEGL003807)	
SXPU	Ruderal Chinese Privet Upland Shrubland
A4082. *Pueraria montana* - *Wisteria sinensis* Exotic Ruderal Vine-Shrubland Alliance	
Pueraria montana var. *lobata* Ruderal Vine-Shrubland (CEGL003882)	
SXVL*	Ruderal Vine-Shrubland
Wisteria sinensis Ruderal Vine-Shrubland (CEGL008568)	
SXVL*	Ruderal Vine-Shrubland
A3322. *Rubus* spp. - *Prunus* spp. - *Cornus drummondii* Eastern Ruderal Shrubland Alliance	
Baccharis halimifolia Ruderal Shrubland (CEGL004657)	
SXGS	Ruderal Groundsel-tree Shrubland
Rubus (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland (CEGL004732)	
SXBB	Ruderal Blackberry - Greenbrier Shrub Thicket
2.C. Shrub & Herb Wetland Subclass	
2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland Formation	
2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division	
M061. Eastern North American Cool Temperate Seep Macrogroup	
G182. Central Interior Seepage Fen Group	
A3390. *Carex lurida* - *Carex interior* - *Parnassia grandifolia* Southern Interior Seepage Fen Alliance	
Carex lurida - *Carex leptalea* - *Parnassia grandifolia* - *Juncus brachycephalus* - (*Xyris tennesseensis*) Seepage Fen (CEGL004161)	
N/A	

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M069. Eastern North American Marsh, Wet Meadow & Shrubland Macrogroup	
G125. Eastern North American Freshwater Marsh Group	
A3669. *Peltandra virginica* - *Pontederia cordata* - *Sagittaria* spp. Marsh Alliance	
Pontederia cordata - *Peltandra virginica* Marsh (CEGL004291)	
N/A	
G167. Eastern North American Shrub Swamp Group	
A3685. *Alnus* spp. - *Salix* spp. Lakeshore & Depression Shrub Swamp Alliance	
Alnus serrulata Southeastern Shrub Swamp (CEGL008474)	
SSAS	Southeastern Alder Swamp
A0795. *Arundinaria gigantea* Shrub Swamp Alliance	
Arundinaria gigantea ssp. *gigantea* Shrub Swamp (CEGL003836)	
SCBF	Floodplain Canebrake
A3670. *Cephalanthus occidentalis* - *Decodon verticillatus* Shrub Swamp Alliance	
Cephalanthus occidentalis / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp (CEGL002191)	
SSBP	Southern Buttonbush Pond
M880. Eastern North American Wet Shoreline Vegetation Macrogroup	
G755. Eastern North American Riverine Wetland Vegetation Group	
A1657. *Justicia americana* Riverbed Alliance	
Justicia americana Riverbed Vegetation (CEGL004286)	
N/A	
A0948. *Salix nigra* Riverscour Scrub Alliance	
Salix nigra Wet Shrubland (CEGL003901)	
SBWR	Black Willow Riverbank Shrubland
G756. Eastern North American Wet Shoreline Vegetation Group	
A1881. *Polygonum* spp. Wet Meadow Shoreline Alliance	
Polygonum (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290)	
HSFP*	Smartweed Floodplain & Pond
Polygonum amphibium - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699)	
HSFP*	Smartweed Floodplain & Pond
Polygonum spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555)	
HSFP*	Smartweed Floodplain & Pond
M303. Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup	
G557. Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group	
A3412. *Juncus effusus* - *Andropogon glomeratus* var. *pumilus* - *Saccharum giganteum* Ruderal Marsh Alliance	
Juncus effusus Marsh (CEGL004112)	
HCRM	Common Rush Marsh
Scirpus cyperinus - *Panicum rigidulum* - *Rhynchospora corniculata* - (*Dulichium arundinaceum*) Marsh (CEGL004719)	
N/A	
Scirpus cyperinus Southern Ruderal Marsh (CEGL003866)	
HXMG*	Ruderal Mixed Grassland

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3409. *Ligustrum sinense* - *Tamarix* spp. Southern Ruderal Wet Shrubland Alliance
	Ligustrum sinense Ruderal Wet Shrubland (CEGL003837)
SXPW	Ruderal Chinese Privet Wet Shrubland
	A4151. *Vitis rotundifolia* - *Ampelopsis arborea* - *Campsis radicans* Ruderal Vine-Shrubland Alliance
	Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620)
SXVL*	Ruderal Vine-Shrubland
2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division	
	M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup
	G188. Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh Group
	A3404. *Zizaniopsis miliacea* - *Zizania aquatica* - *Pontederia cordata* Southeastern Floodplain Marsh Alliance
	Zizaniopsis miliacea Coastal Plain Slough Marsh (CEGL004139)
HGCM	Giant Cutgrass Slough Marsh
5. AQUATIC VEGETATION CLASS	
5.B. Freshwater Aquatic Vegetation Subclass	
5.B.2. Temperate & Boreal Freshwater Aquatic Vegetation Formation	
5.B.2.Na. North American Freshwater Aquatic Vegetation Division	
	M108. Eastern North American Freshwater Aquatic Vegetation Macrogroup
	G114. Eastern North American Freshwater Aquatic Vegetation Group
	A4064. *Nymphaea odorata* - *Nuphar* spp. - *Brasenia schreberi* Aquatic Vegetation Alliance
	Hydrocotyle ranunculoides - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305)
HAFV*	Aquatic Ruderal Herbaceous Vegetation
	Nelumbo lutea Aquatic Vegetation (CEGL004323)
HAAL	American Lotus Aquatic Wetland
	Nuphar advena - *Nymphaea odorata* Aquatic Vegetation (CEGL002386)
HAFV*	Aquatic Floating Herbaceous Vegetation
	A4066. *Potamogeton* spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation Alliance
	Potamogeton spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation (CEGL004725)
HAFV*	Aquatic Floating Herbaceous Vegetation
	M401. North American Temperate Ruderal Aquatic Vegetation Macrogroup
	G595. Eastern North American Ruderal Aquatic Vegetation Group
	A4219. *Eichhornia crassipes* - *Alternanthera philoxeroides* Ruderal Aquatic Vegetation Alliance
	Alternanthera philoxeroides Ruderal Aquatic Vegetation (CEGL003858)
HXAV*	Aquatic Ruderal Herbaceous Vegetation
	Eichhornia crassipes Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671)
HXAV*	Aquatic Ruderal Herbaceous Vegetation
	Ludwigia peploides Aquatic Vegetation (CEGL007835)
HXAV*	Aquatic Ruderal Herbaceous Vegetation

Table 13 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
6. OPEN ROCK VEGETATION CLASS	
6.B. Temperate & Boreal Open Rock Vegetation Subclass	
6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation Formation	
6.B.1.Na. Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation Division	
M111. Eastern North American Cliff & Rock Vegetation Macrogroup	
G840. Appalachian Cliff & Rock Vegetation Group	
A2076. *Pellaea atropurpurea* - *Cystopteris bulbifera* Appalachian Circumneutral Cliff Alliance	
Cystopteris bulbifera - (*Asplenium rhizophyllum*) Cliff Sparse Vegetation (CEGL004394)	
N/A	
A3915. Appalachian Wet Cliff Alliance	
Heuchera parviflora var. *parviflora* - *Trichomanes boschianum* - *Thalictrum mirabile* - (*Ageratina luciae-brauniae*, *Solidago albopilosa*) Cliff Vegetation (CEGL004301)	
N/A	
G841. Central Midwest-Interior Cliff & Rock Vegetation Group	
A2073. *Hydrangea arborescens* / *Heuchera villosa* Interior Circumneutral Cliff Alliance	
Hydrangea arborescens / *Impatiens* (*capensis*, *pallida*) - *Heuchera villosa* Cliff Shrubland (CEGL004708)	
N/A	
7. AGRICULTURAL & DEVELOPED VEGETATION	
7.A. Woody Agricultural Vegetation Cultural Subclass	
7.A.2. Forest Plantation & Agroforestry Cultural Formation	
7.A.2.1. Forest Plantation Cultural Subformation	
CGR007. Temperate & Boreal Plantation Cultural Group	
CSG005. Eastern North American Temperate Forest Plantation Cultural Subgroup	
CTY012. Native Southern Pine Plantation Cultural Type	
Pinus taeda Forest Plantation (CST007179)	
CPLP	Loblolly Pine Plantation
CTY017. Native Southern Hardwood Plantation Cultural Type	
CPSH	Native Southern Hardwood Plantation
7.B. Herbaceous Agricultural Vegetation Cultural Subclass	
7.B.1. Row & Close Grain Crop Cultural Formation	
CRCC	Row & Close Grain Crop
7.C. Herbaceous & Woody Developed Vegetation Cultural Subclass	
CDVA	Developed Area
CBRN	Barren Land
MOSAIC RUDERAL VEGETATION	
Ruderal Catastrophic Vegetation	
MXTR	Modified Ruderal Tornado Regeneration Vegetation
NON-USNVC	
Non-Vegetated Water (<1% vegetated)	
NOSR	Open Water Stream & River
NOWL	Open Water Lake
NOWP	Open Water Pond

*Map class also represents other vegetation associations.

Summary Report of the Map Layer

A summary report is provided in Table 14 of the spatial-data layer (vegetation map) by individual map class at the most detailed level of polygon attribution (map class). The table summarizes frequency of polygons, area, average polygon size, and percent map coverages for each map class.

Table 14. Frequencies of polygons and areas for map classes represented in the vegetation map layer for the Natchez Trace Parkway vegetation mapping project.

[Tally results represent the vegetation map layer at the most detailed level of map-class attribution. The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. Poly, Polygon; Freq, Frequency; ha, Hectare; Ave, Average]

Map Class Code - Name	Poly Freq	Area (ha)	Ave (ha)
Oak & Conifer Woodland			
WBBC - Black Belt Prairie Cedar Woodland	102	122.2	1.2
WCOB - Chinquapin Oak Unglaciated Bluff Woodland	3	1.6	0.5
WHRO - Western Highland Rim Oak Woodland	3	1.6	0.5
Yellow Pine - Oak/Beech Forest			
FSLO - Shortleaf Pine - Oak Forest	45	50.7	1.1
FLWO - East Gulf Coastal Plain Loblolly - White Oak Forest	8	12.7	1.6
FLBM - East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest	2	1.7	0.8
Northern Oak - (Hardwood) Forest			
FNCO - Northern Chestnut Oak Forest	195	609.5	3.1
FNOH - Northern Oak - (Hickory) Forest	2,152	4,796.7	2.2
FHOT - Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest	115	165.5	1.4
Southern Oak - (Hardwood) Forest			
FSOH - Southern Oak - (Hardwood) Forest	655	1,180.5	1.8
Beech - Hardwood Forest			
FBNC - Northern & Central Beech Forest	264	455.6	1.7
FBMS - Southern Beech - Magnolia Forest	62	63.3	1.0
Ruderal Conifer - (Hardwood) Forest			
FXRC - Ruderal Eastern Red-cedar Forest	125	87.4	0.7
FXWP - Ruderal Eastern White Pine Forest	3	2.0	0.7
FXPN - Ruderal Pine - (Hardwood) Forest	2,461	3,711.4	1.5
Ruderal Hardwood Forest			
FXHC - Ruderal Hardwood Forest Complex	14	8.6	0.6
FXMH - Ruderal Mixed Hardwood Forest	815	736.6	0.9
FXSO - Ruderal Sweetgum - (Oak) Forest	1,173	995.9	0.8
FXTT - Ruderal Tuliptree Forest	139	103.0	0.7
FXWO - Ruderal Water Oak Forest	440	388.7	0.9
Oak Bottomland & Floodplain Forest			
FFRO - Southern Red Oak Flatwoods Forest	17	28.6	1.7
FOBF - Oak Bottomland & Floodplain Forest	537	647.1	1.2

Table 14 (continued). Frequencies of polygons and areas for map classes represented in the vegetation map layer for the Natchez Trace Parkway vegetation mapping project.

[Tally results represent the vegetation map layer at the most detailed level of map-class attribution. The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. Poly, Polygon; Freq, Frequency; ha, Hectare; Ave, Average]

Map Class Code - Name	Poly Freq	Area (ha)	Ave (ha)
Hardwood Bottomland & Floodplain Forest			
FCBF - East Gulf Coastal Plain Beech Floodplain Forest	3	6.7	2.2
FBLF - River Birch Levee Forest	39	25.6	0.7
FMHF - Mixed Hardwood Floodplain Forest	202	224.8	1.1
FCSF - Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest	66	53.9	0.8
FSSF - Sycamore - Silver Maple Calcareous Floodplain Forest	43	50.8	1.2
FBWS - Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest	4	1.6	0.4
Swamp Forest			
FBCP - East Gulf Coastal Plain Bald-cypress Pondshore	2	0.5	0.2
FBCS - Bald-cypress Swamp	15	10.0	0.7
FWTS - Water Tupelo Swamp Forest	12	10.7	0.9
FCPS - Southern Upper East Gulf Coastal Plain Seepage Forest	15	11.7	0.8
FPFS - Coastal Plain Planertree Floodplain Swamp Forest	4	5.1	1.3
FIAS - Interior Forested Acidic Seep	1	0.6	0.6
Ruderal Hardwood Flooded Forest			
FXMF - Ruderal Mixed Floodplain Forest	669	685.5	1.0
FXTW - Ruderal Chinese Tallow Wet Forest	1	0.2	0.2
Herbaceous Prairie			
HPBB - Black Belt Prairie	12	5.2	0.4
HJCP - Mississippi Jackson Calcareous Clay Prairie	3	3.1	1.0
Ruderal Shrubland			
SXBB - Ruderal Blackberry - Greenbrier Shrub Thicket	4	2.1	0.5
SXGS - Ruderal Groundsel-tree Shrubland	35	18.3	0.5
SXPU - Ruderal Chinese Privet Upland Shrubland	12	6.0	0.5
SXVL - Ruderal Vine-Shrubland	32	12.4	0.4
Ruderal Herbaceous			
HXMG - Ruderal Mixed Grassland	2,017	3,176.0	1.6
Herbaceous Shoreline & Canebrake			
SCBF - Floodplain Canebrake	1	0.8	0.8
HSFP - Smartweed Floodplain & Pond	22	6.8	0.3
Shrub & Herbaceous Marsh			
SBWR - Black Willow Riverbank Shrubland	13	6.6	0.5
SSAS - Southeastern Alder Swamp	16	8.0	0.5
SSBP - Southern Buttonbush Pond	5	2.0	0.4
HCRM - Common Rush Marsh	13	4.8	0.4
HGCM - Giant Cutgrass Slough Marsh	15	7.7	0.5
Ruderal Shrub Wetland			
SXPW - Ruderal Chinese Privet Wet Shrubland	14	6.8	0.5

Table 14 (continued). Frequencies of polygons and areas for map classes represented in the vegetation map layer for the Natchez Trace Parkway vegetation mapping project.

[Tally results represent the vegetation map layer at the most detailed level of map-class attribution. The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. Poly, Polygon; Freq, Frequency; ha, Hectare; Ave, Average]

Map Class Code - Name	Poly Freq	Area (ha)	Ave (ha)
Floating Aquatic Vegetation			
HAFV - Aquatic Floating Herbaceous Vegetation	12	7.4	0.6
HAAL - American Lotus Aquatic Wetland	4	1.2	0.3
Ruderal Floating Aquatic Vegetation			
HXAV - Aquatic Ruderal Herbaceous Vegetation	12	8.7	0.7
Ruderal Catastrophic Vegetation			
MXTR - Modified Ruderal Tornado Regeneration Vegetation	55	158.8	2.9
Cultural Agriculture			
CPLP - Loblolly Pine Plantation	107	37.9	0.4
CPSH - Native Southern Hardwood Plantation	6	1.1	0.2
CRCC - Row & Close Grain Crop	227	458.3	2.0
Cultural Developed			
CDVA - Developed Area	320	1,895.5	5.9
CBRN - Barren Land	18	21.2	1.2
Open Water			
NOSR - Open Water Stream & River	112	497.6	4.4
NOWL - Open Water Lake	6	28.9	4.8
NOWP - Open Water Pond	30	13.7	0.5
Totals	**13,529**	**21,655.5**	**1.6**

Brief Analysis and Discussion

General Overview of the Parkway Vegetation Map

Collectively, the spatial-database layer (vegetation map) produced for the NATR vegetation mapping project is composed of 13,529 polygons and covers 21,655.5 ha, with an average polygon size of 1.6 ha. The 54 map classes representing natural (including ruderal) vegetation in the USNVC apply to 93.5% of polygons (12,648 polygons; average size of 1.5 ha) and cover 85.6% of the Parkway (18,542.7 ha). Further broken-down, map classes representing natural vegetation in the USNVC indicate that the Parkway is 70.5% forest and woodland (15,258.7 ha), 0.3% shrubland (63.0 ha), and 14.9% herbaceous cover (3,221.0 ha). Map classes representing cultural vegetation in the USNVC apply to 5.0% of polygons (678 polygons; average size of 3.6 ha) and cover 11.1% of the Parkway (2,413.9 ha). Map classes representing nonvegetation open and flowing water (non-USNVC) apply to 1.1% of polygons (148 polygons; average size of 3.6 ha) and cover 2.5% of the Parkway (540.1 ha). Map classes representing catastrophically disturbed vegetation (non-USNVC) apply to 0.4% of polygons (55 polygons; average size of 2.9 ha) and cover 0.7% of the Parkway (158.8 ha).

Non-Ruderal Forest and Woodland

Overall, map classes representing ruderal forest associations account for 43.2% (5,840) of the mapped polygons and 31.0% (6,719.3 ha) of NATR, whereas map classes representing nonruderal forest and woodland associations account for 33.7% (4,566) of the polygons but 39.4% (8,539.5 ha) of the Parkway. This difference indicates that nonruderal forest and woodland associations are generally in larger, more homogenous and contiguous blocks, and the average area of a ruderal forest block is 1.2 ha compared to 1.9 ha for nonruderal forest and woodland map classes. These nonruderal forest and woodland coverage figures also discount the value of large blocks of contiguous forest composed of numerous different nonruderal map classes.

The major component of the nonruderal forest and woodland map classes in NATR is the Northern Oak - (Hickory) Forest (FNOH). This forest has absolute dominance of all other nonruderal forest map classes and covers four times the area of the next, most common nonruderal forest map class. This map class covers 22.1% of the Parkway (4,787.7 ha) with an average size of 2.2 ha (2,150 polygons) and a maximum polygon size of 229.4 ha. In addition to covering a large area, this map class is composed of nine USNVC associations that present the confusing and overlapping signatures of dry-mesic oak forests along the Parkway.

Ruderal Forest

The ruderal forest types are dominated by one map class: Ruderal Pine - (Hardwood) Forest (FXPN). This map class covers 17.1% (3,711.4 ha) of NATR. This map class is composed of eight USNVC associations, all dominated or codominated by loblolly pine (*Pinus taeda*). Originally, this map class was drawn to be just upland successional loblolly pine; however, the AA determined that the wet and dry ruderal loblolly pine map classes were consistently confused, necessitating the combination of the two ruderal variants This map class now covers the gambit of wet and dry ruderal loblolly pine forests and even includes some rare examples of nonruderal wet loblolly pine forest.

Shrublands

Overall, map classes representing nonruderal shrub associations account for 0.3% (35 polygons) of the mapped polygons and 0.08% (17.3 ha) of the NATR area, whereas map classes representing ruderal shrub associations account for 0.7% (97 polygons) of the polygons and 0.2% (45.7 ha) of the Parkway area.

The dominant shrub map class in NATR is the Ruderal Groundsel-tree Shrubland (SXGS). Although this map class is the most common shrub-dominated map class, it only is the 30th most-common map class along the Parkway. The SXGS map class covers 0.08% of the Parkway (18.3 ha) with an average size of 0.5 ha (35 polygons). This ruderal map class marks the noted northward progression of eastern baccharis (*Baccharis halimifolia*), a species historically limited to the coastal plain and salt-water inundated marshes.

Herbaceous Vegetation

Overall, map classes representing ruderal herbaceous associations account for 15.0% (2,029 polygons) of the mapped polygons and 14.7% (3,184.7 ha) of the NATR area, whereas map classes

representing nonruderal herbaceous associations account for 0.6% (81 polygons) of the polygons and 0.2% (36.2 ha) of the Parkway area.

Ruderal herbaceous vegetation plays a critical role at NATR. Covering 3,176.0 ha (14.7% of the Parkway), the Ruderal Mixed Grassland (HXMG) map class generally is along the entire length of the Parkway roadway and is actively maintained by the Parkway. This map class also includes pastures and hayfields along the Parkway. The pastures and hayfields are kept in active agriculture but are not specifically improved as monoculture crops. Representing seven associations and one alliance in the USNVC, the map class comprises of 2,017 polygons (1.6 ha average), many of the polygons as long and narrow corridors of managed grass.

Open Water

Although open water in NATR is relatively uncommon, open water covers 2.5% (540.1 ha) of the Parkway. The greatest majority of open water is due to the crossing at the Tennessee River, which accounts for 390.4 ha of open water. The remainder of open water is a mix of various-sized streams, rivers, ponds, and lakes scattered along the Parkway.

Cultural Vegetation

A final aspect of NATR that cannot be ignored is the cultural landscape. The cultural landscape covers 11.1% of the Parkway (2,413.9 ha) spread among 678 polygons (3.6 ha average). Although five map classes represent cultural vegetation in the USNVC, only two map classes cover a large area. The first map class is the Row & Close Grain Crop (CRCC) map class that covers 458.3 ha (2.1% of the Parkway) and is composed of intensive agriculture. The second map class is the Developed Area (CDVA) map class that covers 1,895.5 ha (8.8% of the Parkway). The CDVA map class is composed of a diverse mix of developed landscapes from remote mowed picnic areas along the Parkway to small gravel county roads to an eight-lane interstate; however, this map class, as it travels the length of the Parkway, primarily represents the roadway.

Map Layer Presentation

A sample presentation of the map layer produced for the NATR vegetation mapping project is shown in Figure 20. With NATR being a linear corridor covering 715 kilometers, map presentation in this report is limited by the scale of the Parkway. Insets are included in Figure 20 to provide examples of the details that exists in the map at a fine scale; however, with this presentation, the color symbology is generalized with map classes grouped into broader categories. These categories are the same as the bolded categories provided in Tables 12 and 14.

Detailed map polygons and their classification to the USNVC are provided in the project geodatabase and can be accessed using GIS software.

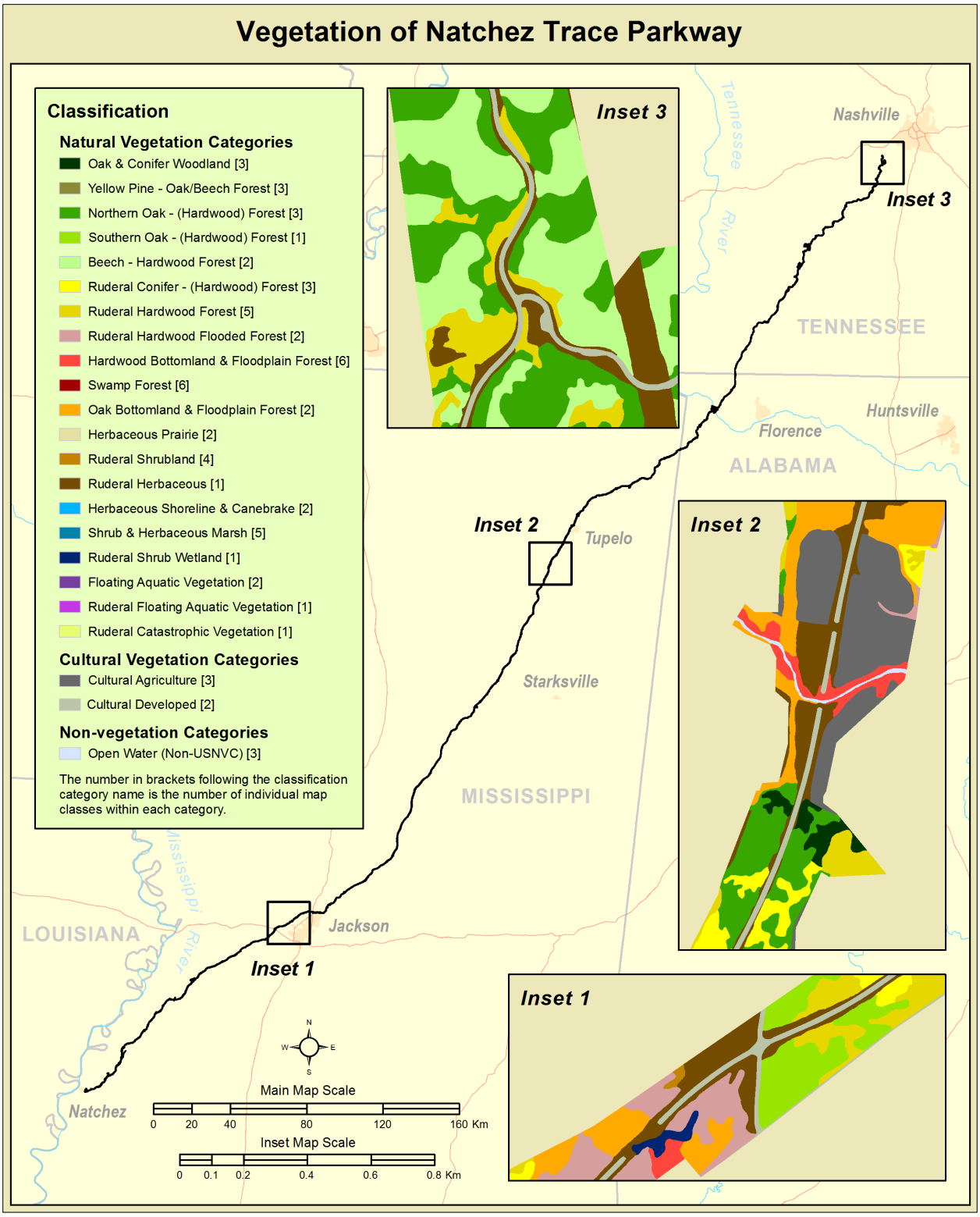


Figure 21. Vegetation map display from the Natchez Trace Parkway vegetation mapping project.

Accuracy Assessment

Methods

Purpose

The objective of an accuracy assessment (AA) is to measure the probability that a particular location has been assigned the correct vegetation class in the map layer. The process of an AA is based on field observations, and the process of mapping is based on aerial image interpretation with different perspectives of scale and observation. An AA estimates thematic (map class) errors in the data, giving data users the information needed to determine data suitability for a particular application. At the same time, data producers are able to learn more about the nature of errors in the data. Thus, the two attributes of an AA are "users' accuracy," which is the probability that the map actually represents what was classified on the ground, and "producers' accuracy," which is the probability that an AA site has been mapped correctly. An error in mapping from a users' perspective is one of commission where a map class was mapped as a vegetation type that did not exist at the assessment site. An error in mapping from a producers' perspective is one of omission; for example, a map class was not mapped as the vegetation type that existed at the assessment site. Both producers' and users' accuracies can be obtained from the same set of data by using different analyses. Errors exist when map classes are not the same as the classes observed in the field. A major assumption of an AA is that the process of mapping and the process of the assessment (e.g., the application of the classification system) are identical, so that a "false error" is not detected because of procedural differences.

Sampling Design

A stratified random sampling approach was used to select AA sites for the Natchez Trace Parkway (NATR) vegetation mapping project. All locations within the Parkway administrative boundary, excluding areas specified by Parkway personnel and/or listed as private property, were included in the sampling design. All map classes representing natural (including ruderal) vegetation associations in the U.S. National Vegetation Classification were included as the individual themes to randomly selected sites.

The number of samples needed for each map class (theme) was determined by using National Park Service (NPS) Vegetation Mapping Inventory (VMI) Program recommendations (Lea and Curtis 2010) as suggested in the following scenarios.

- Scenario A—The class is abundant, covering more than 50 hectares (ha) in total area. The map class receives the maximum sample size of 30.
- Scenario B—The class is relatively abundant, covering at least 8.33 ha but no more than 50 ha in total area. The map class receives a sample size of six-tenths of the observations per hectare of the map class (equal to one observation for every 1.67 ha of map class area). (This ratio allocates observations at a density rate equal to 30 observations per 50 ha).
- Scenario C—The class is relatively rare, covering less than 8.33 ha in total area. The map class receives five observations; the recommended minimum sample size.

For Scenario C, a class could receive less than five observations if the area was on private land or if the total area was extremely low.

Where applicable, each sampling site was buffered from the polygon boundary to ensure that the field classification of the observed area (a circular area approximately the size of the minimum mapping unit [MMU]) would not be confused with vegetation types represented in adjacent polygons. Confusion and error could have been attributed to several causes: (1) confusion if the observation area was not wholly contained within the map class, (2) positional error caused by global positioning system (GPS) error, and (3) allowable positional error included in the map data. The National Map Accuracy Standard requirement for positional accuracy of 1:24,000-scale products is 12.2 meters (m) (Federal Geographic Data Committee 1998).

The required buffer distance was calculated with the following formula:

$$\text{Buffer Distance} = \sqrt{R^2 + F^2 + M^2}$$

where R is the radius distance of the observation area, F is the expected (e.g., 90th percentile) GPS error distance, and M is the standard requirement (maximum positional error distance in the map) for positional accuracy.

The MMUs that were used to map the Parkway were 0.5 ha and 0.25 ha, depending on the map class; map-class MMUs are described in the "Vegetation Mapping" section of this report. Given these MMUs, the radius length of a circular area of 0.5 ha is 40 m and of 0.25 ha is 28 m; these values represent the value of R. The value of F is generalized to 15 m, and the value of M is generalized to 12 m. Therefore, a buffer distance of either 44 m or 34 m (depending on the MMU designated for a particular map class) was applied to the interior side of polygon boundaries. For some map-class themes that were characteristically shaped as narrow and linear in the mapping, the buffer needed to be reduced because the target number of AA sites could not otherwise be attained. The buffer size was reduced on a case-by-case basis and was reduced incrementally until the target number of sites could be selected for a particular theme; this process promoted the maximum distance in buffer while still attaining the targeted number of sites.

Multiple observation sites in a polygon were possible, provided the sites did not overlap in area (a maximum of three AA sites were allowed in any single mapped polygon). When map polygons were characteristically shaped as narrow and linear, the hard-copy maps for the field crews included boundary lines that marked the interpreted boundaries between two map classes alongside points showing locations of the AA sites. Track files, for use with handheld GPS units, of these same boundary lines were also provided to field crews for these instances.

Once the number of AA sites was determined and buffers were applied, random coordinates were generated for each map class using the Geospatial Modelling Environment suite of tools. These coordinates were projected in the Universal Transverse Mercator, Zone 16 North, by using the North American Datum of 1983. The coordinates then were provided to the field crews to upload into GPS receivers. Staff from the U.S. Geological Survey Upper Midwest Environmental Sciences Center

(UMESC) provided the field crews with 1:16,000-scale hard-copy maps displaying the locations of the AA sites overlaid on both U.S. Geological Survey digital raster graphics (DRG) and true-color aerial imagery. Polygon boundaries were shown only for those areas that were unable to accommodate the required buffer distance. Figure 21 shows the locations of AA sites that had been randomly selected for field classification to assess the accuracy of the vegetation map layer for the NATR vegetation mapping project.

Field Data Collection

Without knowing the map classifications of AA site locations, field observation data were collected by four AA field teams (field crews); each field crew consisted of a lead botanist and field assistant who were trained in AA procedures by ecologists from NatureServe and the UMESC. Each field crew navigated to the preselected AA sites using GPS and hard-copy maps.

Field crews assessed an area approximately the size of the MMU at each AA site; that is, a circle with a 40 m radius for a MMU of 0.5 ha; a circle with a 28 m radius for a MMU of 0.25 ha; or if the mapped polygon boundaries could not support a circular MMU, an area specified by polygon boundaries that was provided on hard-copy maps and GPS track files. At each AA site, field crews determined the assessment area (either 0.5 ha or 0.25 ha) by the color of point shown on their hard-copy field maps. Blue AA site indicated 40 m analysis radius (0.5 ha analysis area), red AA site indicated 28 m analysis radius (0.25 ha analysis area), and any blue or red site with corresponding polygon boundary lines indicated the analysis size and boundary. In these very narrow polygons (as indicated on the DRG and true-color maps with pink boundary lines), the field crews considered the location of the point in relation to polygon boundaries and gave more attention to vegetation along the axis of the polygon.

Within the targeted assessment area, the field crew recorded data that included: the GPS coordinate location, dominant and indicator species, environmental data, and pertinent comments. (For an example of a field form, see “Appendix F: Accuracy Assessment Form”). A field key to vegetation associations of NATR (draft versions May 7, 2015, and August 20, 2015) directed field crews to the vegetation association that best fit the AA site (Figure 22). When the association type was uncertain (e.g., a vegetation type that expressed a variation not supported by the vegetation field key or an ecotone between two vegetation types), the crew still made a single “best call” but took extra notes on the circumstance. In numerous instances, an “alternate field call” was recorded, thus providing a second vegetation type to classify a specific site. When two vegetation types were recognized, the crew was instructed to note the vegetation type that contained the most area within the radius of a MMU (for additional field collection details and procedures, see “Appendix G: Accuracy Assessment Field Manual”).

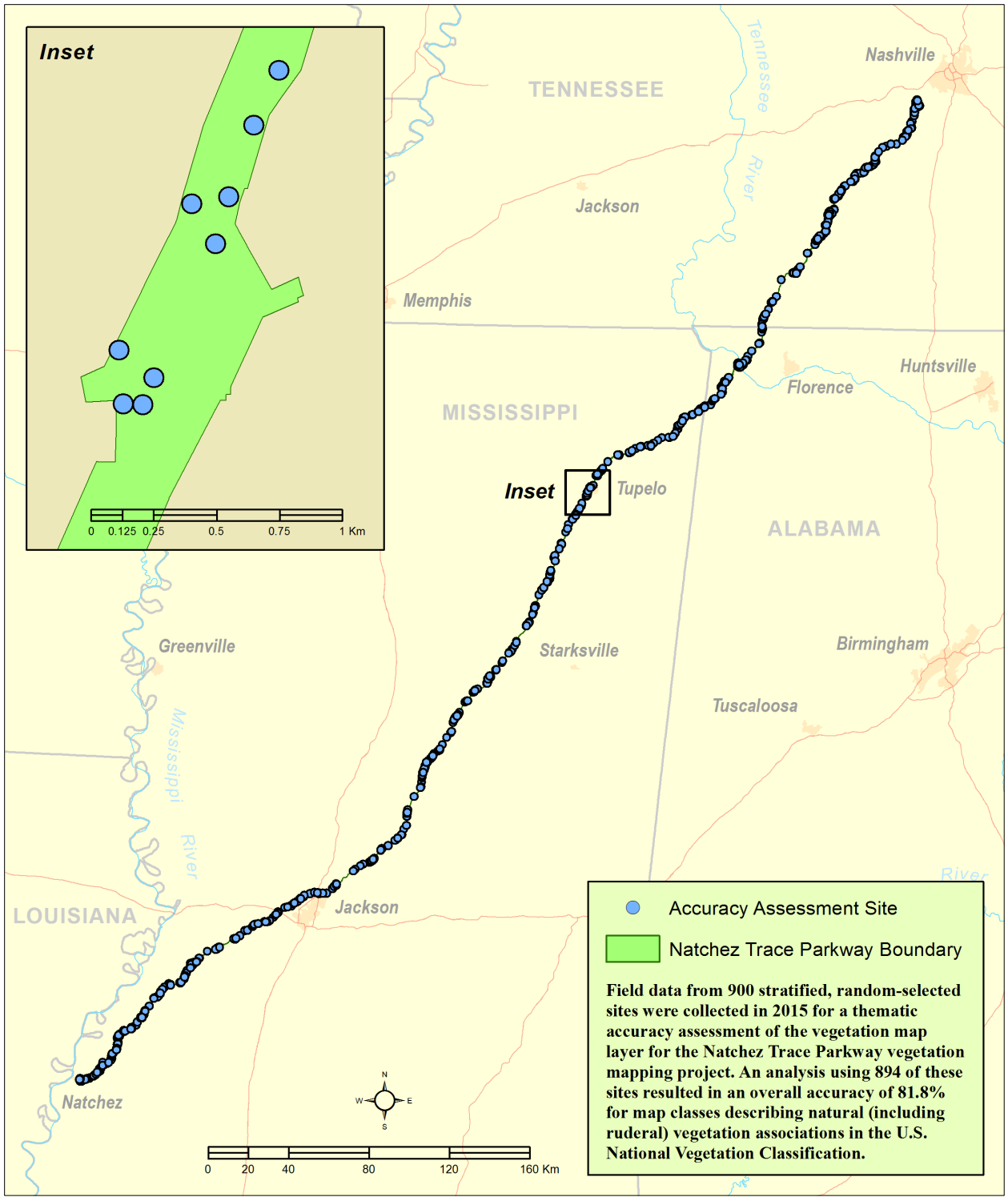


Figure 22. Locations of accuracy assessment sites to assess the accuracy of the vegetation map layer for the Natchez Trace Parkway vegetation mapping project.

Data Analyses

Field data for 900 AA sites were collected and entered into the NPS PLOTS version 4.0 (National Park Service 2015) database for product delivery to the NPS VMI Program. Of the 900 AA collection sites, 6 sites were not used because of unresolvable issues with the field data. Thus, 894 AA sites were used in the analysis.

The database of AA site data was subsequently reviewed for data entry errors. The analysis of map accuracy included the following steps:

- Initial comparative analysis of the field and map data,
- Review of all disagreements and correction of false errors as necessary,
- Individual map-class analysis,
- Final output of results into a contingency (matrix) table, and
- Final output of the analyses and results into a spatial database for use in a geographic information system.



Figure 23. Field classification of an accuracy assessment site for the Natchez Trace Parkway vegetation mapping project.

Initial Comparative Analysis

A spatial join of the AA field-site data and the map-polygon data was prepared. This spatial join allowed each AA field-site call (vegetation type) and the corresponding map-polygon call (map class representing vegetation type) to be compared to each other. ArcGIS (Version 10.3, Esri) was used to compare and tabulate the field-site call to the map-polygon call. Matches were accepted when either the primary or the secondary field-site classification call matched the map-polygon classification call. The initial comparison revealed that 62.33% of the AA sites matched the corresponding mapped polygons.

Review of Disagreements

All mismatches (disagreements) were subsequently reviewed for false errors. A false error is defined as a mismatch between the AA field-site call and the map-polygon call when the mismatch was caused by spatial accuracy error in the GPS field-site coordinates, by a missing or misapplied field-site classification call, or by a field-site assessment of an area smaller than the MMU (an inclusion). In contrast, a true error is defined as a mismatch outside of the reasons given for a false error. This review process involved using ArcGIS to locate and view the AA field site locations and their corresponding polygons on a computer screen by using digital aerial imagery and Stereo Analyst for ArcGIS (ERDAS, Inc.). The field data sheets were also reviewed to gain a fuller sense of the context of the ground data. From this process, an initial disagreement was determined to be either a true error or a false error, which would then become a match. The three types of false errors are spatial error, questionable field-site classification call, and inclusion.

Spatial Error

A spatial error might exist when (1) the GPS device acquired inaccurate field coordinates or (2) a geospatial error existed within the vegetation map layer (called a "map-layer shift"). These spatial errors could displace the newly acquired field coordinate to an adjacent polygon on the map layer. By selecting sites more than 34 m (0.25 ha MMU vegetation types) or 44 m (0.5 ha MMU vegetation types) from polygon edges, spatial errors in GPS coordinates could be minimized; however, GPS accuracy occasionally could fall outside this parameter.

Questionable Field-Site Classification Call

A field assessment determination might be questioned during the analysis; most likely when the perspective from the ground was limited by impenetrable vegetation or wet soils preventing the field crew from accessing the entire MMU. If the MMU area was diverse, with more than one map class represented, omitting or failing to recognize other vegetation types was possible. These situations were reviewed by checking the aerial imagery for diversity at the site and by inspecting the field data sheets for possible problems. Questionable field call errors required further, joint analysis by UMESC and NatureServe staff.

Inclusion

The area assessed in the field during the AA may fall below the MMU for mapping; therefore, the area was termed an inclusion. After a review of the aerial imagery, the site in question may have contained vegetation that was an inclusion to the surrounding map class. Certain vegetation features are quite distinct from each other when the aerial imagery was viewed three-dimensionally (e.g., open woodland versus dense forest), which thereby allows easy assessment of site inclusions in the office. Inclusion may also exist when an area in the field is a valid MMU, but the assessed area overlaps into an adjacent polygon. If the assessed area actually falls within the intended polygon is sometimes difficult to determine, particularly in the case of smaller polygons adjacent to polygons with similar vegetation types. Along with the questionable field calls, inclusion errors required further joint analysis by UMESC and NatureServe staff.

Individual Map-Class Analysis

A contingency table was generated to present the results of the initial analysis of the AA data to the vegetation map layer. The AA contingency table listed accuracy results for each map class, including users' and producers' accuracies. The matrix table listed the frequency of agreement and the placement of disagreements. Individual map-class accuracies that fell below standards of the NPS VMI Program were reviewed to determine which map classes were in confusion with each other. If repeated confusion was evident, a decision was made whether to merge the map classes to gain higher accuracy or to leave the map classes separate. Certain map classes were left with lower accuracies because the benefit was determined to be greater for separate map classes with lower accuracies than for merged map classes with higher accuracies. These decisions were made with input from UMESC and NATR staff.

To avoid underestimating the roll that NATR, NatureServe, and UMESC played in the reconciliation of AA results and the impact that these results had on the final map classification for the Parkway, further understanding of the processes and steps that ultimately produced the final AA results and map classification is needed. The following is an outline of the discussions among NATR, NatureServe, and UMESC staff regarding AA issues, AA results, and eventual merging of map classes.

Review and Reconciliation of Site Specific AA Data

NatureServe and UMESC staff met cooperatively to review and reconcile site specific AA field data. This meeting took place at the UMESC during January 12–14, 2016. Site specific AA field data were reviewed for potential changes to classification assignments and for inclusions or time-change events. Adjustments to the vegetation classification were also addressed. Of the 900 AA sites, 187 were included in the review and reconciliation of AA field data.

Post-Reconciliation AA Contingency Table

The AA contingency table was updated to reflect adjustments from the review and reconciliation meeting. Individual map classes that fell below the 80% accuracy standard of the NPS VMI Program were studied for where confusion was present in the mapping. Detailed proposals were drafted, and the proposals listed the potential merges of map classes that had consistent confusion to each other in mapping. These proposals were sent to NATR staff for their input and decision. Each proposed resolution explained the pros and/or cons regarding the resolution's effect to the vegetation map layer. This information helped NATR staff to realize the cost-benefit ratio of accepting a map class with lower than standard accuracy to retain map detail or of accepting a merging of map classes to gain higher accuracy yet lose some map detail. These proposals are outlined in "Appendix H: Accuracy Assessment Reconciliation." All proposals were accepted by NATR staff and the consolidation of map classes were made accordingly.

Final AA Contingency Table

The results from the complete analyses, including the reconciliations of AA site data and the consolidation of map classes, were updated into the contingency table. The frequency of agreement and the placement of disagreements are listed in the contingency table. The percentages of users' and producers' accuracies were recalculated for each map class.

AA Spatial Database

For use in a geographic information system, a feature-class layer was produced of the AA site locations, as well as supporting tables; the layer and tables were incorporated into the geodatabase for the NATR vegetation mapping project. The field data for AA are also included in the NPS PLOTS version 4.0 (National Park Service 2015) database for the project.

Results

Of the 894 sites used in the analysis (6 of the 900 sites were not used because of unresolvable issues with the field data), the initial comparison determined that only 62.33% of the AA sites matched the corresponding polygons that represented natural (including ruderal) vegetation associations in the U.S. National Vegetation Classification. Through the review process of correcting false errors and of combining some map classes because of low accuracies, the overall accuracy was increased to 81.77%. A kappa adjustment for chance agreements resulted in an overall accuracy of 81.06%. The contingency matrix for the AA results is provided in "Appendix I: Accuracy Assessment Contingency Table." The matrix table lists the accuracy of each map class (along with 90% confidence intervals), with the users' accuracy reflecting errors of inclusion (commission errors) and the producers' accuracy reflecting errors of exclusion (omission errors). The width of each confidence interval was affected by the sample size used to derive the point estimate.

The overall AA met the accuracy requirement of 80% established by the NPS VMI Program. The most important factors affecting accuracy were (1) disagreements between mappers and field crews in percent-cover estimates of the strata; (2) difficulties distinguishing between upland and wetland hydrology during the mapping; (3) difficulties distinguishing among the many oak types, both wetland and upland, present within NATR during the mapping; (4) difficulties distinguishing exotic and early successional tree species from native hardwood tree species during the mapping; (5) difficulties distinguishing percent cover of specific exotic and early successional tree species during the mapping; and (6) difficulties distinguishing between wetland tree canopy species and stratum cover percentages during the mapping. In regard to percent-cover estimates, past experience indicates that estimates in the field are generally lower than estimates from an aerial survey; thus, some mismatches were from a result of two different perspectives.

With the analysis complete, some individual map class accuracies did not meet the 80% requirement (taking into account 90% confidence intervals). In general, errors of commission (users' accuracy) occurred in fewer map classes than did errors of omission (producers' accuracy). The following are map classes for which the mapping project did not meet the required rates of accuracy in terms of either the actual percentage or the confidence intervals.

Users' Accuracy (Errors of Commission)

The users' accuracy for the Ruderal Sweetgum - (Oak) Forest (FXSO) map class was 63%, with a 90% confidence interval of 52–74%. Of the 59 AA sites tested for FXSO, 22 sites contained vegetation types other than FXSO, with errors attributed as follows:

- Nine Southern Oak - (Hardwood) Forest (FSOH) sites were mapped as FXSO because the cherrybark oak (*Quercus pagoda*) and/or water oak (*Q. nigra*) component of the canopy was underestimated by the mappers;
- Seven Ruderal Mixed Floodplain Forest (FXMF) sites were mapped as FXSO because wetland hydrology was mistaken for upland hydrology and/or because the red maple (*Acer rubrum*) and/or green ash (*Fraxinus pennsylvanica*) component of the canopy was underestimated by the mappers;
- Two Northern Oak - (Hickory) Forest (FNOH) sites were mapped as FXSO because the oak species component of the canopy was underestimated by the mappers;
- One Ruderal Mixed Hardwood Forest (FXMH) site was mapped as FXSO because the amount of sweetgum (*Liquidambar styraciflua*) in the canopy was either overestimated or misidentified by the mapper and/or because the amount of ruderal canopy tree species was underestimated by the mappers;
- One Southern Red Oak Flatwoods Forest (FFRO) site was mapped as FXSO because wetland hydrology was mistaken for upland hydrology and the southern red oak (*Quercus falcata*) component of the canopy was underestimated by the mappers;
- One Mixed Hardwood Floodplain Forest (FMHF) site was mapped as FXSO because wetland hydrology was mistaken for upland hydrology and/or because the silver maple (*Acer saccharinum*), sugarberry (*Celtis laevigata*), and/or boxelder (*A. negundo*) component of the canopy was underestimated by the mappers; and
- One Interior Forested Acidic Seep (FIAS) site was mapped as FXSO because wetland hydrology was mistaken for upland hydrology and because the red maple and/or blackgum (*Nyssa sylvatica*) component of the canopy was underestimated by the mappers.

The users' accuracy for the Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest (FCSF) map class was 63%, with a 90% confidence interval of 47–79%. Of the 30 AA sites tested for FCSF, 11 sites contained vegetation types other than FCSF, with errors attributed as follows:

- Four Oak Bottomland & Floodplain Forest (FOBF) sites were mapped as FCSF because the amount of oaks in the tree canopy was either underestimated or misidentified as American sycamore (*Platanus occidentalis*) and/or sweetgum by the mappers;
- Three FMHF sites were mapped as FCSF because the green ash, sugarberry, and/or boxelder component of the canopy was either underestimated or misidentified as sycamore and/or sweetgum by the mappers;
- Three FXMF sites were mapped as FCSF because the red maple and/or green ash component of the canopy was either underestimated or misidentified as American sycamore by the mappers; and
- One Southern Upper East Gulf Coastal Plain Seepage Forest (FCPS) site was mapped as FCSF because the swamp tupelo (*Nyssa biflora*) component of the canopy was either underestimated or misidentified as sweetgum by the mappers.

Producers' Accuracy (Errors of Omission)

The producers' accuracy for the FXMH map class was 63%, with a 90% confidence interval of 47–78%. Of the 32 AA sites classified in the field as FXMH, 12 sites fell within polygons that were mapped as other vegetation types, with errors attributed as follows (for FXMH "mixed ruderal tree species" includes sugar maple [*Acer saccharum*], red maple, redbud [*Cercis canadensis*], eastern redcedar [*Juniperus virginiana*], Osage-orange [*Maclura pomifera*], winged elm [*Ulmus alata*], hackberry [*Celtis occidentalis*], and/or sugarberry [*Celtis laevigata*]):

- Three polygons were mapped as Ruderal Eastern Red-cedar Forest (FXRC) because eastern redcedar (*Juniperus virginiana*) was overestimated in the canopy stratum;
- Two polygons were mapped as Ruderal Tuliptree Forest (FXTT) because tuliptree (*Liriodendron tulipifera*) was overestimated in the canopy stratum and/or because some combination of mixed ruderal tree species was misidentified in the canopy stratum as tuliptree;
- One polygon was mapped as Ruderal Pine - (Hardwood) Forest (FXPN) because the total cover of pine species (*Pinus* spp.) was overestimated in the canopy stratum;
- One polygon was mapped as Ruderal Hardwood Forest Complex (FXHC) because a combination of mixed ruderal tree species was misidentified in the canopy stratum as princesstree (*Paulownia tomentosa*), Chinese tallow (*Triadica sebifera*), tree of heaven (*Ailanthus altissima*), or black locust (*Robinia pseudoacacia*);
- One polygon was mapped as FXSO because a combination of mixed ruderal tree species was misidentified in the canopy stratum as some combination of sweetgum and oak species;
- One polygon was mapped as Northern & Central Beech Forest (FBNC) because a combination of mixed ruderal tree species was misidentified in the canopy stratum as some combination of American beech (*Fagus grandifolia*) and hardwood tree species;
- One polygon was mapped as FNOH because a combination of mixed ruderal tree species was misidentified in the canopy stratum as some combination of oak species and hickory species (*Carya* spp.);
- One polygon was mapped as Sycamore - Silver Maple Calcareous Floodplain Forest (FSSF) because a combination of mixed ruderal tree species was misidentified in the canopy stratum as some combination of silver maple and American sycamore; and
- One polygon was mapped as Ruderal Blackberry - Greenbrier Shrub Thicket (SXBB) because a combination of mixed ruderal tree species was misidentified as blackberry species (*Rubus* spp.).

The producers' accuracy for the FSOH map class was 63%, with a 90% confidence interval of 52–74%. Of the 62 AA sites classified in the field as FSOH, 23 sites fell within polygons that were mapped as other vegetation types, with errors attributed as follows:

- Nine polygons were mapped as FXSO because sweetgum was overestimated in the canopy stratum and/or because the ruderal nature of the site was overemphasized;

- Seven polygons were mapped as Ruderal Water Oak Forest (FXWO) because the dominance of water oak in the canopy was overestimated and/or because the ruderal nature of the site was overemphasized;
- Three polygons were mapped as Southern Beech - Magnolia Forest (FBMS) because the dominance of American beech and hardwood tree species was overestimated;
- Two polygons were mapped as FXMH because the dominance of mixed ruderal tree species was overestimated and/or the ruderal nature of the site was overemphasized;
- One polygon was mapped as FXHC because the canopy was identified as princesstree, Chinese tallow, tree of heaven, or black locust and/or because the ruderal nature of the site was overemphasized; and
- One polygon was mapped as FNOH because a combination of cherrybark oak, water oak, sweetgum, and pecan was misidentified in the canopy stratum as some combination of other oak and hickory species.

The producers' accuracy for the FNOH map class was 69%, with a 90% confidence interval of 59–79%. Of the 67 AA sites classified in the field as FNOH, 21 sites fell within polygons that were mapped as other vegetation types, with errors attributed as follows:

- Six polygons were mapped as Northern Chestnut Oak Forest (FNCO) because the dominance of chestnut oak in the canopy stratum was overemphasized;
- Four polygons were mapped as Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest (FHOT) because the dominance of tuliptree in the canopy stratum was overemphasized;
- Two polygons were mapped as FXSO because the dominance of sweetgum in the canopy stratum was overestimated and/or because the ruderal nature of the site was overemphasized;
- Two polygons were mapped as FFRO because the hydrology of the site was judged to be a flatwoods rather than an upland;
- Two polygons were mapped as FSSF because a combination of oak and hickory species was misidentified in the canopy stratum as some combination of silver maple and American sycamore and because the hydrology of the site was judged to be a floodplain rather than an upland;
- One polygon was mapped as FXRC because eastern redcedar was overestimated in the canopy;
- One polygon was mapped as FSOH because the oak species were misidentified;
- One polygon was mapped as Shortleaf Pine - Oak Forest (FSLO) because a combination of oak and hickory species was underestimated in the canopy and/or because shortleaf pine (*Pinus echinata*) was overestimated in the canopy;
- One polygon was mapped as Chinquapin Oak Unglaciated Bluff Woodland (WCOB) because the canopy stratum was misjudged to be chinquapin oak (*Quercus muehlenbergii*); and
- One polygon was mapped as Oak Bottomland & Floodplain Forest (FOBF) because a combination of upland oak and hickory species was misidentified in the canopy stratum as some combination of wetland oak and hickory species.

The producers' accuracy for the FXMF map class was 55%, with a 90% confidence interval of 43–67%. Of the 53 AA sites classified in the field as FXMF, 24 sites fell within polygons that were mapped as other vegetation types, with errors attributed as follows:

- Seven polygons were mapped as FXSO because the site was misidentified as an upland rather than a wetland of similar canopy stratum;
- Five polygons were mapped as FMHF because a combination of sweetgum, red maple, and green ash was misidentified in the canopy stratum as some combination of silver maple, sugarberry, and boxelder;
- Three polygons were mapped as FCSF because a combination of sweetgum, red maple, and green ash was misidentified in the canopy stratum as some combination of sycamore and sweetgum;
- Three polygons were mapped as Coastal Plain Planertree Floodplain Swamp Forest (FPFS) because a combination of sweetgum, red maple, and green ash was misidentified in the canopy stratum as planertree (*Planera aquatica*);
- Two polygons were mapped as FXMH because a combination of sweetgum, red maple, and green ash was misidentified in the canopy stratum as some combination of mixed ruderal tree species;
- One polygon was mapped as FXTT because the dominance of tuliptree in the canopy stratum was overestimated;
- One polygon was mapped as FOBF because the dominance of wetland oak and hardwood tree species was overestimated;
- One polygon was mapped as FSSF because the dominance of some combination of silver maple and American sycamore was overestimated; and
- One polygon was mapped as FCPS because a combination of sweetgum, red maple, and green ash was misidentified in the canopy stratum as was misidentified in the canopy stratum as swamp tupelo.

Literature Cited

Avery, T. E. 1978. Forester's guide to aerial photo interpretation. Agriculture Handbook 308. U.S. Forest Service, Washington, D.C., USA. (Revised and enlarged version of Occasional Paper 156, Southern Forest Experiment Station, New Orleans, January 1957.)

Beyer, H. L. 2004. Hawth's Analysis Tools for ArcGIS web site. http://www.spatialecology.com/htools (accessed 27 March 2015).

Brady, N. C. and R. R. Weil. 2002. The Nature and Properties of Soils, 13th Edition. Prentice Hall, New Jersey, USA.

Bray, J. R., and J. T. Curtis. 1957. An ordination of the upland forest communities of southern Wisconsin. Ecol. Monogr. 27:325-349.

Cleland, D. T., J. A. Freeouf, J. E. Keys Jr., G. J. Nowacki, C. Carpenter, and W. H. McNab. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States [1:3,500,000] [CD-ROM]. Sloan, A.M., cartog. Gen. Tech. Report WO-76. Washington, DC: U.S. Department of Agriculture, Forest Service.

Daubenmire, R. F. 1968. Plant communities: a textbook of plant synecology. Harper & Row. New York. 300 pp.

Federal Geographic Data Committee. 1998a. Content standard for digital geospatial metadata, FGDC-STD-001-1998. Available at http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/v2_0698.pdf (accessed 27 March 2015).

Federal Geographic Data Committee. 1998b. Spatial data transfer standard, FGDC-STD-002 (modified version ANSI NCITS 20:1998). Available from http://www.fgdc.gov/standards/standards_publications/index_html (accessed 27 March 2015).

Federal Geographic Data Committee. 2008. National vegetation classification standard, Version 2, FGDC-STD-005-2008 (Version 2). Available at http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/NVCS_V2_FINAL_2008-02.pdf (accessed 27 March 2015).

Fosberg, F.R. 1961. A classification of vegetation for general purposes. *Tropical Ecology* 2:1–28.

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

Hershey, R. R., and W. A. Befort. 1995. Aerial photo guide to New England forest cover types. General Technical Report NE-195. U.S. Forest Service, Radnor, Pennsylvania, USA.

Jennings, M. D., D. Faber-Langendoen, R. K. Peet, O. L. Loucks, D. C. Glenn-Lewin, A. Damman, M. G. Barbour, R. Pfister, D. H. Grossman, D. Roberts, D. Tart, M. Walker, S. S. Talbot, J. Walker, G. S. Hartshorn, G. Waggoner, M. D. Abrams, A. Hill, M. Rejmanek. 2006. Description,

documentation, and evaluation of associations and alliances within the U.S. National Vegetation Classification, Version 4.5. Ecological Society of America, Vegetation Classification Panel. Washington, D.C., USA.

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

Keys, J. E., Jr., C. A. Carpenter, S. L. Hooks, F. G. Koenig, W. H. McNab, W. E. Russell, and M-L. Smith. 1995. Ecological units of the eastern United States - first approximation (map and booklet of map unit tables). Presentation scale 1:3,500,000, colored. U.S. Department of Agriculture Forest Service, Atlanta, Georgia, USA.

Lea, C. and A. C. Curtis. 2010. Thematic accuracy assessment procedures: National Park Service Vegetation Inventory, version 2.0. Natural Resource Report NPS/2010/NRR—2010/204.National Park Service, Fort Collins, Colorado, USA.

McCune, B., and M.J. Mefford. 2006. PC-ORD, Multivariate analysis and ecological data, Version 5.32. MjM Software Design, Gleneden Beach, Oregon, USA.

Mostafa, M.M.R., Liberty, E, and J. Hutton, 2007. An End-to-End Airborne Digital Mapping Solution for Rapid Direct Georeferenced Orthophoto Production.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Wiley & Sons. New York. 547 pp.

National Park Service. 2015. PLOTS version 4.0 "PLOTSv4.0". Colorado Natural Heritage Program. Available at http://science.nature.nps.gov/im/inventory/veg/plots.cfm. (accessed 7 March 2016).

NatureServe. 2004. Field methods for vegetation mapping. Prepared for the U.S. Geological Survey and National Park Service. Washington, D.C., USA.

NatureServe. 2005. NPS PLOTS Database Version 2.0. NatureServe, Arlington, Virginia, USA.

Nordman, C., M. Russo, and L. Smart. 2011. Vegetation Types of the Natchez Trace Parkway, based on the U.S. National Vegetation Classification. NatureServe Central Databases (International Ecological Classification Standard: Terrestrial Ecological Classifications). Arlington, Virginia, USA. (Data current as of 11 April 2011).

Omernik, J.M. 2005. Ecoregions of the United States (Omernik Level III). U.S. Geological Survey, Reston, Virginia, USA. Available at: http://nationalatlas.gov/mld/forfrgi.html (accessed 11 April 2011).

Palmer, M.W. 1990. The estimation of species richness by extrapolation. Ecol. 71(3): 1195-1198.

The Nature Conservancy and Environmental Systems Research Institute. 1994a. NBS/NPS vegetation mapping program: Standardized national vegetation classification system. Prepared for the National Biological Survey and National Park Service. Washington, D.C., USA.

The Nature Conservancy and Environmental Systems Research Institute. 1994b. NBS/NPS vegetation mapping program: Field methods for vegetation mapping. Prepared for the National Biological Survey and National Park Service. Washington, D.C., USA.

The Nature Conservancy, Environmental Systems Research Institute, and National Center of Geographic Information and Analysis. 1994. NBS/NPS vegetation mapping program: accuracy assessment procedures. Prepared for the U.S. Department of the Interior, National Biological Survey and National Park Service. Washington, D.C., USA.

U.S. Department of Agriculture, Natural Resource Conservation Service. 2011. The PLANTS Database. Available at http://plants.usda.gov (accessed 12 January 2011).

U.S. Geological Survey. 1999. Map accuracy standards. U.S. Geological Survey. Fact sheet 171–99. Available at http://pubs.er.usgs.gov/publication/fs17199 (accessed 27 March 2015).

USNVC [United States National Vegetation Classification] Database. 2016. United States National Vegetation Classification Database Ver 2.0. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. [usnvc.org] (accessed 9 February 2016).

Appendix A: Plot Sampling Form

NPS GULF COAST PROJECT: Plot *Sampling Form* **Page** 1

County:_____ **Park: NATR** **Plot Code:**_____ **State: AL MS TN** **Location org: NPS**

Provisional community name_____

*Classified community name*_____

Classifier _____ Date_____ NVC ELCODE_____

*Survey date:*_____ *Time*_____

*Surveyors:*_____

Reference tree is a _____ of _____ cm dbh with tag #_____. Center of 20 x 50m plot is at a bearing of _____ degrees and _____ m from tree. (Reference trees do not have to be tagged by field crew).

Directions to plot and reference tree (including any notes on best access route, and mile marker):

_____

_____

Time taken to walk to plot:

PLOT CONFIGURATION (Depict the plot layout on right with respect to the surrounding area and attempt to draw in points where GPS positions were collected, witness tree, bearing of centerline, locations of pictures taken, and communities near the 20 x 50m plot.)

Plot representativeness -Is the surrounding area all the same? ____YES ____ NO - If not, depict below)

PLOT SIZE: 20x50m Other:_____

PLOT LOCATION (Below show general plot location.

Include N arrow and direction to or location of parkway)



Est. Extent of occurrence of community:

<1 Ha 1-10 Ha 10-100 Ha >100 Ha

Picture #_____

Description of pictures (N,E,S & W from GPS point at middle of plot)

:_____

_____

_____

GPS DATA: GPS Point should be at the center of the plot.

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

GPS Techniques/Equipment: Garmin V _____ **Datum(pick one)** WGS84 NAD 83 NAD27 UTM Zone: 15 16

GPS Unit ID _____ **GPS file name** ___ ___ ___ ___ ___ ___ (standard = First letter of park + # of plot (N04 or V04)

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

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

Community Survey
Page 1

NPS GULF COAST PROJECT: Plot *Sampling Form* **Page** 2

County:_____ **Park: NATR Plot Code:**_____ **State: AL MS TN Location org: NPS**

ENVIRONMENTAL / SITE INFORMATION

Measured Slope _____ ° _____ %

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

Measured Aspect _____ ° (N=0 °)

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

Topographic Postion

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

Cowardin System

__ *Upland* __ *Palustrine*
__ *Lacustrine* __ *Riverine*

Landform (check most applicable)

__ Alluvial flat
__ Alluvial terrace
__ Bank
__ Bar
__ Bench
__ Bottomland
__ Cliff
__ Depression
__ Draw
__ Floodplain
__ Hillslope bedrock outcrop
__ Midslope
__ Nose slope
__ Ridge
__ Seep
__ Toe slope
__ Slope
__ Streambed
__ Streamhead
__ Ravine

Rock types present:

Hydrologic Regime

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

Irrglrly exposed

QUALITATIVE ASSESSMENT:

A) HYDROLOGY:

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

Soil Texture: __ Sand __ Loamy sand
__ Sandy loam __ Sandy clay loam __Sandy clay
__ Silt loam __ Silty clay loam __ Silty clay
__ Loam __ Clay loam __Clay
__ Peat __Muck

Drainage:

__ Rapidly drained __Somewhat poorly drained
__ Well drained __ Poorly drained
__ Moderately well drained __ Very poorly drained

Ground cover

_____% Bedrock _____% Litter, duff _____% Other _____
_____% Large rocks (cobbles, boulders >10cm) _____% Wood (> 1 cm)
_____% Small rocks (gravel, 0.2-10 cm) _____% Water

_____% Sand (0.1-2 mm) _____% Bare soil

Leaf type:

__Broad-leaved
__Needle-leaved
__Microphyllous (tiny leaved)
__Graminoid
__Broad-leaved herbaceous
__Pteridophyte
__Mixed

Leaf phenology (dominant stratum)

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

Physiognomic Class

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

Natural and Anthropogenic Disturbance

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

Disturbance and animal use comments:

Community Survey
Page 2

NPS GULF COAST PROJECT: Plot *Sampling Form* **Page** 3

County:_____ Park: NATR Plot Code:_____ State: AL MS TN Location org: NPS

QUANTITATIVE VEGETATION SAMPLE

STRATA	STRATA HEIGHT (tallest)	COVER CLASS	DOMINANT/DIAGNOSTIC SPECIES	*Height scale (use tallest one for strata)*	*% cover for strata = top of cover class*
Emergent – T1				< .5m	5%
Tree Canopy T2				.5-1m	10%
Understory T3				1-2m	20%
Tall shrub S1				2-5m	30%
Short shrub S2				5-10m	40%
Herb. (Field) H				10-15m	50%
Non-vascular N				15-20m	60%
Vine/liana V				20-35m	70%
Other notable species (indicators of distinctive conditions, e.g. high pH soil, elevation, geographic region, other particularly abundant species):				35-50m	80%
				>50m	90%
					100%

***T1:** Emergent \ **T2:** Tree Canopy \ **T3** Subcanopy \ **S1** Tall Shrub (1.0m–5m) \ **S2** Short Shrub (0.5m – 1m) \ **H** Herbaceous and field stratum woody plants (<0.5m) \ **N** Nonvascular \ **V** Vines (lianas) \ **E** Epiphytes*

SPECIES COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM (enter cover values for each stratum AND for Total Cover)

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

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%

Community Survey
Page 3

NPS GULF COAST PROJECT: Plot *Sampling Form* **Page 4**

County:_____________ Park: NATR Plot Code:________ State: AL MS TN Location org: NPS

SPECIES COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM

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

Use additional pages for other species in the 0.1 ha plot

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

T1: Emergent
T2: Canopy
T3 Subcanopy
S1 Tall Shrub (1.0m - 5m)
S2 Short Shrub (0.5m - 1m)
H Herb. / Field
N Nonvascular
V Vines (lianas)
E Epiphytes

Community Survey
Page 4

Appendix B: Descriptions of Vegetation Associations

U.S. NATIONAL VEGETATION CLASSIFICATION

Associations of Natchez Trace Parkway

9 February 2016

by

NatureServe

4600 North Fairfax Drive, 7th Floor
Arlington, VA 22203

601A Foster Street
Durham, NC 27701-2108

This subset of the International Ecological Classification Standard covers associations attributed to Natchez Trace Parkway. This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to Mary J. Russo, Central Ecology Data Manager, Durham, NC mary_russo@natureserve.org, Milo Pyne, Senior Regional Ecologist, Durham, NC milo_pyne@natureserve.org, and Carl Nordman, Regional Vegetation Ecologist, Durham, NC carl_nordman@natureserve.org.

NatureServe
A Network Connecting Science With Conservation

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Copyright © 2016 NatureServe, 4600 North Fairfax Drive, 7th floor
Arlington, VA 22203, U.S.A. All Rights Reserved.

Citations:

The following citation should be used in any published materials which reference ecological system and/or International Vegetation Classification (IVC hierarchy) and association data:

NatureServe. 2016. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 26 January 2016.

Restrictions on Use: Permission to use, copy and distribute these data is hereby granted under the following conditions:

1. The above copyright notice must appear in all documents and reports;
2. Any use must be for informational purposes only and in no instance for commercial purposes;
3. Some data may be altered in format for analytical purposes, however the data should still be referenced using the citation above.

Any rights not expressly granted herein are reserved by NatureServe. Except as expressly provided above, nothing contained herein shall be construed as conferring any license or right under any NatureServe copyright.

Information Warranty Disclaimer: All data are provided as is without warranty as to the currentness, completeness, or accuracy of any specific data. The absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. NatureServe hereby disclaims all warranties and conditions with regard to these data, including but not limited to all implied warranties and conditions of merchantability, fitness for a particular purpose, and non-infringement. In no event shall NatureServe be liable for any special, indirect, incidental, consequential damages, or for damages of any kind arising out of or in connection with the use of these data. Because the data in the NatureServe Central Databases are continually being updated, it is advisable to refresh data at least once a year after receipt.

NatureServe
4600 North Fairfax Drive, 7th Floor
Arlington, VA 22203

601A Foster Street
Durham, NC 27701-2108

These data are extracted from:

NatureServe. 2016. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 26 January 2016.

This document may be generally cited as follows:

NatureServe[1]. 2016. International Ecological Classification Standard: Terrestrial Ecological Classifications. U.S. National Vegetation Classification. Associations of Natchez Trace Parkway. NatureServe Central Databases. Arlington, VA. Data current as of 28 January 2016.

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

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

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

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

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

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

TABLE OF CONTENTS

Page

1. FOREST & WOODLAND B-11

1.B.1. WARM TEMPERATE FOREST & WOODLAND B-11

1.B.1.Na. Southeastern North American Forest & Woodland B-11

M305. Southeastern North American Ruderal Forest B-11

G029. Southeastern Exotic Ruderal Forest B-11
Ruderal Chinaberrytree Forest B-11
Ruderal Upland Chinese Tallow Forest B-13

G031. Southeastern Native Ruderal Forest B-15
Ruderal Interior Sweetgum - Oak Forest B-15
Ruderal Sweetgum Forest B-17
Ruderal Water Oak Forest B-19
Ruderal Loblolly Pine - Sweetgum Forest B-21
Ruderal Loblolly Pine - Oak Forest B-23
Ruderal Loblolly Pine / Sweetgum - Red Maple Forest B-25
Ruderal Mixed Deciduous Forest B-28

M008. Southern Mesic Mixed Broadleaf Forest B-29

G007. Southern Mesic Beech - Magnolia - Oak Forest B-29
East Gulf Coastal Plain Calcareous Bluff Beech - Magnolia Forest B-29
East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest B-31
Southern Loess Hills Hardwood - Pine Forest B-34

G166. Southern Mesic Beech - Oak - Mixed Deciduous Forest B-36
Upper East Gulf Calcareous Bluff Forest B-36
East Gulf Coastal Plain Beech Floodplain Forest B-38
East Gulf Coastal Plain Rich Beech - White Oak Forest B-40
East Gulf Coastal Plain Loblolly - White Oak Forest B-42
Loess Bluff Sweetgum - Pecan - Water Oak Forest B-44
Basic Mesic Coastal Plain Oak-Hickory Forest B-46
Cherrybark Oak - Water Oak Loess Bluff Forest B-49

1.B.2. COOL TEMPERATE FOREST & WOODLAND B-51

1.B.2.Na. Eastern North American Forest & Woodland B-51

M883. Appalachian-Interior-Northeastern Mesic Forest B-51

G020. Appalachian-Central Interior Mesic Forest B-51
Beech - Maple Unglaciated Forest B-51
Southern Mesic Beech - Tuliptree Slopes B-54
Central Interior Beech - White Oak Forest B-57

M013. Eastern North American Ruderal Forest B-60

G032. Eastern North American Exotic Ruderal Forest B-60
Ruderal Tree-of-Heaven Forest B-60
Ruderal Princess-tree Woodland B-62

G030. Eastern North American Native Ruderal Forest B-64
Ruderal Eastern Red-cedar Forest B-64
Ruderal Shortleaf Pine Forest B-66
Ruderal Eastern White Pine Forest B-68
Ruderal Virginia Pine Forest B-70
Interior Low Plateau Ruderal Sugarberry, Hackberry Forest B-73
Ruderal Honey-locust - Elm Woodland B-75
Ruderal Tuliptree Forest (Typic Type) B-76
Ruderal Tuliptree Forest (Rich Type) B-79
Ruderal Black Locust Forest B-82

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

TABLE OF CONTENTS (CONTINUED)

Page

M016. Southern & South-Central Oak - Pine Forest & Woodland B-84
G601. Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland B-84
White Oak - Mixed Oak Dry-Mesic Alkaline Forest B-84
Interior Plateau Chinquapin Oak - Shumard Oak Forest B-87
Shumard Oak - Chinquapin Oak Mesic Limestone Forest B-90
Black Belt Prairie Cedar Woodland B-93
Chinquapin Oak Unglaciated Bluff Woodland B-95
G165. Piedmont-Central Atlantic Coastal Plain Oak Forest B-97
Dry Acidic Eastern Coastal Plain Oak-Hickory Forest B-97
G012. Shortleaf Pine - Oak Forest & Woodland B-100
Mixed Pine - Cherrybark Oak Forest B-100
East & Upper East Gulf Coastal Plains Shortleaf Pine - Mesic Oak Forest B-102
East Gulf Coastal Plain Shortleaf Pine - Southern Red Oak Forest B-104
East Gulf Coastal Plain Shortleaf Pine - Post Oak Forest B-106
G159. South-Central Interior Oak Forest & Woodland B-108
White Oak - Red Oak Dry-Mesic Acidic Forest B-108
Lower Piedmont Chestnut Oak Forest B-111
Interior Low Plateau Chestnut Oak - Mixed Oak Forest B-113
Interior Dry-Mesic White Oak - Hickory Forest B-116
Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest B-119
Interior Southern Red Oak - White Oak Forest B-122
Western Highland Rim Post Oak Barrens B-125
G651. South-Central Interior Oak Savanna & Barrens B-127
Western Highland Rim Blackjack Oak Barrens B-127

1.B.3. TEMPERATE FLOODED & SWAMP FOREST B-129
1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest B-129
M029. Central Hardwood Floodplain Forest B-129
G652. Silver Maple - Green Ash - Sycamore Floodplain Forest B-129
Sycamore - Silver Maple Calcareous Floodplain Forest B-129
G673. Silver Maple - Sugarberry - Sweetgum Floodplain Forest B-132
River Birch Levee Forest B-132
Southern Interior Box-elder Riparian Forest B-135
Silver Maple - Sugarberry - Pecan Floodplain Forest B-137
Southern Green Ash - Elm - Sugarberry Floodplain Forest B-140
M503. Central Hardwood Swamp Forest B-143
G044. Central Interior-Appalachian Seepage Swamp B-143
Interior Forested Acidic Seep B-143
G654. South-Central Flatwoods & Pond Forest B-146
Willow Oak Bottomland Flatwoods Forest B-146
M302. Eastern North American Ruderal Flooded & Swamp Forest B-149
G552. Eastern North American Ruderal Flooded & Swamp Forest B-149
Ruderal Box-elder Floodplain Forest B-149
1.B.3.Nb. Southeastern North American Flooded & Swamp Forest B-152
M161. Pond-cypress Basin Swamp B-152
G036. Pond-cypress Basin Swamp B-152
East Gulf Coastal Plain Bald-cypress Pondshore B-152

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

TABLE OF CONTENTS (CONTINUED)

Page

M310. Southeastern North American Ruderal Flooded & Swamp Forest ... B-154
G762. Southeastern Exotic Ruderal Flooded & Swamp Forest ... B-154
Ruderal Chinese Tallow Wet Forest ... B-154
G553. Southeastern Native Ruderal Flooded & Swamp Forest ... B-155
Ruderal Sweetgum Wet Forest ... B-155
Ruderal Loblolly Pine - Tuliptree Wet Forest ... B-158
Ruderal Loblolly Pine - Sweetgum Wet Forest ... B-160
M033. Southern Coastal Plain Basin Swamp & Flatwoods ... B-162
G130. Hardwood - Loblolly Pine Nonriverine Wet Flatwoods ... B-162
Southern Red Oak Flatwoods Forest ... B-162
M032. Southern Coastal Plain Evergreen Hardwood - Conifer Swamp ... B-164
G037. Coastal Plain Mixed Evergreen Swamp ... B-164
Southern Upper East Gulf Coastal Plain Seepage Forest ... B-164
M031. Southern Coastal Plain Floodplain Forest ... B-166
G033. Bald-cypress - Tupelo Floodplain Forest ... B-166
Water Tupelo Swamp Forest ... B-166
Coastal Plain Planertree Floodplain Swamp Forest ... B-169
Bald-cypress Swamp ... B-171
G034. Oak - Sweetgum Floodplain Forest ... B-174
Red Maple - Green Ash Seasonally Flooded Swamp ... B-174
Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest ... B-176
Laurel Oak Bottomland Forest ... B-178
Overcup Oak - Sweetgum Bottomland Forest ... B-180
Swamp Chestnut Oak - Sweetgum Mesic Floodplain Forest ... B-183
Sweetgum - Cherrybark Oak Floodplain Forest ... B-186
Southern Coastal Plain Small River Oak Bottomland Forest ... B-189
East Gulf Coastal Plain Oak-Sweetgum Small Stream Floodplain Forest ... B-192
Piedmont Loblolly Pine - Mixed Oak Floodplain Forest ... B-195
G759. Southern Ash - Elm - Willow Floodplain Forest ... B-196
Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest ... B-196
Nuttall Oak - Sugarberry Bottomland Forest ... B-198

2. SHRUB & HERB VEGETATION ... B-200

2.B.2. TEMPERATE GRASSLAND & SHRUBLAND ... B-200
2.B.2.Nc. Eastern North American Grassland & Shrubland ... B-200
M508. Central Interior Calcareous Scrub & Grassland ... B-200
G174. South-Central Patch Prairie ... B-200
Highland Rim Wet-Mesic Prairie ... B-200
M123. Eastern North American Ruderal Grassland & Shrubland ... B-202
G059. Eastern North American Ruderal Meadow & Shrubland ... B-202
Little Bluestem Old-field Grassland ... B-202
2.B.2.Ne. Southeastern North American Grassland & Shrubland ... B-204
M309. Southeastern Coastal Plain Patch Prairie ... B-204
G175. Southeastern Coastal Plain Patch Prairie ... B-204
Black Belt Prairie ... B-204
Mississippi Jackson Calcareous Clay Prairie ... B-207

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

TABLE OF CONTENTS (CONTINUED)

Page

M307. Southeastern Ruderal Grassland & Shrubland B-209

G583. Southeastern Ruderal Grassland & Shrubland B-209

Broomsedge Old-field Grassland B-209
Ruderal Carpetgrass Grassland B-211
Ruderal Cogongrass Grassland B-212
Cultivated Meadow B-212
Ruderal Bahia Grass Grassland B-215
Ruderal Winged Sumac - Broomsedge Grassland B-217
Ruderal Johnson Grass Grassland B-219
Ruderal Chinese Privet Upland Shrubland B-220
Ruderal Kudzu Vineland B-222
Ruderal Wisteria Vineland B-224
Ruderal Groundsel-tree Shrubland B-226
Ruderal Blackberry - Greenbrier Shrub Thicket B-228

2.C.4. TEMPERATE TO POLAR FRESHWATER MARSH, WET MEADOW & SHRUBLAND B-230

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland ... B-230

M061. Eastern North American Cool Temperate Seep B-230

G182. Central Interior Seepage Fen B-230

Highland Rim Parnassia Seepage Fen B-230

M069. Eastern North American Marsh, Wet Meadow & Shrubland B-232

G125. Eastern North American Freshwater Marsh B-232

Pickerelweed Marsh B-232

G167. Eastern North American Shrub Swamp B-234

Southeastern Alder Swamp B-234
Floodplain Canebrake B-236
Southern Buttonbush Pond B-238

M880. Eastern North American Wet Shoreline Vegetation B-241

G755. Eastern North American Riverine Wetland Vegetation B-241

Water-willow Rocky Bar and Shore B-241
Black Willow Riverbank Shrubland B-244

G756. Eastern North American Wet Shoreline Vegetation B-246

Smartweed - Cutgrass Beaver Pond B-246
Smartweed Pond B-248
Smartweed - Savanna Panicgrass Southern Flooded Marsh B-250

M303. Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland B-252

G557. Southeastern Ruderal Marsh, Wet Meadow & Shrubland B-252

Common Rush Marsh B-252
Highland Rim Pond (Woolgrass Bulrush - Threeway Sedge Type) B-254
Ruderal Southern Woolgrass Marsh B-256
Ruderal Chinese Privet Wet Shrubland B-258
Ruderal Grapevine - Peppervine - Trumpet Creeper Wet Thicket B-259

2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland B-261

M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh B-261

G188. Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh B-261

Giant Cutgrass Slough Marsh B-261

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

TABLE OF CONTENTS (CONTINUED)

Page

5. AQUATIC VEGETATION B-263

5.B.2. TEMPERATE & BOREAL FRESHWATER AQUATIC VEGETATION B-263

5.B.2.Na. North American Freshwater Aquatic Vegetation B-263

M108. Eastern North American Freshwater Aquatic Vegetation B-263

G114. Eastern North American Freshwater Aquatic Vegetation B-263

Coastal Plain Riverine Floating Mat B-263

American Lotus Aquatic Wetland B-265

Water-lily Aquatic Wetland B-267

Pondweed - Hornwort - Waterweed Submerged Aquatic Vegetation B-269

M401. North American Temperate Ruderal Aquatic Vegetation B-271

G595. Eastern North American Ruderal Aquatic Vegetation B-271

Ruderal Alligator-weed Aquatic Vegetation B-271

Ruderal Water-hyacinth Aquatic Vegetation B-273

Floating Primrose-willow Aquatic Marsh B-275

6. OPEN ROCK VEGETATION B-277

6.B.1. TEMPERATE & BOREAL CLIFF, SCREE & OTHER ROCK VEGETATION B-277

6.B.1.Na. Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation B-277

M111. Eastern North American Cliff & Rock Vegetation B-277

G840. Appalachian Cliff & Rock Vegetation B-277

Appalachian Wet Limestone Cliff B-277

Cumberland Plateau Rockhouse B-279

G841. Central Midwest-Interior Cliff & Rock Vegetation B-281

Highland Rim Limestone Cliff/Talus Seep B-281

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

1. FOREST & WOODLAND

1.B.1. Warm Temperate Forest & Woodland

1.B.1.Na. Southeastern North American Forest & Woodland

M305. Southeastern North American Ruderal Forest

G029. Southeastern Exotic Ruderal Forest

Ruderal Chinaberrytree Forest
***Melia azedarach* Ruderal Forest [Park Special]**
Chinaberrytree Ruderal Forest
Identifier: CEPS004837

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Exotic Ruderal Forest (G029)
Alliance	Southeastern Exotic Ruderal Forest (A3233)
Association	Ruderal Chinaberrytree Forest

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This invasive Chinaberry forest was sampled once in the park. The site is a steep ravine with well-drained silty clay soil. The unvegetated surface is dominated by litter/duff and bare soil with some wood. Evidence of disturbance includes the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate (50% cover) canopy, 10-15 m tall, and moderate (50%) subcanopy (5-10 m) are exclusively dominated by the invasive exotic *Melia azedarach*. Scattered shrubs *Acer negundo, Callicarpa americana, Platanus occidentalis*, and *Quercus velutina* are present. The herbaceous layer (50%) is dominated by the exotic *Lolium arundinaceum*; other herbs (mostly exotics) include *Galium aparine, Geranium carolinianum, Lygodium japonicum, Paspalum urvillei*, and *Stellaria media*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Melia azedarach*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer negundo*, *Callicarpa americana*
Herb (field)	Graminoid	*Lolium arundinaceum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Melia azedarach*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Cardamine hirsuta* (), *Cyrtomium fortunei* (), *Lamium amplexicaule* (), *Lolium arundinaceum* (High/Medium), *Lygodium japonicum* (High/Medium), *Macrothelypteris torresiana* (), *Melia azedarach* (Medium/Low), *Paspalum urvillei* (), *Pueraria montana* var. *lobata* (), *Stellaria media* (Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (12-Nov-2010).

CLASSIFICATION

Status: Nonstandard

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi between M35 and M40.
Nations: US
States/Provinces: MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 232Bd:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.557.
Local Description Authors: M.J. Russo
Global Description Authors:
References: Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Upland Chinese Tallow Forest

***Triadica sebifera* Ruderal Forest**
Chinese Tallow Ruderal Forest
Identifier: CEGL007037

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Exotic Ruderal Forest (G029)
Alliance	Southeastern Exotic Ruderal Forest (A3233)
Association	Ruderal Upland Chinese Tallow Forest

ELEMENT CONCEPT

Global Summary: *Triadica sebifera (= Sapium sebiferum)*-dominated upland forests, often developed on old fields, dredge spoil, shell middens, or other disturbed sites. The understory and herb layers are often poorly developed. This association is defined broadly until further information is available to refine its description and classification.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This early-successional tallowtree forest was sampled once in the park. The site is dry-mesic alluvial terrace with somewhat poorly drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes past clearing (old field) and the presence of exotic plants.
Global Environment: This community may develop on old fields, dredge spoil, shell middens, or other disturbed sites.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate (60% cover) canopy, 5-10 m tall, is dominated by the invasive exotic *Triadica sebifera* along with *Carya illinoinensis, Fraxinus pennsylvanica*, and *Liquidambar styraciflua*. The sparse (30-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers includes *Baccharis halimifolia, Campsis radicans*, and *Rubus argutus*. The herbaceous layer (20%) is dominated by *Juncus coriaceus*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Triadica sebifera*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Baccharis halimifolia*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Triadica sebifera*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Triadica sebifera*
Global: *Triadica sebifera*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Triadica sebifera* (High)
Global: Invasive/Exotic Plants: *Triadica sebifera* (High)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (1-Dec-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi in the vicinity of M105.
Global Range: The range of this association includes Texas, Louisiana, Alabama, and Georgia, but it could possibly be found in other parts of the southeastern United States, including Florida, Mississippi and South Carolina.
Nations: US
States/Provinces: AL, FL?, GA, LA, MS, SC?, TX
TNC Ecoregions: 31:C, 40:C, 41:C, 43:C, 53:C, 55:P

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

USFS Ecoregions (1994/95): 231Bi:CCC, 231E:C?, 231Fa:CCP, 231Fb:CCC, 232Bs:CCC, 232Ce:CCC, 232Dc:CCC, 232Dd:CCC, 232E:CP, 232F:CP, 255Da:CCC, 255Db:CCP, 255Dc:CCC
Federal Lands: NPS (Fort Pulaski, Jean Lafitte, Natchez Trace); USFWS (Anahuac, Brazoria)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.595.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley and L.M. Smith, mod. M. Pyne
References: Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G031. Southeastern Native Ruderal Forest

Ruderal Interior Sweetgum - Oak Forest

***Liquidambar styraciflua - Quercus (alba, falcata)* Ruderal Forest**
Sweetgum - (White Oak, Southern Red Oak) Ruderal Forest
Identifier: CEGL007217

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Ruderal Sweetgum - Sugarberry - Water Oak Forest (A3232)
Association	Ruderal Interior Sweetgum - Oak Forest

ELEMENT CONCEPT

Global Summary: Stands of this successional forest association are dominated by *Liquidambar styraciflua* but also support additional species in the overstory such as *Quercus alba*, *Liriodendron tulipifera*, and/or *Quercus falcata*. This forest is somewhat later successional and/or more diverse than pure *Liquidambar styraciflua* forests [see *Liquidambar styraciflua* Ruderal Forest (CEGL007216)]. This type may arise following disturbance of mixed *Quercus - Carya* forests. This vegetation type would be more prevalent or more likely to be encountered to the north of the range of *Quercus nigra*, i.e., in the interior and Piedmont rather than in the Coastal Plain.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional sweetgum - oak forest was sampled at seven locations in the park. Sites are gentle north- and northwest-facing mid and upper slopes with well-drained silt loam soil. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes wind damage and the presence of exotic plants.
Global Environment: This type may arise following disturbance of mixed *Quercus - Carya* forests. This vegetation type would be more prevalent or more likely to be encountered to the north of the range of *Quercus nigra*, i.e., in the interior and Piedmont rather than in the Coastal Plain.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-80% cover) canopy, 15-35 m tall, is dominated by *Liquidambar styraciflua* along with various oaks, including *Quercus alba, Quercus falcata, Quercus nigra*, and *Quercus stellata*. *Quercus pagoda* is a common canopy tree in examples of this vegetation south of Jackson, MS. The sparse (20-40%) subcanopy (5-20 m) may include *Carya ovata, Cornus florida, Liquidambar styraciflua, Nyssa sylvatica, Oxydendrum arboreum*, and/or *Quercus nigra*. The sparse (10-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are dominated by species of *Rhododendron* and *Vaccinium*. The herbaceous layer (up to 100%) may be dominated by tree seedlings, *Athyrium filix-femina ssp. asplenioides, Microstegium vimineum* (exotic), *Osmunda cinnamomea, Osmunda regalis var. spectabilis*, or *Podophyllum peltatum*. Dominant vines (up to 30%) include *Lonicera japonica* (exotic) and *Toxicodendron radicans*.
Global Vegetation: The overstory of stands of this association are usually dominated by *Liquidambar styraciflua*, but may also support other species such as *Quercus alba, Liriodendron tulipifera*, and *Quercus falcata*. Other woody species encountered in plots attributed to this type include *Fraxinus americana, Cornus florida, Diospyros virginiana, Quercus velutina, Quercus rubra*, and *Carya* spp. (NatureServe Ecology unpubl. data).

At Shiloh National Military Park, this vegetation is documented from a plot (SHIL.4) which was disturbed by a tornado in 1971 or 1972 (D. Turnbo pers. comm. 2003). There are stumps and tip-up mounds from the tornado and the salvage logging which followed. The dominant tree is *Liquidambar styraciflua* with *Acer rubrum* canopy subdominant. *Carya alba* and *Quercus alba* are also important, with *Quercus falcata, Prunus serotina, Nyssa sylvatica*, and *Carya glabra*. *Cornus florida, Carya pallida*, and *Quercus rubra* are important primarily in the subcanopy and tall-shrub strata. *Vaccinium stamineum* and *Ilex decidua* are tall shrubs; most of the *Quercus* spp. and *Carya* spp. also occur as tall shrubs. Short shrubs include *Quercus phellos, Ulmus alata, Rosa carolina, Vitis rotundifolia, Lonicera japonica, Mimosa microphylla, Hypericum hypericoides, Juniperus virginiana, Ligustrum sinense, Vaccinium stamineum, Diospyros virginiana, Nyssa sylvatica, Smilax glauca, Carya glabra, Vaccinium arboreum*, and *Rubus argutus*. The herbaceous stratum has 30% cover, but there are no dominant species. The most abundant herbaceous species are *Dichanthelium boscii* and *Botrychium biternatum*. Other herbaceous species are *Scutellaria elliptica, Houstonia purpurea, Elephantopus tomentosus, Asplenium platyneuron, Polystichum acrostichoides, Dichanthelium laxiflorum, Viola x palmata, Galium circaezans, Sanicula canadensis, Athyrium filix-femina ssp. asplenioides, Conoclinium coelestinum, Lobelia puberula, Cirsium horridulum, Lycopodium digitatum (= Diphasiastrum digitatum), Chasmanthium laxum, Lespedeza repens, Ruellia strepens*, and *Pycnanthemum verticillatum var. pilosum (= Pycnanthemum pilosum)*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus alba*, *Quercus falcata*, *Quercus nigra*, *Quercus stellata*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Liquidambar styraciflua*, *Quercus alba*, *Quercus falcata*, *Quercus nigra*
Global: *Liquidambar styraciflua*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Castanea pumila* var. *ozarkensis* (G5T3), *Matelea baldwyniana* (G3), *Saxifraga palmeri* (G3Q), *Trillium viridescens* (G2G4Q)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (8-Aug-2000). This forest represents successional vegetation. Consequently it is not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This community is composed of at least 40% *Liquidambar styraciflua* in the canopy, but it differs from earlier successional *Liquidambar styraciflua* in that it has a minor or major component of oaks and hickories and other later-successional trees in the subcanopy and canopy. However, unlike less-disturbed, more natural *Liquidambar styraciflua* types, it is not located in a floodplain and it has a very low-diversity herbaceous layer.
Global Similar Associations:

- *Liquidambar styraciflua - Carya illinoinensis - Quercus nigra* Ruderal Forest (CEGL004122)
- *Liquidambar styraciflua - Quercus nigra - Pinus taeda / Vaccinium elliottii - Morella cerifera* Ruderal Forest (CEGL007726) which is more likely and more prevalent in the southern Coastal Plain.
- *Liquidambar styraciflua* Ruderal Forest (CEGL007216) terms (prior to the appearance of oak saplings in the canopy and subcanopy).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (4) and Tennessee (2) between M375 and M380 and between M385 and M390.
Global Range: This early-successional sweetgum forest has been defined from the Interior Highlands of the central United States and from the Piedmont of the southeastern United States, and is also reported for the Southern Ridge and Valley, but is likely much more widespread.
Nations: US
States/Provinces: AL, AR, GA, MS, SC, TN
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 50:C, 52:C
USFS Ecoregions (1994/95): 222Ag:CCC, 222An:CCC, 222Cg:CCC, 222Ef:CCC, 222Eg:CCC, 231Ab:CCC, 231Ba:CCC, 231Cc:CCC, M222Aa:CCC, M231A:CC
Federal Lands: NPS (Buffalo River, Chickamauga-Chattanooga, Fort Donelson, Horseshoe Bend, Mammoth Cave?, Natchez Trace, Shiloh); USFS (Delta?, Holly Springs, Oconee?, Ouachita, Ouachita (Mountains), Ozark, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tombigbee?, Tuskegee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.008, NATR.044, NATR.054, NATR.084, NATR.085, NATR.216, NATR.245.
Local Description Authors: M.J. Russo
Global Description Authors: R.E. Evans, mod. C.W. Nordman
References: Gallyoun et al. 1996, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Turnbo pers. comm., White 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Sweetgum Forest

***Liquidambar styraciflua* Ruderal Forest**
Sweetgum Ruderal Forest
Identifier: CEGL007216

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Ruderal Sweetgum - Sugarberry - Water Oak Forest (A3232)
Association	Ruderal Sweetgum Forest

ELEMENT CONCEPT

Global Summary: This early-successional upland forest of the southeastern U.S. occurs on a variety of environmental settings, resulting from succession following human activities such as logging and clearing or agriculture. Stands are dominated by *Liquidambar styraciflua*, sometimes to the exclusion of other species. *Pinus taeda* is a common associate. Other associated species are highly variable and depend on location and stand history.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional sweetgum forest was sampled at seven locations in the park. Sites range from flats to moderate slopes and ridges. Soils range from well-drained to somewhat poorly drained and include clay loam, sandy loam, silt, and silty clay. The unvegetated surface is dominated by litter/duff (up to 100%) with some wood and bare soil. Evidence of disturbance includes roads/trails, past clearing (old agricultural fields) and mowing, and the presence of exotic plants.
Global Environment: This association is found in uplands that have been heavily impacted by agriculture or other severe disturbances and are recovering.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (30-90% cover) canopy, 10-50 m tall, and sparse to dense (40-70%) subcanopy (5-15 m) are dominated by *Liquidambar styraciflua*; additional tree species may include *Acer negundo, Acer rubrum, Celtis laevigata, Nyssa sylvatica, Pinus taeda, Platanus occidentalis, Prunus serotina, Quercus nigra*, and *Ulmus americana*. The very sparse to very dense (5-90%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Callicarpa americana, Diospyros virginiana, Fraxinus pennsylvanica, Ligustrum sinense* (exotic), *Symphoricarpos orbiculatus*, and *Ulmus alata*. Dominants in the herbaceous layer (5-70%) can include *Ageratina altissima, Chasmanthium laxum, Chasmanthium sessiliflorum, Dichanthelium dichotomum, Lonicera japonica* (exotic), *Solidago rugosa ssp. aspera*, and/or *Thelypteris noveboracensis*. Vines (up to 40%) include *Campsis radicans, Lonicera japonica, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: Stands are dominated by *Liquidambar styraciflua*, sometimes to the exclusion of other species.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Liquidambar styraciflua*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Liquidambar styraciflua*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Dioscorea oppositifolia* (High/Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Lygodium japonicum* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (19-Aug-2002). This is an upland successional vegetation type composed of native species. Its conservation value is limited, but it may provide buffer for communities of greater conservation value.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Similar Associations:

- *Liquidambar styraciflua - Liriodendron tulipifera / Lindera benzoin / Arisaema triphyllum* Floodplain Forest (CEGL004418) a later-successional bottomland association.
- *Liquidambar styraciflua - Quercus (alba, falcata)* Ruderal Forest (CEGL007217) of interior provinces.
- *Liquidambar styraciflua - Quercus nigra - Pinus taeda / Vaccinium elliottii - Morella cerifera* Ruderal Forest (CEGL007726) a more diverse successional forest of the Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2), Mississippi (4) and Tennessee (1) between M25 and M30, M385 and M390, and in the vicinity of M5, M10, M105, and M410.
Global Range: This association may be found throughout the southeastern United States, in the coastal plains and interior ecoregions. It is also attributed to New Jersey with the merger of CEGL006927. The status in intervening states (e.g., Delaware, Maryland) needs to be assessed.
Nations: US
States/Provinces: AL, AR, DC?, DE, GA, KY, LA, MD, MS, NC, NJ, OK, SC, TN, VA
TNC Ecoregions: 31:P, 32:P, 40:P, 41:C, 42:C, 43:C, 44:C, 50:C, 51:P, 52:C, 53:P, 56:P, 57:C, 58:C, 62:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Ef:CCC, 222Fa:CCP, 222Fb:CCC, 222Fe:CCP, 231Aa:CCP, 231Ab:CCC, 231Bh:CCC, 231Bi:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCC, 232Bd:CCC, 232Cb:CCC, M221Dc:???, M221Dd:???
Federal Lands: NPS (Big South Fork, Chickamauga-Chattanooga?, Colonial, Cowpens, George Washington Birthplace, Guilford Courthouse, Horseshoe Bend, Kings Mountain, Mammoth Cave, Moores Creek, Natchez Trace, National Capital-East, Ninety Six, Petersburg, Shiloh, Thomas Stone, Vicksburg); USFS (Cherokee?, Oconee?, St. Francis); USFWS (Cape May, E.B. Forsythe, Patuxent, Prime Hook, Supawna Meadows)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.141, NATR.165, NATR.217, NATR.302, NATR.405, NATR.560, NATR.572.
Local Description Authors: M.J. Russo
Global Description Authors: R. White, mod. M. Pyne
References: Collins and Anderson 1994, Coxe 2009, Lea et al. 2012, Lea et al. 2013, McCrain and Church 1985, McManamay et al. 2012, NatureServe 2009, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Patterson 2008c, Patterson 2008d, Patterson 2008e, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White 2004, White and Govus 2003, White and Govus 2005, White and Pyne 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Water Oak Forest

***Quercus nigra* Ruderal Forest**
Water Oak Ruderal Forest
Identifier: CEGL004638

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Ruderal Sweetgum - Sugarberry - Water Oak Forest (A3232)
Association	Ruderal Water Oak Forest

ELEMENT CONCEPT

Global Summary: This community is a result of soil disturbance and/or fire suppression of upland pinelands of the Southeastern Coastal Plain and of pinelands and subsequent old fields in the adjacent Piedmont areas. South of the range of southern yellow pines, this community is found on spoil banks, artificial levees, and other anthropogenic landforms in a marsh and swamp landscape context. This association occurs on mesic or dry-mesic sites, especially on loamy or other fine-textured soils (in contrast to *Quercus hemisphaerica - Quercus nigra* Forest Alliance (A0053), which occurs primarily on coarse-textured sands in drier situations). *Quercus nigra* dominates the tree canopy. Other oaks (e.g., *Quercus falcata, Quercus phellos, Quercus hemisphaerica*) may be intermixed, as well as *Liquidambar styraciflua*, remnant *Pinus palustris*, weedy *Pinus elliottii var. elliottii, Carya* spp., or *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia, Liriodendron tulipifera, Carya alba*, and *Cornus florida* in the subcanopy.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional water oak forest was sampled at eight locations in the park. Sites are flat or gentle to moderate slopes and ridges with mostly eastern aspects. Soils range from well-drained to somewhat poorly drained silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes roads/trails, past logging, and the presence of exotic plants.
Global Environment: This community is a result of disturbance and/or fire suppression of upland pinelands of the southeastern Coastal Plain and adjacent Piedmont. South of the range of southern yellow pines, this community is found on highly disturbed upland sites, spoil banks, artificial levees, and other anthropogenic landforms in a marsh and swamp landscape context. It occurs on mesic or dry-mesic sites, especially on loamy or other fine-textured soils. In the Piedmont transition of South Carolina, it may have grown out of areas that were heavily farmed or cut over in the past but which did not grow up into *Pinus taeda* forests.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-80% cover) canopy, 15-35 m tall, is dominated by *Quercus nigra* and may be codominated by *Liquidambar styraciflua, Pinus taeda, Quercus pagoda*, and/or *Quercus phellos*. The sparse to moderate (40-70%) subcanopy (15-20 m) may include *Acer rubrum, Juniperus virginiana, Liquidambar styraciflua*, and *Ulmus alata*. Dominant and/or common species in the sparse to moderate (10-60%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers include *Cornus florida, Diospyros virginiana, Ilex decidua, Ligustrum sinense* (exotic, often dominant), *Prunus serotina*, and *Vaccinium* spp. The herbaceous layer is sparse (5-30%) and may include *Botrychium dissectum* and *Chasmanthium* spp. Vines (up to 30%), often climbing into the shrub layers as well as along the ground, are *Berchemia scandens, Lonicera japonica* (exotic), *Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy of this association is dominated by *Quercus nigra*. Other oaks may be intermixed, especially *Quercus phellos*, as well as *Quercus falcata, Quercus hemisphaerica, Liquidambar styraciflua*, remnant *Pinus palustris*, weedy *Pinus elliottii var. elliottii, Carya* spp., or *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia, Liriodendron tulipifera, Carya alba*, and *Cornus florida* in the subcanopy.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*, *Quercus pagoda*, *Quercus phellos*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus florida*, *Diospyros virginiana*, *Ilex decidua*, *Vaccinium elliottii*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus nigra*
Global: *Quercus nigra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Triadica sebifera* (High)
Global: **Vulnerable Plants**: *Quercus oglethorpensis* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (modified/managed) (17-May-2002). This vegetation is presumed to be either a result of disturbance of more diverse-canopied hardwood forests, and/or a result of lack of fire on sites which would be dominated by *Pinus palustris*. In the Piedmont area of South Carolina, it may occur on areas formerly codominated by *Quercus oglethorpensis*. In these areas, the *Quercus oglethorpensis* still survives, making this modified community of more conservation value in those areas.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: The "successional" and "ruderal" aspects of this association may need to be teased apart.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The eight sampled sites are in Mississippi between M105 and M110, M115 and M120, and in the vicinity of M80, M95, M105, and M310.
Global Range: This community is distributed throughout the southeastern United States, including within the traditional range of longleaf pine communities, mainly in the Coastal Plain from Texas up through at least South Carolina. In some parts of its range in South Carolina and Georgia, the community may be found in the Piedmont within 50 to 70 miles of the fall-line and may share dominance with other successional pine-dominated communities more common in the Piedmont. It is also found south of where pines dominate the landscape, as in southern Louisiana.
Nations: US
States/Provinces: AL, FL?, GA, LA, MS, NC, SC, TX?
TNC Ecoregions: 31:C, 41:P, 42:?, 43:C, 52:C, 53:C, 55:?, 56:C, 57:C
USFS Ecoregions (1994/95): 231A:CC, 231Bd:CCC, 231Bi:CCC, 231Bl:CCC, 232Bm:CCC, 232Bq:CCC, 232Br:CCC, 232Ca:CCC, 232Cb:CCC, 232Eb:CPP, 234Aa:???, 234Ab:???, 234Ac:???, 234Ag:???, 234Ah:???, 234Ak:???, 234Al:???, 234Am:???, 234An:???
Federal Lands: DOD (Fort Benning, Fort Gordon, Fort Stewart); NPS (Chattahoochee River, Cowpens, Jean Lafitte, Moores Creek, Natchez Trace, Ninety Six); USFS (Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tuskegee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.304, NATR.313, NATR.503, NATR.588, NATR.589, NATR.590, NATR.593, NATR.639.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: McCrain and Church 1985, McManamay et al. 2012, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., White 2004, White and Govus 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Loblolly Pine - Sweetgum Forest

***Pinus taeda - Liquidambar styraciflua* Ruderal Forest**
Loblolly Pine - Sweetgum Ruderal Forest
Identifier: CEGL008462

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest (A3231)
Association	Ruderal Loblolly Pine - Sweetgum Forest

ELEMENT CONCEPT

Global Summary: This community type is broadly defined to accommodate mid- to late-successional upland forests strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*, resulting from past disturbance (such as agricultural or other land clearing). Understory composition differs based on edaphic site and on age and history. This broadly defined type occupies a variety of edaphic sites, ranging from mesic through dry-mesic sites on a wide variety of (generally acidic) soils. If left unmanaged or undisturbed, this can be a short-lived forest type, which is likely to succeed with greater age into various oak- and oak-pine-dominated forests.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional loblolly pine - sweetgum forest was sampled at eight locations in the park. Sites include flat bottomlands as well as gentle to moderate mid and upper slopes of mostly southern aspects. Soils are well- to moderately well-drained clay loam, sandy clay, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes past logging/clearing, wind damage, and the presence of exotic plants.
Global Environment: Stands of this community type are strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*, resulting from past disturbance followed by forest succession. This community type is more influenced by past land-use history than by specific soil differences. However, this community type tends to occur on poorly drained and low-nutrient soils, especially in areas that were farmed heavily in the past. Stands on poorly drained sites have often been subjected to ditching activities.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (30-90% cover) canopy, 15-35 m tall, is codominated by *Pinus taeda* and *Liquidambar styraciflua* and may also include *Liriodendron tulipifera* and *Pinus echinata*. *Liquidambar styraciflua* also dominates the very sparse to dense (10-80%) subcanopy (5-20 m) and the very sparse to moderate (5-60%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers. Other shrubs include *Acer negundo, Carpinus caroliniana, Carya glabra, Celtis laevigata, Fagus grandifolia, Ulmus* spp., and the invasive exotic *Ligustrum sinense* (which may codominate). The herbaceous layer (5-50%) includes tree seedlings, *Botrychium dissectum, Polystichum acrostichoides, Rubus argutus*, and vines (up to 30%) of *Lonicera japonica* (exotic), *Parthenocissus quinquefolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: Stands of this community type are strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*. Some other species which may be present in stands of this association include *Quercus phellos, Quercus nigra, Ulmus alata, Acer rubrum, Quercus michauxii, Nyssa sylvatica*, and *Prunus serotina*, along with *Vitis rotundifolia, Toxicodendron radicans, Rubus argutus, Smilax rotundifolia, Eupatorium capillifolium, Eupatorium hyssopifolium, Erigeron strigosus, Solidago gigantea, Ambrosia artemisiifolia, Juncus effusus, Juncus subcaudatus*, and the exotics *Lespedeza cuneata* and *Ligustrum sinense*. Examples of this association in low-lying areas may also have a dense herbaceous layer of *Microstegium vimineum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*
Tree canopy	Needle-leaved tree	*Pinus taeda*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Liriodendron tulipifera*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Liquidambar styraciflua*, *Pinus taeda*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Perilla frutescens* (Low)
Global: Invasive/Exotic Plants: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (20-Oct-2000). This forest represents early successional or silviculturally managed vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: This community likely occurs along the northern periphery of the Gulf Coast Prairies and Marshes Ecoregion of eastern Texas. The similarity of this association with *Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum* Ruderal Forest (CEGL006011) suggests that a merge with that type should be considered.
Global Similar Associations:

- *Liriodendron tulipifera - Pinus taeda* Ruderal Forest (CEGL007521) with greater dominance by *Liriodendron*.
- *Pinus echinata* Ruderal Forest (CEGL006327)
- *Pinus taeda - (Pinus echinata) - Quercus falcata - Carya texana / Vaccinium arboreum* Forest (CEGL007528) overlaps only in the western part of the range of this type.
- *Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum* Ruderal Forest (CEGL006011) is an earlier successional stage of this association and is distinguished by a lack of *Liquidambar styraciflua* in the canopy and a well-developed hardwood understory.
- *Pinus taeda / Saccharum alopecuroidum - Andropogon* spp. Ruderal Forest (CEGL007109) a related *Pinus taeda*-dominated type placed in evergreen.
- *Pinus virginiana* Ruderal Forest (CEGL002591)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2) and Mississippi (6).
Global Range: This altered forest type is widespread in the lowland portions of the southeastern to mid-Atlantic United States, particularly on the Coastal Plain, but also on adjacent inland provinces.
Nations: US
States/Provinces: AL, AR, DE, GA, LA, MD, MS, NC, OK, SC, TN, TX, VA
TNC Ecoregions: 31:P, 39:C, 40:C, 41:C, 43:C, 44:C, 50:C, 52:C, 53:C, 56:C, 57:C, 58:C, 62:C
USFS Ecoregions (1994/95): 222Ef:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Bd:CCC, 231Bg:CCC, 231Bi:CCC, 231Bk:CCC, 231Cc:CCC, 231Fa:CPP, 232Ac:CCC, 232Bm:CCC, 232Bx:CCC, 232Cb:CCC, 232Ce:CCC, 232F:CC, 255Da:PPP
Federal Lands: DOD (Fort Benning?); NPS (Chickamauga-Chattanooga, Cumberland Island, George Washington Birthplace, Guilford Courthouse, Horseshoe Bend, Kings Mountain, Little River Canyon, Natchez Trace, Ninety Six, Petersburg, Richmond, Shiloh); USFS (Angelina, Bienville, Conecuh?, Croatan, Davy Crockett, Kisatchie, Oconee, Ouachita, Ouachita (Coastal Plain), Ouachita (Mountains), Sabine, Sam Houston, Talladega, Talladega (Oakmulgee), Talladega (Talladega), Tuskegee?, Uwharrie); USFWS (Blackwater, Chesapeake Marshlands, Prime Hook)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.142, NATR.257, NATR.310, NATR.322, NATR.356, NATR.387, NATR.646, NATR.652.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. R. White and E. Largay
References: Allard 1990, Coxe 2009, Eyre 1980, Foti 1994b, Foti et al. 1994, Harcombe and Neaville 1977, Hoagland 2000, LNHP 2009, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Patterson 2008d, Patterson 2008e, Patterson 2008f, Peet et al. unpubl. data, Schotz et al. 2008, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., USFS 1988, White and Govus 2003, White and Govus 2005, White and Pyne 2003, Zanoni et al. 1979

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Loblolly Pine - Oak Forest

***Pinus taeda - Quercus falcata - Liquidambar styraciflua / Rhus copallinum* Ruderal Forest**
Loblolly Pine - Southern Red Oak - Sweetgum / Winged Sumac Ruderal Forest
Identifier: CEGL008450

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest (A3231)
Association	Ruderal Loblolly Pine - Oak Forest

ELEMENT CONCEPT

Global Summary: This successional, essentially evergreen forest of the Upper East Gulf Coastal Plain is dominated by a mixture of *Pinus taeda* with hardwoods, including *Quercus* spp. and *Liquidambar styraciflua*. The oaks present may include *Quercus falcata, Quercus hemisphaerica*, and *Quercus nigra*. These forests develop on former mesic to dry-mesic *Pinus palustris* sites, following removal of *Pinus palustris* and disturbance. There may be some variation in canopy composition with soil texture. *Quercus hemisphaerica* may be more prevalent on sandy soils, *Quercus nigra* on finer-textured ones. Common shrubs include *Rhus copallinum* and *Vaccinium stamineum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional loblolly pine - oak - sweetgum forest was sampled at 17 locations in the park. Sites include flat lowland and ridges and gentle mid and upper slopes with southern or eastern aspects. Soils are well- to moderately well-drained clay loam, sandy loam, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes an abundance of exotic plants.
Global Environment: This forest is described from the Upper East Gulf Coastal Plain of Fort Benning, Georgia. It occurs on rolling uplands on sandy loam soils at various aspects. These forests develop on former mesic to dry-mesic *Pinus palustris* sites, following removal of *Pinus palustris* and disturbance.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (40-80% cover) canopy, 15-35 m tall, is dominated by various combinations of *Liquidambar styraciflua, Pinus echinata, Pinus taeda, Quercus alba, Quercus coccinea, Quercus nigra*, and *Quercus pagoda*, as is the sparse to dense (30-80%) subcanopy (5-20 m) which may also include *Acer rubrum, Cornus florida, Morus rubra, Nyssa sylvatica, Prunus serotina*, and/or *Quercus stellata*. The sparse to dense (30-80%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy species along with *Ligustrum sinense* (exotic) and *Ulmus alata*. The herbaceous layer is sparse (5-20%) but often includes tree seedlings and vines (up to 40%) that may also climb into the upper layers and include *Lonicera japonica* (exotic), *Parthenocissus quinquefolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy is dominated by a mixture of *Pinus taeda* (typically greater than 75%) with hardwoods, including *Quercus* spp. and *Liquidambar styraciflua*. The oaks present may include *Quercus falcata, Quercus hemisphaerica*, and *Quercus nigra*. *Quercus hemisphaerica* may be more prevalent on sandy soils, *Quercus nigra* on finer-textured ones. Common shrubs include *Rhus copallinum* and *Vaccinium stamineum*. On the Apalachicola National Forest, a related somewhat diverse stand on dissected slopes near a creek contains *Pinus taeda, Nyssa biflora, Quercus hemisphaerica, Quercus nigra, Liquidambar styraciflua, Magnolia virginiana, Magnolia grandiflora*, and *Acer rubrum*. Shrubs are moderately diverse and include *Clethra alnifolia, Cliftonia monophylla, Cyrilla racemiflora, Ilex coriacea, Ilex opaca, Itea virginica, Leucothoe axillaris, Lyonia lucida, Osmanthus americanus, Symplocos tinctoria*, and *Vaccinium stamineum*. The classification status of this stand is somewhat unclear, but it is placed here pending further investigation. It may be in fact a fully natural, not a "modified" type.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus taeda*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ulmus alata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus falcata*, *Quercus nigra*
Tree canopy	Broad-leaved evergreen tree	*Quercus hemisphaerica*
Short shrub/sapling	Broad-leaved deciduous shrub	*Rhus copallinum*, *Vaccinium stamineum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Liquidambar styraciflua*, *Pinus taeda*, *Quercus nigra*, *Ulmus alata*
Global: *Liquidambar styraciflua*, *Pinus taeda*, *Quercus falcata*, *Quercus hemisphaerica*, *Quercus nigra*, *Rhus copallinum*, *Vaccinium stamineum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Dioscorea oppositifolia* (High/Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Global: Vulnerable Plants: *Stylisma pickeringii* var. *pickeringii* (G4T3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (19-Aug-2002). This is a successional forest composed of species native to the southeastern United States; it is not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: There may be substantial hardwoods (*Quercus* spp., *Liquidambar styraciflua*) in the canopy and subcanopy, but this association is primarily composed of *Pinus taeda*.
Global Similar Associations:
- *Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum* Ruderal Forest (CEGL006011)
- *Pinus taeda* Forest Plantation (CST007179) applies to young, dense, monospecific, stands with plantation structure.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The 17 sampled sites are in Mississippi between M135 and M140, M155 and M160, M175 and M180, M230 and M235, M380 and M385, and in the vicinity of M10, M45, M55, M65, M90, M115, M125, M230, and M235.
Global Range: This forest occurs in the Upper East Gulf Coastal Plain and adjacent East Gulf Coastal Plain of Mississippi, Alabama, Florida and Georgia, and the South Atlantic Coastal Plain of Florida and Georgia.
Nations: US
States/Provinces: AL, FL, GA, MS
TNC Ecoregions: 43:C, 53:C, 56:P
USFS Ecoregions (1994/95): 222Ef:CCC, 231Bd:CCC, 231Bg:CCC, 231Bh:CCC, 231Bi:CCC, 231Bk:CCC, 231Bl:CCC, 232Bb:CCC, 232Bd:CCC, 232Ce:CCP, 232Dc:CCC
Federal Lands: DOD (Fort Benning); NPS (Fort Frederica?, Natchez Trace); USFS (Apalachicola)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.090, NATR.164, NATR.229, NATR.233, NATR.265, NATR.291, NATR.294, NATR.299, NATR.307, NATR.338, NATR.341, NATR.349, NATR.355, NATR.378, NATR.379, NATR.380, NATR.500.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Loblolly Pine / Sweetgum - Red Maple Forest

***Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum* Ruderal Forest**
Loblolly Pine / Sweetgum - Red Maple / Deerberry Ruderal Forest
Identifier: CEGL006011

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest (A3231)
Association	Ruderal Loblolly Pine / Sweetgum - Red Maple Forest

ELEMENT CONCEPT

Global Summary: This wide-ranging association is most common from the Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, likely extending throughout the adjacent Coastal Plain. A large amount of variability exists in species composition and density due to geographic and disturbance factors. It represents stands in which *Pinus taeda* is the monospecific dominant tree in the overstory. Stands typically have more-or-less closed canopies, understories dominated by fire-intolerant hardwoods, and shrub-dominated lower strata. These are generally early- to mid-successional forests where the pines have reached tree size (as opposed to saplings) and have been established for a long enough period to have developed a closed canopy. Below the canopy of *Pinus taeda*, a well-developed subcanopy of hardwoods is present. *Acer rubrum var. rubrum* and *Liquidambar styraciflua* are often the dominant species in the subcanopy. If significant numbers of these species enter the canopy, the stand would instead be classified as *Pinus taeda - Liquidambar styraciflua* Ruderal Forest (CEGL008462). Although this forest may result from a planted stand [see *Pinus taeda* Forest Plantation (CST007179)], it is distinguished from young pine plantations by tree height and the formation of distinct stratal layers, especially a well-developed subcanopy. This type may also develop following site preparation, with or without site conversion, and following agriculture.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional loblolly pine forest was sampled at 46 locations in the park. Sites are flat to gentle slopes and ridges of any aspect. Soils are well- to moderately well-drained loam, sandy clay, sandy loam, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff (up to 100%) with some wood. Evidence of disturbance wind damage, past fire, and the presence of exotic plants.
Global Environment: This forest follows agricultural cropping or silvicultural site preparation on a variety of sites, and presumably is more likely on moderately dissected topography where fire is a rare occurrence. This community usually is not present on steep slopes and does not occur on wet soils. It occurs on well- to moderately well-drained soils, usually Ultisols, on sites that formerly were under hardwood cover or subjected to agriculture.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to dense (40-80% cover) canopy, 10-50+ m tall, is dominated by *Pinus taeda*. The very sparse to dense (10-80%) subcanopy (5-20 m) is dominated by *Acer rubrum* and *Liquidambar styraciflua*. Additional tree species can include *Fraxinus americana, Juniperus virginiana, Oxydendrum arboreum, Pinus echinata, Prunus serotina* and *Quercus nigra*. The very sparse to dense (10-30%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of subcanopy species along with *Cornus florida, Ligustrum sinense* (exotic), *Nyssa sylvatica*, and *Ulmus alata*, but lack any pine regeneration. The herbaceous layer (5-80%) is dominated by vines *Berchemia scandens, Campsis radicans, Lonicera japonica* (exotic), *Parthenocissus quinquefolia, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*; herbs are sparse. This community also supports Mississippi state-rare *Deparia acrostichoides*.
Global Vegetation: The tree canopy of *Pinus taeda* is at least 60% but may be considerably more dense, up to and including closed canopies. Tree subcanopy density varies with stand disturbance history but generally is <50%. Shrub and herb layer coverages do not exceed 25% and decrease with increasing age of the stand. Other species of pine, especially *Pinus echinata* and *Pinus virginiana* may be sparingly present in the canopy. Other species that may be present in the subcanopy in addition to *Liquidambar styraciflua* and *Acer rubrum var. rubrum* include *Quercus coccinea, Quercus velutina, Quercus alba, Quercus falcata, Nyssa sylvatica, Carya glabra, Carya alba, Diospyros virginiana, Prunus serotina, Cornus florida, Liriodendron tulipifera*, and *Sassafras albidum* (NatureServe Ecology unpubl. data). Other species in addition to *Vaccinium stamineum* that may be present in the shrub stratum include *Juniperus virginiana, Vaccinium arboreum, Rhus copallinum, Gaylussacia baccata, Callicarpa americana*, and probably others. The herbaceous layer usually forms <5% cover and contains such species as *Gelsemium sempervirens, Chimaphila maculata, Polystichum acrostichoides*, and *Potentilla canadensis*. An example from Oconee National Forest has a thinned canopy and grassy herbaceous layer. The exotic *Lonicera japonica* may be common within occurrences of this community.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*, *Liquidambar styraciflua*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus florida*, *Nyssa sylvatica*, *Ulmus alata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*, *Liquidambar styraciflua*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium stamineum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer rubrum*, *Liquidambar styraciflua*, *Pinus taeda*, *Ulmus alata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Deparia acrostichoides* (G5, MS state-rare); **Invasive/Exotic Plants**: *Campanula rapunculoides* (High/Low), *Hedera helix* (High/Medium), *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Nandina domestica* (High/Low)
Global: **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (modified/managed) (8-Aug-2002). This is a successional forest composed of species native to the southeastern United States; it is not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: The similarity of this association with *Pinus taeda - Liquidambar styraciflua* Ruderal Forest (CEGL008462) suggests that a merge with that type should be considered.
Global Similar Associations:

- *Pinus echinata* Ruderal Forest (CEGL006327) occurs in the same region but is dominated by *Pinus echinata* instead of *Pinus taeda*.
- *Pinus taeda - Liquidambar styraciflua* Ruderal Forest (CEGL008462) is a related late-successional type with hardwoods in the canopy.
- *Pinus taeda - Liriodendron tulipifera / Acer saccharum* Ruderal Forest (CEGL007105) of the Ridge and Valley.
- *Pinus taeda - Quercus (alba, falcata, stellata)* Successional Coastal Plain Forest (CEGL004766)
- *Pinus taeda - Quercus falcata - Liquidambar styraciflua / Rhus copallinum* Ruderal Forest (CEGL008450)
- *Pinus taeda / Rhus copallinum* Forest Plantation (CST007108)
- *Pinus taeda* Forest Plantation (CST007179) applies to young dense monospecific stands with plantation structure.
- *Pinus virginiana* Ruderal Forest (CEGL002591)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2) and Mississippi (44).
Global Range: This forest ranges from the Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, extending into the adjacent coastal plains, including the eastern end of the Upper East Gulf Coastal Plain (e.g., Talladega National Forest).
Nations: US
States/Provinces: AL, DE, GA, LA, MD, MS, NC, SC, TN, TX, VA
TNC Ecoregions: 40:C, 41:C, 43:C, 44:C, 52:C, 53:C, 56:P, 57:C, 58:C, 62:C
USFS Ecoregions (1994/95): 221D:CC, 222Ef:CCC, 222Eg:CCC, 231Aa:CCC, 231Ab:CCC, 231Ba:CCC, 231Bb:CCC, 231Bd:CCC, 231Be:CCC, 231Bg:CCC, 231Bh:CCC, 231Bi:CCC, 231Bj:CCC, 231Bk:CCC, 231Bl:CCC, 232Ab:CCC, 232Ac:CCC, 232Bb:CCC, 232Cb:CCC, M221D:??
Federal Lands: NPS (Chattahoochee River, Cowpens, George Washington Birthplace, Horseshoe Bend, Kennesaw Mountain, Little River Canyon, Moores Creek, Natchez Trace, Petersburg, Shiloh); USFS (Land Between the Lakes?, Oconee, Sumter, Sumter (Piedmont), Talladega, Talladega (Oakmulgee), Talladega (Talladega), Uwharrie?); USFWS (Cape May, Chesapeake Marshlands)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.081, NATR.083, NATR.148, NATR.154, NATR.180, NATR.219, NATR.231, NATR.240, NATR.241, NATR.247, NATR.248, NATR.250, NATR.251, NATR.253, NATR.254, NATR.255, NATR.266, NATR.274, NATR.277, NATR.279, NATR.280, NATR.281, NATR.282, NATR.284, NATR.285, NATR.289, NATR.290, NATR.292, NATR.295, NATR.296, NATR.297, NATR.298, NATR.300, NATR.301, NATR.323, NATR.329, NATR.340, NATR.342, NATR.352, NATR.353, NATR.354, NATR.362, NATR.364, NATR.370, NATR.385, NATR.435.

Local Description Authors: M.J. Russo

Global Description Authors: S. Landaal, mod. L.A. Sneddon

References: Allard 1990, Bartgis 1986, Coxe 2009, Eyre 1980, Felix et al. 1983, Harrison 2004, Harrison 2011, McCrain and Church 1985, McManamay et al. 2012, NatureServe Ecology - Southeastern U.S. unpubl. data, NatureServe n.d., Nordman et al. 2011, Patterson 2008d, Patterson 2008e, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, USFS 1988, White 2004

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Mixed Deciduous Forest

Ruderal Mixed Deciduous Forest [Park Special]
Ruderal Mixed Deciduous Forest
Identifier: CEPS004809
Terrestrial Community Complex - OtherSuccessional Mixed Deciduous Forest

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southeastern North American Ruderal Forest (M305)
Group	Southeastern Native Ruderal Forest (G031)
Alliance	[no alliance placement]
Association	Ruderal Mixed Deciduous Forest

ELEMENT CONCEPT

Global Summary: This type is a conceptual placeholder, designed only to act as a provisional type for vegetation complexes, ruderal or early-successional vegetation, and other types that cannot be reliably classified. It is created to facilitate regularized local land unit mapping of a managed area and to provide a standard label for polygons in a vegetation map. It is a diverse map class representing upland successional deciduous forests of highly variable composition. Any successional upland forest not captured in the associations listed for a particular area can be included here.
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) ().

CLASSIFICATION

Status: Nonstandard

ELEMENT DISTRIBUTION

Nations: US
States/Provinces: AL, DC, LA, MD, MS, TN, VA, WV
TNC Ecoregions: 31:C
USFS Ecoregions (1994/95): 232Eb:CCC
Federal Lands: NPS (Antietam, C&O Canal, Catoctin Mountain, George Washington Parkway, Harpers Ferry, Jean Lafitte, Manassas, Monocacy, Natchez Trace, National Capital-East, Rock Creek, Wolf Trap)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors:
References: Eastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M008. Southern Mesic Mixed Broadleaf Forest

G007. Southern Mesic Beech - Magnolia - Oak Forest

East Gulf Coastal Plain Calcareous Bluff Beech - Magnolia Forest

***Fagus grandifolia - Magnolia grandiflora - Fraxinus americana / Acer barbatum - Ostrya virginiana* Forest**
American Beech - Southern Magnolia - White Ash / Southern Sugar Maple - Hophornbeam Forest
Identifier: CEGL007458

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Magnolia - Oak Forest (G007)
Alliance	Beech - Magnolia Forest (A0369)
Association	East Gulf Coastal Plain Calcareous Bluff Beech - Magnolia Forest

ELEMENT CONCEPT

Global Summary: This is the most calcareous association of beech - magnolia forest. It occurs over calcareous rock or sediments on flats and slopes. *Fagus grandifolia* and *Magnolia grandiflora* dominate the canopy, with lesser amounts of *Ulmus americana, Fraxinus americana, Quercus alba, Tilia americana var. caroliniana, Carya glabra, Quercus shumardii, Quercus muehlenbergii, Quercus michauxii, Juglans nigra*, and *Pinus glabra*. The subcanopy is typically dominated by *Acer barbatum*, and also includes *Carpinus caroliniana ssp. caroliniana, Magnolia ashei, Ostrya virginiana, Persea palustris, Ulmus rubra, Cercis canadensis var. canadensis, Cornus florida, Morus rubra, Ilex opaca var. opaca*, and *Quercus nigra*. The shrub and woody vine stratum is diverse and generally well-developed, including species such as *Aesculus pavia, Hydrangea quercifolia, Sabal minor, Rhapidophyllum hystrix, Euonymus americanus, Styrax grandifolius, Stewartia malacodendron, Halesia* sp., *Arundinaria gigantea ssp. gigantea, Ilex decidua, Toxicodendron radicans ssp. radicans, Callicarpa americana, Parthenocissus quinquefolia, Smilax glauca, Smilax tamnoides*, and *Bignonia capreolata*. Herbs include *Melica mutica, Polystichum acrostichoides, Arisaema dracontium, Sanicula canadensis, Dioscorea quaternata, Sanguinaria canadensis, Phryma leptostachya, Carex basiantha, Botrychium virginianum, Oplismenus hirtellus, Smallanthus uvedalius, Asplenium platyneuron var. bacculum-rubrum, Laportea canadensis, Urtica chamaedryoides*, and *Collinsonia canadensis*. Vascular epiphytes are *Pleopeltis polypodioides ssp. michauxiana* and *Tillandsia usneoides*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This beech - magnolia forest was sampled at four locations in the park. Sites are gentle to somewhat steep slopes with well-drained clay loam or silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, past logging, and the presence of exotic plants.
Global Environment: This most calcareous of beech - magnolia forest associations occurs over calcareous rock or sediments on flats and slopes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-90% cover) canopy, 20-35 m tall, and moderate to dense (50-100%) subcanopy (15-20 m) are dominated by *Fagus grandifolia* along with *Liquidambar styraciflua, Magnolia grandiflora, Quercus michauxii, Quercus pagoda*, and *Ulmus alata*. Additional subcanopy trees include *Acer barbatum, Carpinus caroliniana, Fraxinus americana*, and *Ulmus americana*. The sparse to moderate (20-60%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Asimina triloba, Arundinaria gigantea, Euonymus americanus, Hydrangea quercifolia, Ostrya virginiana*, and *Prunus caroliniana*. Herbs are sparse; common ones include *Chasmanthium sessiliflorum, Dichanthelium boscii, Oplismenus hirtellus*, and *Polystichum acrostichoides*. Vines (5-10%) include *Bignonia capreolata, Parthenocissus quinquefolia*, and *Vitis rotundifolia*.
Global Vegetation: *Fagus grandifolia* and *Magnolia grandiflora* dominate the canopy of this calcareous beech - magnolia forest, with lesser amounts of *Ulmus americana, Fraxinus americana, Quercus alba, Tilia americana var. caroliniana, Carya glabra, Quercus shumardii, Quercus muehlenbergii, Quercus michauxii, Juglans nigra*, and *Pinus glabra*. The subcanopy is typically dominated by *Acer barbatum*, and also includes *Carpinus caroliniana ssp. caroliniana, Magnolia ashei, Ostrya virginiana, Persea palustris, Ulmus rubra, Cercis canadensis var. canadensis, Cornus florida, Morus rubra, Ilex opaca var. opaca*, and *Quercus nigra*. The shrub and woody vine stratum is diverse and generally well-developed, including species such as *Aesculus pavia, Hydrangea quercifolia, Sabal minor, Rhapidophyllum hystrix, Euonymus americanus, Styrax grandifolius, Stewartia malacodendron, Halesia* sp., *Arundinaria gigantea ssp. gigantea, Ilex decidua, Toxicodendron radicans ssp. radicans, Callicarpa americana, Parthenocissus quinquefolia, Smilax glauca, Smilax tamnoides*, and *Bignonia capreolata*. Herbs include *Melica mutica, Polystichum acrostichoides, Arisaema dracontium, Sanicula canadensis, Dioscorea quaternata, Sanguinaria canadensis, Phryma leptostachya, Carex basiantha, Botrychium virginianum, Oplismenus hirtellus, Smallanthus uvedalius, Asplenium platyneuron var. bacculum-rubrum, Laportea canadensis, Urtica chamaedryoides*, and *Collinsonia canadensis*. Vascular epiphytes are *Pleopeltis polypodioides ssp. michauxiana* and *Tillandsia usneoides*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia*, *Quercus michauxii*
Tree canopy	Broad-leaved evergreen tree	*Magnolia grandiflora*
Tree subcanopy	Broad-leaved deciduous tree	*Acer barbatum*, *Fraxinus americana*, *Ostrya virginiana*, *Ulmus americana*
Herb (field)	Flowering forb	*Oplismenus hirtellus*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*, *Dichanthelium boscii*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia*
Tree canopy	Broad-leaved evergreen tree	*Magnolia grandiflora*
Tree subcanopy	Broad-leaved deciduous tree	*Acer barbatum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer barbatum*, *Fagus grandifolia*, *Magnolia grandiflora*
Global: *Acer barbatum*, *Cercis canadensis* var. *canadensis*, *Fagus grandifolia*, *Fraxinus americana*, *Magnolia grandiflora*, *Ostrya virginiana*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Celastrus orbiculata* (High/Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Oplismenus hirtellus* ()
Global: Vulnerable Plants: *Magnolia ashei* (G2)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1G2 (14-Sep-2006). This type is distributed at low frequency from Alabama to Georgia and Florida in the East Gulf Coastal Plain. It is not abundant anywhere. This community is susceptible to urban/residential development and logging. Excessive foot traffic, logging and feral hog activity are threats to the diverse herbaceous understory and may cause erosion. Undisturbed sites are rare, although there are a few excellent examples on protected lands in Florida.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: The distribution and abundance of this association is uncertain. Examples occur at Florida Caverns State Park (Jackson County, Florida). This association should be compared to *Quercus pagoda - Magnolia grandiflora - Fagus grandifolia / Hydrangea quercifolia / Thelypteris kunthii* Forest (CEGL007461).
Global Similar Associations:
- *Fagus grandifolia - Magnolia grandiflora - Pinus glabra - (Magnolia macrophylla) / (Illicium floridanum)* Forest (CEGL007460)
- *Quercus pagoda - Magnolia grandiflora - Fagus grandifolia / Hydrangea quercifolia / Thelypteris kunthii* Forest (CEGL007461)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi between M15 and M20, M50 and M55, and in the vicinity of M20 and M55.
Global Range: This beech - magnolia forest occurs in the East Gulf Coastal Plain from Alabama through Florida and Georgia.
Nations: US
States/Provinces: AL, FL, GA, MS
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Bh:CCC, 232Bd:CCC, 232Bi:CCC, 232Bs:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.169, NATR.175, NATR.542, NATR.569.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. M. Pyne
References: Allard 1990, FNAI 1992a, FNAI 1992b, FNAI 2010a, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest

***Fagus grandifolia - Magnolia grandiflora - Pinus glabra - (Magnolia macrophylla) / (Illicium floridanum)* Forest**
American Beech - Southern Magnolia - Spruce Pine - (Bigleaf Magnolia) / (Florida Anisetree) Forest
Identifier: CEGL007460

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Magnolia - Oak Forest (G007)
Alliance	Beech - Magnolia Forest (A0369)
Association	East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest

ELEMENT CONCEPT

Global Summary: This forest occurs in ravines and on broad upland flats, on somewhat acidic to circumneutral loamy soils which are not subject to flooding, or sometimes in temporarily flooded situations. These mesic to dry-mesic forests occur in hilly transitional areas from longleaf pine hills to stream bottoms, and are often best expressed in areas of steep slopes (or along alluvial flats). Canopies are diverse; some common trees are *Fagus grandifolia, Magnolia grandiflora, Quercus alba, Quercus pagoda, Quercus nigra, Quercus hemisphaerica, Pinus taeda, Pinus glabra, Liquidambar styraciflua, Nyssa sylvatica, Liriodendron tulipifera, Fraxinus americana, Quercus michauxii, Quercus falcata, Quercus velutina, Quercus laurifolia, Carya alba* (in the north), *Carya glabra, Ulmus alata*, and *Pinus echinata*. Species in the subcanopy include *Acer barbatum, Acer rubrum, Oxydendrum arboreum, Carpinus caroliniana ssp. caroliniana, Ostrya virginiana, Prunus caroliniana, Prunus serotina, Symplocos tinctoria, Magnolia macrophylla* (rare to the west), *Halesia diptera, Styrax grandifolius, Sassafras albidum, Ilex opaca, Hamamelis virginiana, Crataegus marshallii, Morus rubra*, and *Cornus florida*. Common shrubs are *Illicium floridanum* (in some examples), *Ilex longipes* (in the west), *Ilex vomitoria, Callicarpa americana, Euonymus americanus, Hypericum hypericoides, Asimina parviflora, Osmanthus americanus* (rare to the west), *Viburnum dentatum, Amelanchier canadensis, Vaccinium arboreum, Chionanthus virginicus* (rare to the west), *Vaccinium elliottii, Aesculus pavia var. pavia, Sebastiania fruticosa, Persea borbonia*, and rarely *Stewartia malacodendron*. Common woody vines include *Vitis rotundifolia, Smilax rotundifolia, Smilax pumila, Smilax glauca, Smilax smallii, Berchemia scandens, Bignonia capreolata*, and *Lonicera sempervirens*. The herb layer includes a mix of *Hexastylis arifolia var. arifolia, Solidago arguta var. boottii, Pteridium aquilinum var. pseudocaudatum, Viola walteri, Arisaema triphyllum, Chasmanthium sessiliflorum, Chasmanthium laxum, Carex* spp., *Oplismenus hirtellus ssp. setarius (= Oplismenus setarius), Epifagus virginiana, Podophyllum peltatum, Uvularia perfoliata, Polygonatum biflorum, Mitchella repens, Trillium foetidissimum, Tipularia discolor, Polystichum acrostichoides, Dioscorea quaternata, Scleria* sp., *Aristolochia serpentaria, Sanicula canadensis, Lilium michauxii, Spigelia marilandica, Euphorbia corollata, Solidago caesia, Smilax herbacea* (very uncommon), and rarely *Chamaelirium luteum*. The troublesome exotics *Ligustrum sinense, Lygodium japonicum*, and *Lonicera japonica* are usually present to a greater or lesser degree in stands of this type. This association occurs in the central and eastern Florida parishes (essentially east of the Amite River) of eastern Louisiana, and extends eastwards into the Coastal Plain of Mississippi, Alabama, and western Florida.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This mixed forest association occurs on relatively level upland sites in the vicinity of Kosciusko, Mississippi. Soils are reported to be moderately well-drained and are comprised of a sandy clay loam. No evidence of anthropogenic and natural disturbances was reported.
Global Environment: This forest occurs in ravines and on broad upland flats, on somewhat acidic to circumneutral loamy soils which are not subject to flooding, or sometimes in temporarily flooded situations. These mesic to dry-mesic forests occur in hilly transitional areas from longleaf pine hills to stream bottoms, and are often best expressed in areas of steep slopes (or along alluvial flats).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: Examples in the park are codominated by a closed (80% cover) canopy of *Pinus glabra, Quercus alba, Fagus grandifolia*, and in slightly lesser abundance, *Pinus taeda, Quercus nigra*, and *Quercus falcata*. The subcanopy is relatively closed (60% cover) and is comprised of the above-mentioned canopy species in addition to *Liquidambar styraciflua* and *Quercus velutina*. Species in the tall- and short-shrub layers are primarily comprised of those in the canopy and subcanopy strata, as well as *Ilex opaca* and *Ostrya virginiana*. Characteristic taxa of the herb layer include *Vitis rotundifolia, Chasmanthium laxum, Arisaema triphyllum, Tipularia discolor*, and *Epifagus virginiana*.
Global Vegetation: Canopies are diverse in stands of this association; some common trees are *Fagus grandifolia, Magnolia grandiflora, Quercus alba, Quercus pagoda, Quercus nigra, Quercus hemisphaerica, Pinus taeda, Pinus glabra, Liquidambar styraciflua, Nyssa sylvatica, Liriodendron tulipifera, Fraxinus americana, Quercus michauxii, Quercus falcata, Quercus velutina, Quercus laurifolia, Carya alba* (in the north), *Carya glabra, Ulmus alata*, and *Pinus echinata*. Species in the subcanopy include *Acer barbatum, Acer rubrum, Oxydendrum arboreum, Carpinus caroliniana ssp. caroliniana, Ostrya virginiana, Prunus caroliniana, Prunus serotina, Symplocos tinctoria, Magnolia macrophylla* (rare to the west), *Halesia diptera, Styrax grandifolius, Sassafras albidum, Ilex opaca, Hamamelis virginiana, Crataegus marshallii, Morus rubra*, and *Cornus florida*. Common shrubs are *Illicium floridanum* (in some examples), *Ilex longipes* (in the west), *Ilex vomitoria, Callicarpa americana, Euonymus americanus, Hypericum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

hypericoides, Asimina parviflora, Osmanthus americanus (rare to the west), *Viburnum dentatum, Amelanchier canadensis, Vaccinium arboreum, Chionanthus virginicus* (rare to the west), *Vaccinium elliottii, Aesculus pavia var. pavia, Sebastiania fruticosa, Persea borbonia*, and rarely *Stewartia malacodendron*. Common woody vines include *Vitis rotundifolia, Smilax rotundifolia, Smilax pumila, Smilax glauca, Smilax smallii, Berchemia scandens, Bignonia capreolata*, and *Lonicera sempervirens*. The herb layer includes a mix of *Hexastylis arifolia var. arifolia, Solidago arguta var. boottii, Pteridium aquilinum var. pseudocaudatum, Viola walteri, Arisaema triphyllum, Chasmanthium sessiliflorum, Chasmanthium laxum, Carex* spp., *Oplismenus hirtellus ssp. setarius (= Oplismenus setarius), Epifagus virginiana, Podophyllum peltatum, Uvularia perfoliata, Polygonatum biflorum, Mitchella repens, Trillium foetidissimum, Tipularia discolor, Polystichum acrostichoides, Dioscorea quaternata, Scleria* sp., *Aristolochia serpentaria, Sanicula canadensis, Lilium michauxii, Spigelia marilandica, Euphorbia corollata, Solidago caesia, Smilax herbacea* (very uncommon), and rarely *Chamaelirium luteum*. The troublesome exotics *Ligustrum sinense, Lygodium japonicum*, and *Lonicera japonica* are usually present to a greater or lesser degree in stands of this type.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fagus grandifolia*, *Quercus alba*
Tree canopy	Needle-leaved tree	*Pinus glabra*
Tree subcanopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*
Shrub/sapling (tall & short)	Needle-leaved tree	*Pinus glabra*
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Fagus grandifolia*, *Liquidambar styraciflua*, *Ostrya virginiana*, *Quercus alba*
Herb (field)	Liana	*Vitis rotundifolia*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus glabra*
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia*
Tree canopy	Broad-leaved evergreen tree	*Magnolia grandiflora*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Epifagus virginiana*, *Fagus grandifolia*, *Pinus glabra*, *Quercus alba*
Global: *Fagus grandifolia*, *Hexastylis arifolia* var. *arifolia*, *Illicium floridanum*, *Magnolia grandiflora*, *Magnolia macrophylla*, *Pinus glabra*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Magnolia ashei* (G2); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Lygodium japonicum* (High/Medium); **Other Plants**: *Trillium foetidissimum* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (11-Feb-2004). This type may be found throughout the lower portions of the East Gulf Coastal Plain, to areas within the natural range of *Magnolia grandiflora* and *Pinus glabra*. This community is not abundant anywhere. A relict of the Pleistocene glacial period, this community is restricted to relatively small areas of suitable cool, moist environmental conditions provided by ravine and stream slopes and upper river terraces (Delcourt and Delcourt 1977). Where it occurs on flat ground, this community is susceptible to urban/residential development and logging. On slopes, foot traffic, logging and feral hog activity are threats to the diverse herbaceous understory and may cause erosion. Undisturbed sites are rare, although there are a few excellent examples on protected lands in Florida. These forests contain some of the greatest floristic diversity of temperate forests in the U.S. and provide important habitat for many endemic species and species at their southern range limits (Kwit et al. 1998, Platt and Schwartz 1990).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Toward the northern edge of the range of this association, the canopy may contain substantial *Quercus alba, Liquidambar styraciflua*, and *Fagus grandifolia*; *Magnolia grandiflora* may be primarily in the subcanopy in these examples. See also *Fagus grandifolia - Quercus alba - Liquidambar styraciflua / Magnolia grandiflora / Smilax pumila* Forest (CEGL007210) for a related slightly less mesic forest with less dominance by *Magnolia grandiflora*. The former *Pinus glabra - Pinus taeda - Fagus grandifolia - Quercus alba - Magnolia grandiflora* Forest (CEGL007510) has been merged into this association by making *Illicium floridanum* optional as a dominant shrub in the title and broadening the floristic description to include species in CEGL007510. Research into differences between the Louisiana and Alabama beech-magnolia forests and those in Panhandle Florida, if there are any, is warranted.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Similar Associations:
- *Fagus grandifolia - Magnolia grandiflora - Fraxinus americana / Acer barbatum - Ostrya virginiana* Forest (CEGL007458)
- *Fagus grandifolia - Magnolia grandiflora - Quercus michauxii - Quercus nigra / Rhododendron canescens* Forest (CEGL004965)
- *Fagus grandifolia - Magnolia grandiflora / Ostrya virginiana / Aesculus parviflora* Forest (CEGL008554)
- *Fagus grandifolia - Quercus alba - Liquidambar styraciflua / Magnolia grandiflora / Smilax pumila* Forest (CEGL007210)

ELEMENT DISTRIBUTION

Global Range: This association occurs in the central and eastern Florida parishes (essentially east of the Amite River) of eastern Louisiana, and extends eastward into the Coastal Plain of Mississippi, Alabama, and western Florida.
Nations: US
States/Provinces: AL:S2S3, FL, GA, LA, MS
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Bd:CCC, 232Ba:CCC, 232Bg:CCC, 232Bh:CCC, 232Bj:CCC, 232Br:CCC, 232Dc:CCC
Federal Lands: DOD (Claiborne Lake, Eglin); NPS (Natchez Trace); USFS (Apalachicola, Conecuh?, De Soto, Homochitto, Tuskegee); USFWS (St. Marks)

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: L.M. Smith and A.S. Weakley
References: Allard 1990, Delcourt and Delcourt 1977, FNAI 1990, FNAI 1992b, FNAI 2010a, Kwit et al. 1998, NatureServe Ecology - Southeastern U.S. unpubl. data, Platt and Schwartz 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Loess Hills Hardwood - Pine Forest

***Fagus grandifolia - Magnolia grandiflora - Quercus pagoda - Acer barbatum - Pinus taeda* Forest**
American Beech - Southern Magnolia - Cherrybark Oak - Southern Sugar Maple - Loblolly Pine Forest
Identifier: CEGL004963

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Magnolia - Oak Forest (G007)
Alliance	Beech - Magnolia Forest (A0369)
Association	Southern Loess Hills Hardwood - Pine Forest

ELEMENT CONCEPT

Global Summary: This association represents the mixed hardwood - pine forests on strongly loess-influenced loam soils in the hills of the western Florida parishes of Louisiana and areas of adjacent southwestern Mississippi, just east of the Tunica Hills upland hardwood forest type. It is similar to *Quercus pagoda - Magnolia grandiflora - Fagus grandifolia / Hydrangea quercifolia / Thelypteris kunthii* Forest (CEGL007461) due to the presence of many calciphilic hardwoods, but it is not as rich and diverse in hardwood, shrub and fern species, and lacking the rare disjunct flora. In addition, pines and certain acidophilic mesic/dry-mesic hardwoods are a natural component of this type. Common trees include *Fagus grandifolia, Magnolia grandiflora, Quercus alba, Quercus pagoda, Quercus falcata, Quercus nigra, Quercus michauxii, Quercus stellata, Quercus shumardii, Liriodendron tulipifera, Carya glabra, Carya cordiformis, Fraxinus americana, Ulmus alata, Acer barbatum, Acer rubrum, Liquidambar styraciflua, Pinus taeda, Pinus glabra, Diospyros virginiana*, and *Magnolia virginiana*. Small trees and shrubs include *Morus rubra, Prunus caroliniana, Cornus florida, Ilex opaca, Oxydendrum arboreum, Carpinus caroliniana ssp. caroliniana, Ostrya virginiana, Sassafras albidum, Prunus serotina var. serotina, Ilex vomitoria, Symplocos tinctoria, Callicarpa americana, Hydrangea quercifolia, Vaccinium elliottii, Vaccinium arboreum, Aesculus pavia var. pavia, Erythrina herbacea, Rhododendron canescens, Styrax grandifolius, Halesia diptera, Aralia spinosa, Hamamelis virginiana*, and *Stewartia malacodendron* (rarely). Common woody vines include *Berchemia scandens, Bignonia capreolata, Vitis rotundifolia, Toxicodendron radicans, Smilax glauca, Smilax rotundifolia, Decumaria barbara, Parthenocissus quinquefolia*, and *Lonicera sempervirens* (invasive). The woody grass *Arundinaria gigantea* is common and often is present in patches of various sizes. Common herbs are *Chasmanthium sessiliflorum, Trillium foetidissimum, Polystichum acrostichoides, Onoclea sensibilis, Elephantopus carolinianus, Mitchella repens, Carex* spp., *Tipularia discolor, Prenanthes altissima, Viola walteri, Aristolochia serpentaria, Sanicula canadensis, Podophyllum peltatum*, and *Uvularia perfoliata*. This community is restricted to the western Florida parishes of eastern Louisiana and areas of adjacent southwestern Mississippi.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This mixed hardwood - pine forest was sampled at four locations in the park. Sites are gentle to moderate slopes and ridges with moderately well-drained silt loam or silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, past logging, fire suppression, possible dogwood (anthracnose, and the presence of exotic plants.
Global Environment: This association represents the mixed hardwood - pine forests on strongly loess-influenced loam soils in the hills of the western Florida parishes of Louisiana, just east of the Tunica Hills upland hardwood forest type.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (70-80% cover) canopy, 20-35 m tall, is dominated by *Liquidambar styraciflua, Magnolia grandiflora, Pinus taeda, Quercus nigra*, and *Quercus pagoda*, as is the moderate (30-70%) subcanopy (15-20 m) along with *Carpinus caroliniana, Cornus florida, Liriodendron tulipifera, Ostrya virginiana, Prunus serotina*, and *Quercus michauxii*. The sparse to dense (10-80%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of *Asimina triloba, Callicarpa americana, Carpinus caroliniana, Cornus florida, Frangula caroliniana, Fraxinus americana, Liquidambar styraciflua, Ostrya virginiana, Ulmus americana*, and *Vaccinium* spp. Herbs may be sparse or dense (80%) and include *Botrychium dissectum, Chasmanthium sessiliflorum, Oplismenus hirtellus, Polystichum acrostichoides*, and many others. Vines (10-20%) include *Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: Common trees in stands of this association include *Fagus grandifolia, Magnolia grandiflora, Quercus alba, Quercus pagoda, Quercus falcata, Quercus nigra, Quercus michauxii, Quercus stellata, Quercus shumardii, Liriodendron tulipifera, Carya glabra, Carya cordiformis, Fraxinus americana, Ulmus alata, Acer barbatum, Acer rubrum, Liquidambar styraciflua, Pinus taeda, Pinus glabra, Diospyros virginiana*, and *Magnolia virginiana*. Small trees and shrubs include *Morus rubra, Prunus caroliniana, Cornus florida, Ilex opaca, Oxydendrum arboreum, Carpinus caroliniana ssp. caroliniana, Ostrya virginiana, Sassafras albidum, Prunus serotina var. serotina, Ilex vomitoria, Symplocos tinctoria, Callicarpa americana, Hydrangea quercifolia, Vaccinium elliottii, Vaccinium arboreum, Aesculus pavia var. pavia, Erythrina herbacea, Rhododendron canescens, Styrax grandifolius, Halesia diptera, Aralia spinosa, Hamamelis virginiana*, and *Stewartia malacodendron* (rarely). Common woody vines include *Berchemia scandens, Bignonia capreolata, Vitis rotundifolia, Toxicodendron radicans, Smilax glauca, Smilax rotundifolia, Decumaria barbara, Parthenocissus quinquefolia*, and *Lonicera sempervirens* (invasive). The woody grass *Arundinaria gigantea* is common and often is present in patches of various sizes. Common herbs are *Chasmanthium sessiliflorum, Trillium foetidissimum, Polystichum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

acrostichoides, Onoclea sensibilis, Elephantopus carolinianus, Mitchella repens, Carex spp., *Tipularia discolor, Prenanthes altissima, Viola walteri, Aristolochia serpentaria, Sanicula canadensis, Podophyllum peltatum*, and *Uvularia perfoliata*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus taeda*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*, *Quercus pagoda*
Tree (canopy & subcanopy)	Broad-leaved evergreen tree	*Magnolia grandiflora*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Asimina triloba*, *Callicarpa americana*, *Frangula caroliniana*, *Ostrya virginiana*
Herb (field)	Flowering forb	*Oplismenus hirtellus*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*
Herb (field)	Fern (Spore-bearing forb)	*Botrychium dissectum*, *Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Acer barbatum*, *Fagus grandifolia*, *Quercus pagoda*
Tree canopy	Broad-leaved evergreen tree	*Magnolia grandiflora*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Magnolia grandiflora*, *Pinus taeda*, *Quercus pagoda*
Global: *Acer barbatum*, *Fagus grandifolia*, *Magnolia grandiflora*, *Pinus taeda*, *Quercus pagoda*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Oplismenus hirtellus* ()
Global: Invasive/Exotic Plants: *Lonicera sempervirens* (); **Other Plants**: *Trillium foetidissimum* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1G2 (28-Dec-2000). This community is restricted to the western Florida parishes of eastern Louisiana and areas of adjacent southwestern Mississippi. It is thought to be floristically and environmentally distinct from related vegetation either in the Tunica Hills to the west, or in the eastern Florida parishes of Louisiana. Its occurrence is restricted to slopes and deep soils, and it is threatened by timber removal, site conversion, and erosion. Many high-quality examples have been eliminated or degraded. Most of the few remaining examples of this association are now limited to steep slopes and isolated ravines which are difficult to enter with logging or farm machinery. Current threats include increased erosion, windthrow, microclimate modification from intensive silvicultural practices on adjacent uplands, herbicide use, and vegetation damage by feral hogs. Some examples have the potential to be protected in the Homochitto National Forest of Mississippi.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Similar Associations:
- *Quercus pagoda - Magnolia grandiflora - Fagus grandifolia / Hydrangea quercifolia / Thelypteris kunthii* Forest (CEGL007461)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi between M25 and M30, M30 and M35, and in the vicinity of M55.
Global Range: This community is restricted to the western 'Florida parishes' of eastern Louisiana and areas of adjacent southwestern Mississippi.
Nations: US
States/Provinces: LA, MS
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Bh:CCC, 232Ba:CCC, 232Bb:CCC, 232Bd:CCC, 234Ad:PPP
Federal Lands: NPS (Natchez Trace); USFS (Homochitto)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.173, NATR.548, NATR.549, NATR.568.
Local Description Authors: M.J. Russo
Global Description Authors: L.M. Smith
References: LNHP 2009, Nordman et al. 2011, Smith 1996a, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G166. Southern Mesic Beech - Oak - Mixed Deciduous Forest

Upper East Gulf Calcareous Bluff Forest

***Acer barbatum - Quercus shumardii - Quercus muehlenbergii - (Aesculus glabra, Carya myristiciformis)* Forest**
Southern Sugar Maple - Shumard Oak - Chinquapin Oak - (Ohio Buckeye, Nutmeg Hickory) Forest
Identifier: CEGL004671

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Coastal Plain Mesic Southern Sugar Maple - Oak Forest (A3236)
Association	Upper East Gulf Calcareous Bluff Forest

ELEMENT CONCEPT

Global Summary: This association is known from moist, north-facing, calcareous bluffs in the Upper East Gulf Coastal Plain of northeastern Mississippi and adjacent Alabama. Canopy species include *Acer barbatum, Aesculus glabra, Carya carolinae-septentrionalis, Carya laciniosa, Carya myristiciformis, Celtis laevigata, Fraxinus americana, Fraxinus pennsylvanica, Fraxinus quadrangulata, Gleditsia triacanthos, Juglans nigra, Morus rubra, Platanus occidentalis, Populus deltoides, Prunus serotina var. serotina, Quercus muehlenbergii, Quercus shumardii, Tilia americana var. caroliniana, Ulmus alata*, and *Ulmus americana*. The subcanopy stratum includes *Acer rubrum, Asimina triloba, Cercis canadensis var. canadensis, Cornus florida, Diospyros virginiana, Juniperus virginiana var. virginiana, Maclura pomifera, Ostrya virginiana, Sassafras albidum, Ulmus rubra*, and *Zanthoxylum clava-herculis*. Shrubs and woody vines include *Aesculus pavia var. pavia, Arundinaria gigantea, Berchemia scandens, Bignonia capreolata, Cocculus carolinus, Cornus drummondii, Crataegus calpodendron, Crataegus marshallii, Euonymus americanus, Euonymus atropurpureus, Frangula caroliniana, Ilex decidua, Menispermum canadense, Parthenocissus quinquefolia, Ptelea trifoliata, Sideroxylon lycioides, Smilax bona-nox, Symphoricarpos orbiculatus, Toxicodendron radicans, Viburnum rufidulum*, and *Vitis aestivalis*. Herbaceous species are numerous. Related vegetation may be found in the Tunica Hills or other calcareous uplands of Louisiana.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This maple - oak forest was sampled once on the park. The site is a moderate east-facing midslope with well-drained silt soil. The unvegetated surface is dominated by litter/duff with some wood. No evidence of disturbance other than the presence of exotic plants was reported. Stands assigned to this association are found in the Black Belt and related calcareous areas of the Upper East Gulf Coastal Plain.

Global Environment: This association is known from moist, north-facing, calcareous bluffs in the Upper East Gulf Coastal Plain of northeastern Mississippi and adjacent Alabama. This association is described from bluffs with mesophytic habitats in the Pontotoc Ridge-Black Prairie transition area of Oktibbeha County, northeastern Mississippi (Morris et al. 1993). The particular bluff from which the vegetation is described is classified as the Bluffport member of the Cretaceous Demopolis formation, the soils being of the Sumter soil series complex. The mean elevation of the bluffs is about 98 m (325 feet). They range from 82-112 m (270-370 feet). Related vegetation may be found in the Tunica Hills or other calcareous uplands of Louisiana.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: This mature calcareous slope forest is characterized by a prominence of *Quercus shumardii* in the moderately dense (70% cover) canopy (20-35 m tall), and to a lesser extent, by *Carya alba* and *Fraxinus americana*. The moderate (50%) subcanopy (10-15 m) is dominated by *Acer barbatum, Carpinus caroliniana*, and *Quercus muehlenbergii*. *Carpinus caroliniana* is the dominant shrub component, and the ground layer is dominated by *Toxicodendron radicans*. Vines include *Lonicera japonica* (invasive exotic) and *Smilax rotundifolia*.

Global Vegetation: Canopy species include *Acer barbatum, Aesculus glabra, Carya carolinae-septentrionalis, Carya laciniosa, Carya myristiciformis, Celtis laevigata, Fraxinus americana, Fraxinus pennsylvanica, Fraxinus quadrangulata, Gleditsia triacanthos, Juglans nigra, Morus rubra, Platanus occidentalis, Populus deltoides, Prunus serotina var. serotina, Quercus muehlenbergii, Quercus shumardii, Tilia americana var. caroliniana, Ulmus alata*, and *Ulmus americana*. The subcanopy stratum includes *Acer rubrum, Asimina triloba, Cercis canadensis var. canadensis, Cornus florida, Diospyros virginiana, Juniperus virginiana var. virginiana, Maclura pomifera, Ostrya virginiana, Sassafras albidum, Ulmus rubra*, and *Zanthoxylum clava-herculis*. Shrubs and woody vines include *Aesculus pavia var. pavia, Arundinaria gigantea, Berchemia scandens, Bignonia capreolata, Cocculus carolinus, Cornus drummondii, Crataegus calpodendron, Crataegus marshallii, Euonymus americanus, Euonymus atropurpureus, Frangula caroliniana, Ilex decidua, Menispermum canadense, Parthenocissus quinquefolia, Ptelea trifoliata, Sideroxylon lycioides, Smilax bona-nox, Symphoricarpos orbiculatus, Toxicodendron radicans, Viburnum rufidulum*, and *Vitis aestivalis*. Herbaceous species are *Allium canadense, Anemone virginiana, Arisaema dracontium, Arisaema triphyllum ssp. quinatum, Botrychium virginianum, Campanulastrum americanum, Cardamine concatenata, Carex albicans (= Carex artitecta), Carex blanda, Carex cephalophora, Carex cherokeensis, Carex gracilescens, Carex jamesii, Carex laxiflora var. serrulata, Carex muehlenbergii, Carex oxylepis, Carex willdenowii, Chasmanthium latifolium, Cynoglossum virginianum, Dasistoma macrophylla, Desmodium nudiflorum, Desmodium pauciflorum, Dichanthelium boscii, Euphorbia commutata, Lilium michauxii, Luzula echinata, Monotropa hypopithys,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Oxalis violacea, Panax quinquefolius, Penstemon tubiflorus, Phlox divaricata, Phryma leptostachya, Pleopeltis polypodioides ssp. michauxiana, Podophyllum peltatum, Polygonatum biflorum, Prenanthes altissima, Ruellia strepens, Sanguinaria canadensis, Sanicula odorata, Scrophularia marilandica, Silene stellata, Smilax herbacea, Spigelia marilandica, Frasera caroliniensis, Thalictrum thalictroides, Trillium recurvatum, and *Viola affinis* (Morris et al. 1993). Indicators of relative dominance are lacking in Morris et al. (1993).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya alba*, *Fraxinus americana*, *Quercus shumardii*
Tree subcanopy	Broad-leaved deciduous tree	*Acer barbatum*, *Quercus muehlenbergii*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Carpinus caroliniana*
Herb (field)	Liana	*Toxicodendron radicans*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer barbatum*, *Aesculus glabra*, *Carya myristiciformis*, *Quercus muehlenbergii*, *Quercus shumardii*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer barbatum*, *Apios priceana*, *Campanulastrum americanum*, *Carya myristiciformis*, *Fraxinus quadrangulata*, *Lithospermum tuberosum*, *Ptelea trifoliata*, *Quercus muehlenbergii*, *Quercus shumardii*
Global: *Acer barbatum*, *Aesculus glabra*, *Carya myristiciformis*, *Quercus muehlenbergii*, *Quercus shumardii*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Apios priceana* (G3), *Frasera caroliniensis* (G5, MS state-rare); **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium)
Global: Other Plants: *Maclura pomifera* (G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1G2 (31-Jan-2001). The complete range of this association is not known. It is presumably restricted to calcareous bluffs and slopes of the Upper East Gulf Coastal Plain, this being a specialized and scarce habitat. Stands are vulnerable to the effects of canopy removal and subsequent soil erosion. No examples are known to be protected, and some are highly threatened by timber removal and development. Other threats include windthrow, microclimate modification from intensive silvicultural practices on adjacent uplands, herbicide use, and vegetation damage by feral hogs.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: The name and circumscription of this association may need revision when additional data are available. This description based on Morris et al. (1993). Alliance placement needs to be reviewed; indicators of relative dominance are lacking in Morris et al. (1993). See also *Quercus shumardii - Quercus pagoda - Fraxinus americana / Ostrya virginiana / Trillium ludovicianum* Forest (CEGL007272) for perhaps related, oak-dominated stands of the West Gulf Coastal Plain. See Wieland (2000a) for mesic stands of bluffs in the Tertiary Jackson Formation of Mississippi.
Global Similar Associations:
- *Tilia americana - Acer barbatum - Fraxinus americana / Arundinaria gigantea / Tillandsia usneoides* Forest (CEGL008557)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi in the vicinity of M230.
Global Range: This association is described from calcareous bluffs of northeastern Mississippi and is presumed to occur in Alabama. Related vegetation may be found in the Tunica Hills or other calcareous uplands of Louisiana.
Nations: US
States/Provinces: AL, LA?, MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bd:CCP, 231Be:CCP, 231Bk:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.377.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: LNHP 2009, Morris et al. 1993, Nordman et al. 2011, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., Wieland 2000a

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Beech Floodplain Forest

***Fagus grandifolia* - *Carya* spp. / (*Acer negundo, Magnolia macrophylla, Tilia americana var. heterophylla*) Temporarily Flooded Forest**
American Beech - Hickory species / (Box-elder, Bigleaf Magnolia, Appalachian Basswood) Temporarily Flooded Forest
Identifier: CEGL004745

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Mesic Southern Coastal Plain Deciduous Forest (A2059)
Association	East Gulf Coastal Plain Beech Floodplain Forest

ELEMENT CONCEPT

Global Summary: The canopy of stands of this floodplain forest of the East Gulf and Upper East Gulf coastal plains is strongly dominated by *Fagus grandifolia*. Other canopy trees include *Carya ovalis, Carya carolinae-septentrionalis*, and *Ulmus americana*. The subcanopy may contain *Acer negundo, Magnolia macrophylla*, and/or *Tilia americana var. heterophylla*, but any of these species may not be present in all examples, as their ranges rarely overlap. Stands would typically contain lower coverage of other hardwoods typical of upper floodplain terraces in this region, such as *Liquidambar styraciflua, Quercus michauxii, Quercus nigra*, and *Quercus shumardii*. Shrubs include *Halesia diptera, Ulmus alata, Arundinaria gigantea* (which may have high cover), *Sabal minor, Toxicodendron radicans, Bignonia capreolata, Parthenocissus quinquefolia*, and *Lindera benzoin*. Some herbs include *Trillium decipiens, Carex granularis, Arisaema dracontium, Arisaema triphyllum, Dioscorea quaternata, Maianthemum racemosum, Eupatorium fistulosum, Botrychium virginianum, Onoclea sensibilis, Pleopeltis polypodioides, Polystichum acrostichoides*, and *Geranium maculatum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This beech - hickory forest was sampled at two locations in the park. Sites are flat to gently sloping bottomlands with somewhat poorly drained loam or silt soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes the presence of exotic plants.
Global Environment: This is a floodplain forest of the East Gulf and Upper East Gulf coastal plains.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (60-70% cover) canopy, 15-35 m tall, and moderate (40%) subcanopy (15-20 m) may include *Carya carolinae-septentrionalis, Carya glabra, Fagus grandifolia, Juniperus virginiana, Liquidambar styraciflua, Quercus michauxii*, and/or *Ulmus americana*. The sparse to moderate (10-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) may contain *Carpinus caroliniana, Cercis canadensis, Fraxinus americana, Ilex decidua*, and *Ostrya virginiana*. Common and/or abundant species in the moderate to dense (50-90%) herbaceous layer include *Chasmanthium latifolium, Chasmanthium sessiliflorum, Dichanthelium boscii, Mitchella repens, Trachelospermum difforme*, and *Verbesina occidentalis*.

Global Vegetation: This floodplain forest of the East Gulf and Upper East Gulf coastal plains is strongly dominated by *Fagus grandifolia*. Other canopy trees include *Carya ovalis, Carya carolinae-septentrionalis*, and *Ulmus americana*. The subcanopy of examples from Fort Benning, Georgia, contains *Acer negundo, Magnolia macrophylla*, and *Tilia americana var. heterophylla*, but any of these species may not be present in all examples, as their ranges rarely overlap. For example, *Tilia americana var. heterophylla* ranges south down the Chattahoochee River but is absent from parts of the putative range of this type to the east and west. Stands could contain lower coverage of other hardwoods typical of upper floodplain terraces in this region, such as *Liquidambar styraciflua, Quercus michauxii, Quercus nigra*, and *Quercus shumardii*. Although they may be present, *Liriodendron tulipifera* and *Betula nigra* are not characteristic of this community. Shrubs include *Halesia diptera, Ulmus alata, Arundinaria gigantea* (which may have high cover), *Sabal minor, Toxicodendron radicans, Bignonia capreolata, Parthenocissus quinquefolia*, and *Lindera benzoin*. Some herbs include *Trillium decipiens, Carex granularis, Arisaema dracontium, Arisaema triphyllum, Dioscorea quaternata, Maianthemum racemosum, Eupatorium fistulosum, Botrychium virginianum, Onoclea sensibilis, Pleopeltis polypodioides, Polystichum acrostichoides*, and *Geranium maculatum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya carolinae-septentrionalis*, *Carya glabra*, *Fagus grandifolia*, *Ulmus americana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Carpinus caroliniana*, *Cercis canadensis*, *Fraxinus americana*
Herb (field)	Flowering forb	*Verbesina occidentalis*
Herb (field)	Graminoid	*Chasmanthium latifolium*, *Chasmanthium sessiliflorum*, *Dichanthelium boscii*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya carolinae-septentrionalis*, *Carya ovalis*, *Fagus grandifolia*
Tree subcanopy	Broad-leaved deciduous tree	*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carpinus caroliniana*, *Carya glabra*, *Fagus grandifolia*
Global: *Acer negundo*, *Carya carolinae-septentrionalis*, *Carya ovalis*, *Fagus grandifolia*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Trillium decipiens* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (19-Aug-2002). The full range of this association is poorly known, but appears to be rare. Its potential area of occurrence is in the East Gulf and Upper East Gulf coastal plains. Beech-dominated floodplains seem to be uncommon on the landscape and to exhibit strong regional floristic variation. Additional information is needed to clarify the taxonomy and conservation status of this community type.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: *Liriodendron tulipifera* and *Betula nigra* may be present in stands of this community, but they are not characteristic species.
Global Similar Associations:
- *Fagus grandifolia - Carya cordiformis - Quercus michauxii / Ilex opaca var. opaca / Podophyllum peltatum* Forest (CEGL006493)
- *Fagus grandifolia - Liquidambar styraciflua - Quercus (michauxii, nigra)* Forest (CEGL007866) of the Atlantic Coastal Plain.
- *Fagus grandifolia - Quercus (laurifolia, nigra) - Pinus taeda* Forest (CEGL008574) of the West Gulf Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This association was sampled once in Colbert County, Alabama and once in Attala County, Mississippi.
Global Range: These beech-dominated floodplain forests are found in the East Gulf and Upper East Gulf coastal plains.
Nations: US
States/Provinces: AL, GA, MS, TN
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 222Cg:CCC, 231Bc:CCP, 231Bd:CCP, 231Be:CCC, 231Bg:CCC, 232Bq:CCC
Federal Lands: DOD (Fort Benning); NPS (Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.134, NATR.261.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Rich Beech - White Oak Forest

***Fagus grandifolia - Quercus alba - Liquidambar styraciflua / Magnolia grandiflora / Smilax pumila* Forest**
American Beech - White Oak - Sweetgum / Southern Magnolia / Sarsaparilla-vine Forest
Identifier: CEGL007210

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Mesic Southern Coastal Plain Deciduous Forest (A2059)
Association	East Gulf Coastal Plain Rich Beech - White Oak Forest

ELEMENT CONCEPT

Global Summary: This association includes mesic mixed hardwood forests of the Gulf Coastal Plain east of the Mississippi River. Within this region, examples are found within the range of *Magnolia grandiflora*, and stands typically include a diagnostic component of this species. Stands of this association contain a canopy dominated by *Fagus grandifolia* and *Quercus alba*, with *Nyssa sylvatica, Liquidambar styraciflua*, and *Quercus hemisphaerica* (more prevalent on upper slopes). The more-or-less open subcanopy contains *Magnolia grandiflora, Magnolia macrophylla, Ostrya virginiana, Liriodendron tulipifera, Acer rubrum*, and *Cornus florida*. Shrubs and woody vines are relatively sparse; shrubs include *Aesculus pavia, Arundinaria gigantea, Hamamelis virginiana, Vaccinium elliottii, Ilex decidua, Symplocos tinctoria, Asimina parviflora*, and *Hypericum hypericoides*. Woody vines include *Vitis rotundifolia, Gelsemium sempervirens*, and *Toxicodendron radicans*. The herbaceous stratum includes *Smilax pumila, Polystichum acrostichoides, Mitchella repens, Arisaema triphyllum, Aristolochia serpentaria, Hexastylis arifolia var. callifolia*?, *Euphorbia corollata, Scutellaria elliptica, Dichanthelium boscii, Chasmanthium sessiliflorum, Carex* spp., *Dioscorea villosa*, and the epiphyte *Pleopeltis polypodioides (= Polypodium polypodioides)*.

ENVIRONMENTAL DESCRIPTION

Global Environment: These forests are found in ravines, slopes, and other sheltered, shaded, concave environments of the Coastal Plain. In some areas this association grades up into forests dominated or codominated by *Quercus hemisphaerica*, or which contain *Quercus falcata, Quercus stellata, Pinus taeda*, and *Juniperus virginiana*.

VEGETATION DESCRIPTION

Global Vegetation: This association differs from genuine beech-magnolia forests (of farther south or of more mesic environments) by having *Magnolia grandiflora*, if present at all, confined to the lower woody strata and not present in the canopy. Typical stands of this association contain a canopy dominated by *Fagus grandifolia* and *Quercus alba*, with *Nyssa sylvatica, Liquidambar styraciflua*, and *Quercus hemisphaerica* (this more prevalent on upper slopes). The more-or-less open subcanopy contains *Magnolia grandiflora, Magnolia macrophylla, Ostrya virginiana, Liriodendron tulipifera, Acer rubrum*, and *Cornus florida*. Shrubs and woody vines are relatively sparse; the shrub stratum may be more diverse than the herbaceous one. Shrubs include *Aesculus pavia, Arundinaria gigantea, Hamamelis virginiana, Vaccinium elliottii, Ilex decidua, Symplocos tinctoria, Asimina parviflora*, and *Hypericum hypericoides*. Woody vines include *Vitis rotundifolia, Gelsemium sempervirens*, and *Toxicodendron radicans*. The herbaceous stratum includes *Smilax pumila, Polystichum acrostichoides, Mitchella repens, Arisaema triphyllum, Aristolochia serpentaria, Hexastylis arifolia var. callifolia*?, *Euphorbia corollata, Scutellaria elliptica, Dichanthelium boscii, Chasmanthium sessiliflorum, Sanguinaria canadensis, Trillium* sp., *Carex* spp., *Dioscorea villosa*, and the epiphyte *Pleopeltis polypodioides (= Polypodium polypodioides)*.

MOST ABUNDANT SPECIES

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia*, *Liquidambar styraciflua*, *Quercus alba*
Tree subcanopy	Broad-leaved evergreen tree	*Magnolia grandiflora*

CHARACTERISTIC SPECIES

Global: *Fagus grandifolia*, *Hexastylis arifolia*, *Liquidambar styraciflua*, *Magnolia grandiflora*, *Quercus alba*, *Smilax pumila*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Croomia pauciflora* (G3), *Magnolia ashei* (G2), *Panax quinquefolius* (G3G4, under collection pressure), *Trillium reliquum* (G3); **Other Plants**: *Rhapidophyllum hystrix* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (15-Oct-2002). This is not an inherently rare forest type, even though it is restricted in its environment and its position on the landscape. Many examples have escaped environmental damage due to their relative inaccessibility. These forests are more widely distributed than true beech-magnolia forests. Threats include removal of the more valuable timber species (e.g., *Quercus alba*) and erosion from timber removal activities, as well as the conversion of adjacent areas to planted pine stands. Some examples are protected on national forests and military bases. The remaining examples on private land are highly vulnerable to canopy removal and conversion to other forest types.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type was originally based on the work of Monk et al. (1989), but the association concept has since been narrowed considerably. This association has been documented from steep slopes of loess-derived soils in the Homochitto National Forest of Mississippi where it grades upslope into forests on upper slopes and ridges which contain *Quercus falcata, Quercus stellata, Pinus taeda*, and *Juniperus virginiana*. Stands have also been attributed to this type in Alabama and north Florida (NatureServe Ecology unpubl. data). Some stands in the Talladega National Forest, Oakmulgee Ranger District, are clearly related to this type, but do not contain any *Magnolia grandiflora* and have dense shrub layers composed of *Illicium floridanum*. They are placed here tentatively, but may be worthy of separate recognition.
Global Similar Associations:

- *Fagus grandifolia - Magnolia grandiflora - Pinus glabra - (Magnolia macrophylla) / (Illicium floridanum)* Forest (CEGL007460) is a beech-magnolia forest rather than a beech-white oak forest.
- *Fagus grandifolia - Magnolia grandiflora / Ostrya virginiana / Aesculus parviflora* Forest (CEGL008554)
- *Fagus grandifolia - Quercus (alba, rubra) / Acer barbatum / Asimina triloba* Forest (CEGL004072)
- *Fagus grandifolia - Quercus alba / Ilex opaca var. opaca / Athyrium filix-femina ssp. asplenioides* Forest (CEGL007208) is presumably the analogous West Gulf Coastal Plain type; possibly the most significant difference between the West Gulf Coastal Plain and East Gulf Coastal Plain types is the occurrence of *Hexastylis arifolia* which is not known from either Texas (Hatch et al. 1990) or western Louisiana (Thomas and Allen 1996).
- *Fagus grandifolia - Quercus alba / Symplocos tinctoria* East Gulf Coastal Plain Forest (CEGL003859)

ELEMENT DISTRIBUTION

Global Range: This forest is known from the East Gulf Coastal Plain and Upper East Gulf Coastal Plain of the southeastern United States. Its possible status assignment to the South Atlantic Coastal Plain is questionable.
Nations: US
States/Provinces: AL, FL, GA, LA, MS, SC
TNC Ecoregions: 43:C, 53:C, 56:?
USFS Ecoregions (1994/95): 231Bd:CCC, 232Bb:CCC, 232Bg:CCC, 232Bl:CCC, 232Bs:CCC
Federal Lands: DOD (Claiborne Lake, Fort Benning); NPS (Natchez Trace); USFS (Apalachicola, Bienville, Conecuh, De Soto, Francis Marion, Homochitto, Talladega, Talladega (Oakmulgee), Tombigbee?, Tuskegee); USFWS (Hillside)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: S. Landaal and M. Pyne
References: Allard 1990, FNAI 1992a, FNAI 1992b, FNAI 2010a, Hatch et al. 1990, Monk et al. 1989, NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data, Schotz pers. comm., Southeastern Ecology Working Group n.d., Thomas and Allen 1996

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Loblolly - White Oak Forest

***Pinus taeda - Quercus alba / Chasmanthium sessiliflorum* Forest**
Loblolly Pine - White Oak / Longleaf Woodoats Forest
Identifier: CEGL004763

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Mesic Southern Coastal Plain Deciduous Forest (A2059)
Association	East Gulf Coastal Plain Loblolly - White Oak Forest

ELEMENT CONCEPT

Global Summary: This forest of the East Gulf Coastal Plain is dominated by *Pinus taeda* and *Quercus alba*. It is a naturally occurring community which may bear some resemblance to, but should not be confused with, successional loblolly stands. Examples are most typically found on upper to midslopes in dissected topography both within the range of longleaf pine and north of this range. *Pinus taeda* and *Quercus alba* are the most constant and diagnostic species of this association. A number of other hardwoods may be present in stands but they occur in low levels of importance. Woody vines and shrubs may be frequent, and herbs are typically sparse and not very diverse. This forest tends to occur in landscapes affected by frequent fire, but this community is less fire-prone than adjacent upland vegetation.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This pine-oak forest was sampled at four locations in the park. Sites are gentle to moderate slopes and ridges with well- to moderately well-drained silt loam soil. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes erosion from past roads, past logging, wind damage, and the presence of exotic plants.
Global Environment: Stands have been documented on somewhat moist, moderately well-drained, sandy soils on lower slopes near streams in the Coastal Plain of Mississippi (NatureServe Ecology unpubl. data, R. Wieland unpubl. data). Stands also occur on flat uplands with locally variable microtopography including evident depressional areas (R. Wieland unpubl. data) which are sometimes known as flatwoods.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to very dense (60-90% cover) canopy, 15-35 m tall, is dominated by *Pinus taeda* and *Quercus* spp., including *Quercus alba, Quercus falcata, Quercus nigra, Quercus pagoda, Quercus phellos, Quercus stellata*, and *Quercus velutina*. The sparse to moderate (10-70%) subcanopy (10-20 m) includes canopy species as well as *Acer rubrum, Carya* spp., *Liquidambar styraciflua*, and *Ulmus alata*. The sparse to moderate (20-60%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of subcanopy species along with *Callicarpa americana, Euonymus americanus, Morus rubra, Nyssa sylvatica, Prunus serotina, Sebastiania fruticosa, Symplocos tinctoria*, and *Vaccinium* spp. Herbs are sparse but include *Chasmanthium laxum* and *Chasmanthium sessiliflorum*; vines present (up to 30%) are *Gelsemium sempervirens, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: Stands of this association are dominated by *Pinus taeda* and *Quercus alba*, and these two species are the most constant and diagnostic species. Although the relative proportion of the two may vary somewhat between examples, in most cases *Pinus taeda* is strongly dominant followed by *Quercus alba* (NatureServe Ecology unpubl. data, R. Wieland unpubl. data). Other important trees recorded in some known examples of this association include *Pinus echinata, Liquidambar styraciflua, Carya glabra, Carya alba*, and *Oxydendrum arboreum*. Less commonly encountered species found in some stands currently attributed to this type are *Pinus glabra, Magnolia macrophylla, Quercus coccinea*, and *Fagus grandifolia*. Small amounts of other *Quercus* spp. may also be present (i.e., *Quercus falcata* and *Quercus rubra*), but if these are found in high relative abundance, they would be indicative of other associations. A number of subcanopy and shrub species may also be present, but none are considered particularly diagnostic. These can include *Cornus florida, Acer rubrum, Ostrya virginiana var. virginiana, Prunus serotina var. serotina, Nyssa sylvatica, Ulmus alata, Hydrangea arborescens, Callicarpa americana, Hamamelis virginiana, Morella cerifera (= Myrica cerifera), Vaccinium elliottii*, and *Vaccinium arboreum*. Woody vines are frequent; *Vitis rotundifolia* sometimes dominates the ground layer. Other vines include *Berchemia scandens, Gelsemium sempervirens, Parthenocissus quinquefolia, Toxicodendron radicans*, and *Bignonia capreolata*. Herbs tend to be sparse and not very diverse; *Chasmanthium sessiliflorum* may be dominant. Other herbs may include *Elephantopus carolinianus, Botrychium dissectum, Polystichum acrostichoides, Sanicula smallii, Mitchella repens, Aristolochia serpentaria, Dichanthelium boscii, Euphorbia corollata*, and *Hypericum hypericoides*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus taeda*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus alba*
Herb (field)	Graminoid	*Chasmanthium laxum*, *Chasmanthium sessiliflorum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Chasmanthium sessiliflorum*, *Pinus taeda*, *Quercus alba*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (11-Feb-2004). This is a naturally occurring forest type confined to the East Gulf Coastal Plain and possibly adjacent areas of the South Atlantic Coastal Plain. Typical stands have been affected by a host of anthropogenic disturbances such as logging and more importantly conversion to plantation pine. In the core range of this type, plantations have been expanding at tremendous rates (McWilliams 1992) often at the expense of natural forests. Intact and mature examples are uncommon and may be largely confined to public lands. Southern Pine Beetles threaten these existing stands and may completely decimate the pine overstory during epidemics.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: The concept of this type is supported by plot data collected in Mississippi (NatureServe Ecology unpubl. data, R. Wieland unpubl. data). The type concept was originally somewhat broader as suggested by the inclusion of *Quercus falcata* as a nominal (which tends to occur on slightly drier sites in the region, and infrequently co-occurs with *Quercus alba*).
Global Similar Associations:

- *Pinus taeda - (Pinus echinata) - Quercus falcata - Carya texana / Vaccinium arboreum* Forest (CEGL007528) related species composition, but occurs west of the Mississippi River only.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi between M110 and M115, M150 and M155, and in the vicinity of M110 and M120.
Global Range: This association is found in the East Gulf Coastal Plain of the United States.
Nations: US
States/Provinces: AL, FL?, GA, LA?, MS
TNC Ecoregions: 43:C, 53:C, 56:?
USFS Ecoregions (1994/95): 231Bg:CCC, 231Bi:CCC, 231Bj:CCC, 231Bl:CCC, 232Ba:CCP, 232Bb:CCC, 232Bj:CCP, 232Bk:CCP, 232Bl:CCC, 232Bq:CCC
Federal Lands: DOD (Fort Benning?); NPS (Natchez Trace); USFS (Apalachicola?, Bienville, Conecuh?, De Soto?, Holly Springs?, Homochitto, Talladega?, Tombigbee, Tuskegee?); USFWS (Eufaula, Noxubee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.184, NATR.186, NATR.501, NATR.505.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne and S. Landaal, mod. R.E. Evans
References: ALNHP 2002, Allard 1990, McWilliams 1992, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., Wieland 1994b, Wieland 2000b, Wieland unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Loess Bluff Sweetgum - Pecan - Water Oak Forest

***Liquidambar styraciflua - Carya illinoinensis - Quercus nigra* Loess Bluff Forest**
Sweetgum - Pecan - Water Oak Loess Bluff Forest
Identifier: CEGL004122

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Mesic Coastal Plain Oak - Hickory Forest (A3234)
Association	Loess Bluff Sweetgum - Pecan - Water Oak Forest

ELEMENT CONCEPT

Global Summary: This association is an upland forest which occurs on moderate to steep sloping loess bluffs associated with the Mississippi River in the Upper East Gulf Coastal Plain (TNC Ecoregion 43). This upland deciduous hardwood forest association is dominated by *Liquidambar styraciflua, Carya illinoinensis*, and to a lesser extent *Quercus nigra*. Other less dominant trees are *Quercus pagoda, Quercus shumardii, Quercus velutina, Quercus rubra, Quercus muehlenbergii, Celtis laevigata, Ulmus rubra, Gleditsia triacanthos, Fraxinus americana*, and in one ravine bottom site *Populus deltoides* and *Robinia pseudoacacia*. Other canopy trees include *Liriodendron tulipifera, Prunus serotina, Sassafras albidum*, and *Quercus michauxii*. Subcanopy trees with the highest cover include *Liquidambar styraciflua, Quercus nigra, Morus rubra, Acer negundo, Liriodendron tulipifera, Celtis laevigata, Ulmus alata, Magnolia grandiflora, Quercus muehlenbergii*, and *Sassafras albidum*. The complete lack of *Quercus alba* is notable and helps separate this from other associations.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sweetgum - water oak forest was sampled at six locations in the park. Sites are gentle to moderate slopes and ridges of any aspect with well- to moderately well-drained silt or silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, wind/ice damage, erosion, and the presence of exotic plants.
Global Environment: This is an upland forest which occurs on moderate to steep sloping loess bluffs associated with the Mississippi River in the Upper East Gulf Coastal Plain (TNC Ecoregion 43). Soils are erosive, well-drained silt loams formed from loess.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (40-70% cover) canopy, 15-35 m tall, and moderate (30-60%) subcanopy (5-20 m) are dominated by *Liquidambar styraciflua* and *Quercus nigra*; additional tree species may include *Acer negundo* (subcanopy), *Carya cordiformis, Carya illinoinensis, Gleditsia triacanthos*, and other *Quercus* spp. The sparse to moderate (5-60%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers may include canopy species along with *Asimina triloba, Cornus foemina, Frangula caroliniana, Fraxinus americana, Lindera benzoin*, and *Ulmus alata*. Common and/or abundant species in the sparse to moderate (5-60%) herbaceous layer include *Bignonia capreolata, Botrychium* spp., *Chasmanthium sessiliflorum, Dichanthelium* spp., *Polygonum virginianum, Polystichum acrostichoides*, and *Symphyotrichum lateriflorum*. Vines (10-20%) include *Berchemia scandens, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: This upland deciduous hardwood forest association is dominated by *Liquidambar styraciflua, Carya illinoinensis*, and to a lesser extent *Quercus nigra*. Other less dominant trees are *Quercus pagoda, Quercus shumardii, Quercus velutina, Quercus rubra, Quercus muehlenbergii, Celtis laevigata, Ulmus rubra, Gleditsia triacanthos, Fraxinus americana*, and in one ravine bottom site *Populus deltoides* and *Robinia pseudoacacia*. Other canopy trees include *Liriodendron tulipifera, Prunus serotina, Sassafras albidum*, and *Quercus michauxii*. Subcanopy trees with the highest cover include *Liquidambar styraciflua, Quercus nigra, Morus rubra, Acer negundo, Liriodendron tulipifera, Celtis laevigata, Ulmus alata, Magnolia grandiflora* (which could be naturalized here), *Quercus muehlenbergii*, and *Sassafras albidum*. Other subcanopy trees are *Acer barbatum, Ulmus americana, Ulmus rubra, Quercus michauxii, Robinia pseudoacacia, Quercus pagoda, Quercus shumardii, Quercus velutina, Carya cordiformis, Quercus rubra, Cornus florida, Tilia americana var. caroliniana, Juniperus virginiana, Carpinus caroliniana*, and *Prunus serotina*. The complete lack of *Quercus alba* is notable and helps separate this from other associations. This association can have high cover of trees and shrubs in the tall-shrub layer. The invasive exotic plant *Ligustrum sinense* had the highest cover of any woody plant in the tall-shrub layer; in about half of the sampled plots it had over 25% cover and in about 20% of the plots it had over 75% cover. The most abundant native woody plants in the tall-shrub layer include *Liquidambar styraciflua, Cercis canadensis, Hydrangea quercifolia*, and *Arundinaria gigantea*. Other less abundant species include *Quercus nigra, Carya illinoinensis, Acer negundo, Acer barbatum, Ulmus americana, Frangula caroliniana, Ulmus alata, Ulmus rubra, Morus rubra, Celtis laevigata, Liriodendron tulipifera, Robinia pseudoacacia, Carya cordiformis, Cornus drummondii, Quercus muehlenbergii, Quercus shumardii, Sassafras albidum, Cornus florida, Juniperus virginiana, Prunus caroliniana, Asimina triloba*, and least commonly *Prunus serotina, Lindera benzoin, Quercus michauxii, Sideroxylon lycioides, Ostrya virginiana, Ilex decidua, Diospyros virginiana, Magnolia grandiflora*, and the exotic plants *Ligustrum japonicum* and *Poncirus trifoliata*. The short shrub with the highest cover is *Toxicodendron radicans*; additional short shrubs include *Euonymus americanus, Aralia spinosa, Juglans nigra, Cornus alternifolia, Sambucus canadensis*, plus the exotic escaped ornamental plants *Nandina domestica, Lonicera japonica*, and *Ligustrum sinense*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Herbaceous plants are generally sparse and include *Asplenium platyneuron, Oplismenus hirtellus, Matelea* sp., *Boehmeria cylindrica, Geum canadense, Athyrium filix-femina ssp. asplenioides, Aristolochia serpentaria, Ageratina altissima (= Eupatorium rugosum), Sanicula canadensis, Polygonum virginianum, Eupatorium serotinum, Polystichum acrostichoides, Botrychium dissectum, Elymus virginicus, Elephantopus carolinianus, Cystopteris protrusa, Leersia virginica, Bidens bipinnata, Carex oxylepis, Carex cherokeensis, Amphicarpaea bracteata, Botrychium virginianum, Phryma leptostachya, Arisaema triphyllum, Dioscorea villosa, Lactuca floridana, Clematis virginiana, Cynoglossum virginianum, Arisaema dracontium, Desmodium perplexum, Dichanthelium boscii, Passiflora lutea, Carex digitalis, Vinca major*, and *Symphyotrichum undulatum*, and exotics *Hedera helix, Cyrtomium fortunei*, and *Liriope* sp.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*
Tree subcanopy	Broad-leaved deciduous tree	*Acer negundo*, *Morus rubra*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya illinoinensis*, *Liquidambar styraciflua*, *Quercus nigra*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya illinoinensis*, *Liquidambar styraciflua*, *Quercus nigra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Melia azedarach* (Medium/Low), *Microstegium vimineum* (High/Medium), *Poncirus trifoliata* ()

Global: Invasive/Exotic Plants: *Cyrtomium fortunei* (), *Hedera helix* (High/Medium), *Ligustrum japonicum* (Medium/Low), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Nandina domestica* (High/Low), *Poncirus trifoliata* ()

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (27-Jan-2016). This association is currently only known from the Loess Bluffs of the Mississippi River in Mississippi, documented at Vicksburg National Military Park. Areas outside the park are only protected to the extent that they are hard to access for logging due to moderate to steep slopes. Many of these forests are successional in nature, having been cleared during the Civil War and at other times. This would tend to suggest that these forests may not be so rare within the specialized habitat of the loess bluffs in Mississippi. The dominant trees are all early-successional species, but this forest seems to be part of the natural community diversity of this habitat.

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Global Similar Associations:

- *Liquidambar styraciflua - Quercus (alba, falcata)* Ruderal Forest (CEGL007217) another *Liquidambar styraciflua*-dominated successional community in nearby East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland (CES203.482).
- *Quercus pagoda - Magnolia grandiflora - Fagus grandifolia / Hydrangea quercifolia / Thelypteris kunthii* Forest (CEGL007461)
- *Quercus pagoda - Quercus michauxii - Magnolia grandiflora - (Tilia americana var. caroliniana) / Sabal minor* Forest (CEGL007712)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The six sampled sites are in Mississippi between M5 and M10, M30 and M35, M40 and M45, and in the vicinity of M35, M75, and M80.

Global Range: This association is currently only known from the Loess Bluffs of the Mississippi River in Mississippi, documented at Vicksburg National Military Park.

Nations: US

States/Provinces: MS

TNC Ecoregions: 43:C, 53:C

USFS Ecoregions (1994/95): 231Bh:CCC, 231Bi:CCC, 232Bb:CCC, 232Bd:CCC

Federal Lands: NPS (Natchez Trace, Vicksburg)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.314, NATR.330, NATR.345, NATR.562, NATR.563, NATR.571.

Local Description Authors: M.J. Russo

Global Description Authors: C.W. Nordman

References: Lea et al. 2013, Nordman et al. 2011, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Basic Mesic Coastal Plain Oak-Hickory Forest

***Quercus alba - Carya glabra - Carya alba / Aesculus pavia* Forest**
White Oak - Pignut Hickory - Mockernut Hickory / Red Buckeye Forest
Identifier: CEGL007225

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Mesic Coastal Plain Oak - Hickory Forest (A3234)
Association	Basic Mesic Coastal Plain Oak-Hickory Forest

ELEMENT CONCEPT

Global Summary: This type is a nutrient-rich, calcareous to subcalcareous, mesic Coastal Plain forest found east of the Mississippi River, extending to the Mid-Atlantic Coastal Plain of North Carolina. Stands are typically dominated by *Quercus alba* and *Carya* spp. *Aesculus pavia* is characteristically present in the understory and shrub layer. Some other canopy components include *Quercus nigra, Carya cordiformis* (in more mesic examples), *Carya pallida* (in drier ones), *Fraxinus americana, Liriodendron tulipifera*, and *Liquidambar styraciflua*. The subcanopy may contain *Liquidambar styraciflua, Liriodendron tulipifera, Cornus florida, Nyssa sylvatica, Morus rubra, Celtis occidentalis, Ostrya virginiana, Acer rubrum, Diospyros virginiana, Prunus serotina, Ulmus alata*, and/or *Quercus velutina*. *Fagus grandifolia* may be present in any of the woody strata but will not be dominant or codominant. Typical vines include *Vitis rotundifolia, Parthenocissus quinquefolia, Cocculus carolinus, Smilax bona-nox, Smilax glauca, Berchemia scandens*, and *Toxicodendron radicans*. More information is needed on the detailed range, environment, and floristics of this association.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This white oak - hickory forest was sampled at nine locations in the park. Sites moderate to somewhat steep slopes, ridges and ravines with northern, eastern, and southern or variable aspects. Soils are well- to moderately well-drained sandy clay, sandy loam, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, past agriculture and erosion, dogwood anthracnose, and the presence of exotic plants.
Global Environment: More information is needed on the detailed range, environment, and floristics of this association. Conceptually, it would be a coastal plain oak-hickory forest found on circumneutral substrates (e.g., on soils with a shell fraction in the profile).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-80% cover) canopy, 20-35 m tall, is dominated by *Quercus alba* along with *Carya alba, Carya glabra, Carya ovalis*, and/or *Carya ovata*; additional trees may include *Fagus grandifolia, Liquidambar styraciflua, Quercus muehlenbergii, Quercus nigra, Quercus pagoda, Quercus shumardii, Quercus stellata*, and other *Quercus* spp. The moderate to dense (30-80%) subcanopy (10-20 m) is dominated by *Acer barbatum, Acer rubrum, Carpinus caroliniana, Carya* spp., *Liquidambar styraciflua, Ostrya virginiana*, and *Quercus* spp. Dominants in the sparse to dense (10-80%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers may include canopy/subcanopy species as well as *Aesculus pavia, Amorpha fruticosa, Arundinaria gigantea, Callicarpa americana, Euonymus americanus, Ilex decidua*, and *Ulmus alata*. The herbaceous layer (5-80%) is often dominated by seedlings of tree and shrub species, but may also be dominated by *Botrychium* spp., *Chasmanthium sessiliflorum, Dichanthelium boscii, Lysimachia lanceolata, Polystichum acrostichoides*, and/or *Uvularia sessilifolia*. Prominent vines (up to 60% cover) include *Bignonia capreolata, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: Stands are typically dominated by *Quercus alba* and *Carya* spp. (most frequently *Carya glabra*, possibly *Carya cordiformis* in more mesic examples, and *Carya pallida* in drier ones). *Aesculus pavia* is characteristically present in the understory and shrub layer. Some other canopy components include *Quercus nigra, Fraxinus americana, Liriodendron tulipifera*, and *Liquidambar styraciflua*. The subcanopy may contain *Liquidambar styraciflua, Cornus florida, Nyssa sylvatica, Morus rubra, Celtis occidentalis, Ostrya virginiana, Acer rubrum, Diospyros virginiana, Prunus serotina, Ulmus alata*, and/or *Quercus velutina*. Some other possible shrubs include *Arundinaria gigantea, Asimina parviflora, Callicarpa americana, Quercus alba, Quercus velutina, Vaccinium elliottii, Rubus argutus*, and *Vaccinium fuscatum*. Typical vines include *Vitis rotundifolia, Parthenocissus quinquefolia, Cocculus carolinus, Smilax bona-nox, Smilax glauca, Berchemia scandens*, and *Toxicodendron radicans*.

Vegetation from Fort Benning, Georgia, which appears to be compatible with this concept contains *Quercus alba, Quercus nigra, Carya pallida, Carya alba*, and *Fraxinus americana* in the canopy, *Cornus florida* and *Liriodendron tulipifera* in the subcanopy as well as *Aesculus pavia, Vitis rotundifolia, Callicarpa americana, Aralia spinosa, Polygonatum biflorum, Hexastylis arifolia, Aristolochia serpentaria, Elephantopus tomentosus, Matelea* sp., and *Passiflora lutea*. This stand would not be on a completely calcareous soil, being found in a more sandy landscape (some sands have a calcareous shell fraction). The concept of this type may be somewhat expanded to accommodate these data. See also stand data from plot TALO.35, Five Mile Branch, Talladega-Oakmulgee National Forest. This example differs from the stand at Fort Benning, but is probably also compatible with the concept of this type. This stand is dominated by *Quercus alba, Liriodendron tulipifera*, and *Liquidambar styraciflua*. Other oak species are not in the

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

canopy and have negligible cover in the subcanopy. The subcanopy contains *Liquidambar styraciflua, Cornus florida, Nyssa sylvatica, Morus rubra, Prunus serotina, Ulmus alata*, and *Quercus velutina*. The hickories *Carya alba* and *Carya glabra* (nominals in this association), as well as *Aesculus pavia*, are present in the shrub layer. Other small trees and shrubs include *Arundinaria gigantea, Diospyros virginiana, Asimina parviflora, Callicarpa americana, Acer rubrum, Quercus alba, Quercus velutina, Celtis occidentalis, Ostrya virginiana, Nyssa sylvatica, Vaccinium elliottii, Rubus argutus*, and *Vaccinium fuscatum*. Typical vines include *Vitis rotundifolia, Parthenocissus quinquefolia, Cocculus carolinus, Smilax bona-nox, Smilax glauca, Berchemia scandens*, and *Toxicodendron radicans*. Herbs in this particular stand include *Acalypha gracilens, Aristolochia serpentaria, Chamaelirium luteum, Chasmanthium sessiliflorum* (most frequent here), *Desmodium* sp., *Dichanthelium* sp., *Dioscorea quaternata, Euphorbia pubentissima, Hexastylis arifolia, Mitchella repens, Ruellia caroliniensis, Smilax hugeri, Viola* spp., and *Athyrium filix-femina ssp. asplenioides* (NatureServe Ecology unpubl. data).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya alba*, *Carya glabra*, *Carya ovalis*, *Carya ovata*, *Quercus alba*
Tree subcanopy	Broad-leaved deciduous tree	*Acer barbatum*, *Carpinus caroliniana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Aesculus pavia*
Herb (field)	Flowering forb	*Uvularia sessilifolia*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*, *Dichanthelium boscii*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya glabra*, *Quercus alba*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Aesculus pavia*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Aesculus pavia*, *Carya glabra*, *Carya ovalis*, *Quercus alba*, *Spigelia marilandica*, *Uvularia sessilifolia*
Global: *Aesculus pavia*, *Carya glabra*, *Quercus alba*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Phyllostachys aurea* (Medium/Low)
Global: Vulnerable Plants: *Brickellia cordifolia* (G3), *Croomia pauciflora* (G3); **Other Plants**: *Rhapidophyllum hystrix* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (28-Mar-2003). Based on a relatively large natural range throughout the Coastal Plain, this is presumably not a rare forest type. However, within this range calcareous to subcalcareous environments are less common than acidic ones. In addition, most examples have been impacted by removal of the more valuable timber species (e.g., *Quercus alba*), and remaining ones on private land are highly vulnerable to canopy removal and conversion to other forest types or other land uses. It would be restricted to the Coastal Plain of the United States.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This association needs additional clarification, expansion, and subsequent range determination. More information is needed on specific examples of this association and how to floristically distinguish it. It is somewhat ambiguously assigned to both "mesic" and "dry-mesic" ecological systems in the southeastern coastal plains.
Global Similar Associations:

- *Pinus taeda - Quercus falcata - Quercus alba / Chasmanthium sessiliflorum - Piptochaetium avenaceum* Forest (CEGL004091)
- *Quercus alba - Carya alba / Chasmanthium sessiliflorum* West Gulf Coastal Plain Forest (CEGL008413) of the West Gulf Coastal Plain.
- *Quercus alba - Carya glabra* / Mixed Herbs Coastal Plain Forest (CEGL007226)
- *Quercus alba - Quercus rubra / Ostrya virginiana / Arundinaria gigantea / Cynoglossum virginianum* Forest (CEGL007971)
- *Quercus alba / Sabal palmetto - Ilex vomitoria* Forest (CEGL004936)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1) and Mississippi (8).
Global Range: This forest is found in the Coastal Plain east of the Mississippi River, extending from Alabama to North Carolina.
Nations: US
States/Provinces: AL, GA, MS, NC, SC, TN
TNC Ecoregions: 43:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 222Cc:CCC, 231Bd:CCC, 231Be:CCC, 231Bi:CCC, 232Bb:CCC, 232Bd:CCC, 232Cb:CCC, 232Ce:CCC
Federal Lands: DOD (Fort Benning); NPS (Natchez Trace, Shiloh); USFS (Croatan, De Soto, Francis Marion, Holly Springs?, Homochitto?, Talladega, Talladega (Oakmulgee), Tombigbee?, Tuskegee)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.017, NATR.018, NATR.131, NATR.204, NATR.546, NATR.559, NATR.566, NATR.591, NATR.599.
Local Description Authors: M.J. Russo
Global Description Authors: J.E. Mohan, mod. M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Peet et al. unpubl. data, Schafale 2012, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Cherrybark Oak - Water Oak Loess Bluff Forest

***Quercus pagoda* - *Quercus nigra* Forest**
Cherrybark Oak - Water Oak Forest
Identifier: CEGL004109

USNVC CLASSIFICATION

Division	Southeastern North American Forest & Woodland (1.B.1.Na)
Macrogroup	Southern Mesic Mixed Broadleaf Forest (M008)
Group	Southern Mesic Beech - Oak - Mixed Deciduous Forest (G166)
Alliance	Coastal Plain Shumard Oak - Cherrybark Oak - White Ash Forest (A3235)
Association	Cherrybark Oak - Water Oak Loess Bluff Forest

ELEMENT CONCEPT

Global Summary: This forest is characterized by a mixed canopy generally with *Quercus pagoda* and *Quercus nigra* as codominants. It occurs on the loess bluffs of the Mississippi River area of Mississippi, especially at Vicksburg National Military Park. Stands of this forest are characterized by a canopy typically containing *Quercus pagoda* and *Quercus nigra* as codominants. Also present as canopy trees are *Quercus shumardii, Ulmus rubra, Sassafras albidum, Carya illinoinensis, Liquidambar styraciflua, Pinus taeda, Robinia pseudoacacia*, and *Fraxinus americana*. Subcanopy trees can additionally include *Acer negundo, Quercus muehlenbergii, Tilia americana var. caroliniana, Carya cordiformis, Prunus serotina, Ulmus alata, Ulmus americana, Liriodendron tulipifera, Cercis canadensis, Quercus michauxii, Celtis laevigata, Morus rubra, Cornus florida, Ostrya virginiana*, and (in Adams and Jefferson counties, Mississippi) *Magnolia grandiflora*. Shrubs include *Carpinus caroliniana, Acer rubrum, Callicarpa americana, Vaccinium arboreum, Vaccinium elliottii, Frangula caroliniana, Toxicodendron radicans, Euonymus americanus, Cornus foemina, Viburnum rufidulum, Lindera benzoin, Asimina triloba, Sideroxylon lycioides, Juniperus virginiana, Diospyros virginiana, Arundinaria gigantea, Acer barbatum, Juglans nigra, Hydrangea quercifolia, Cornus drummondii*, and *Sambucus canadensis*. The exotic shrub *Ligustrum sinense* is especially common in some disturbed stands. Native vines include *Toxicodendron radicans, Gelsemium sempervirens, Parthenocissus quinquefolia, Smilax bona-nox, Ampelopsis arborea, Cocculus carolinus, Smilax tamnoides (= Smilax hispida), Vitis rotundifolia, Vitis cinerea, Smilax glauca, Bignonia capreolata, Smilax rotundifolia, Berchemia scandens*, and *Celastrus scandens*. The most abundant herbaceous plants are *Polystichum acrostichoides, Passiflora lutea, Oplismenus hirtellus ssp. setarius (= Oplismenus setarius), Athyrium filix-femina ssp. asplenioides*, and *Phytolacca americana*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This cherrybark oak - water oak forest was sampled at 11 locations in the park. Sites range from gentle to steep mid and upper slopes and ridges with mostly northern and eastern aspects. Soils are well- to moderately well-drained clay loam, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes roads/trails, past logging and clearing, and the presence of exotic plants.
Global Environment: This forest occurs on the loess bluffs of the Mississippi River area of Mississippi, especially at Vicksburg National Military Park, Warren County, Mississippi.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to dense (40-90% cover) canopy, 20-50 m tall, is dominated by *Quercus nigra* and *Quercus pagoda*; additional tree species may include *Carya* spp., *Liquidambar styraciflua, Pinus taeda*, and other *Quercus* spp. The moderate (30-70%) subcanopy (15-20 m) is made up of canopy species along with *Carpinus caroliniana, Cornus florida, Fagus grandifolia, Fraxinus americana, Ostrya virginiana*, and/or *Ulmus alata*. The sparse to dense (5-80%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Arundinaria gigantea, Callicarpa americana, Frangula caroliniana, Ligustrum sinense* (invasive exotic), and *Prunus serotina*, among others. The most common and abundant species in the sparse to dense (10-80%) herbaceous layer are *Chasmanthium sessiliflorum* and *Polystichum acrostichoides*. Vines (10-30%) include *Bignonia capreolata, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: This forest is characterized by a mixed canopy generally with *Quercus pagoda* and *Quercus nigra* as codominants. Also present as canopy trees are *Quercus shumardii, Ulmus rubra, Sassafras albidum, Carya illinoinensis, Liquidambar styraciflua, Pinus taeda, Robinia pseudoacacia*, and *Fraxinus americana*. Subcanopy trees can additionally include *Acer negundo, Quercus muehlenbergii, Tilia americana var. caroliniana, Carya cordiformis, Prunus serotina, Ulmus alata, Ulmus americana, Liriodendron tulipifera, Cercis canadensis, Quercus michauxii, Celtis laevigata, Morus rubra, Cornus florida, Ostrya virginiana*, and in Adams and Jefferson counties, Mississippi, *Magnolia grandiflora*. Shrubs (in addition to many of the above-mentioned species) include *Carpinus caroliniana, Acer rubrum, Callicarpa americana, Vaccinium arboreum, Vaccinium elliottii, Frangula caroliniana, Toxicodendron radicans, Euonymus americanus, Cornus foemina, Viburnum rufidulum, Lindera benzoin, Asimina triloba, Sideroxylon lycioides, Juniperus virginiana, Diospyros virginiana, Arundinaria gigantea, Acer barbatum, Juglans nigra, Hydrangea quercifolia, Cornus drummondii*, and *Sambucus canadensis*. The exotic shrub *Ligustrum sinense* is especially common, sometimes completely dominating the forest understory. *Ligustrum japonicum, Nandina domestica, Firmiana simplex*, and *Poncirus trifoliata* are occasional. The native vines include *Toxicodendron radicans, Gelsemium sempervirens, Parthenocissus quinquefolia, Smilax bona-nox, Ampelopsis arborea, Cocculus carolinus, Smilax tamnoides (= Smilax hispida), Vitis rotundifolia, Vitis cinerea, Smilax glauca, Bignonia capreolata, Smilax rotundifolia, Berchemia scandens*, and *Celastrus scandens*. Exotic vines include *Lonicera japonica* and

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Hedera helix. The most abundant herbaceous plants are *Polystichum acrostichoides, Passiflora lutea, Oplismenus hirtellus ssp. setarius (= Oplismenus setarius), Athyrium filix-femina ssp. asplenioides*, and *Phytolacca americana*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus nigra*, *Quercus pagoda*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Quercus nigra*, *Quercus pagoda*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus nigra*, *Quercus pagoda*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus nigra*, *Quercus pagoda*
Global: *Quercus nigra*, *Quercus pagoda*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Cyrtomium fortunei* (), *Ligustrum japonicum* (Medium/Low), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Lygodium japonicum* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Invasive/Exotic Plants: *Hedera helix* (High/Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3? (25-Feb-2013). This association is limited to a small area of the loess bluffs of the Mississippi River. Unprotected occurrences are threatened by timber harvest and conversion to loblolly pine plantations. The invasive shrub *Ligustrum sinense* is common in many examples of the association; its increasing abundance represents another threat to the community and its conservation.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:
- *Quercus pagoda - (Quercus falcata) / Ostrya virginiana* Forest (CEGL003871)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The 11 sampled sites are in Mississippi between M0 and M5, M30 and M35, M35 and M40, M50 and M55, M85 and M90, and in the vicinity of M5, M10, M15, M45, and M55.
Global Range: This association is found on loess bluffs of the Mississippi River and elsewhere in the Upper East Gulf Coastal Plain, south of the Mississippi Delta.
Nations: US
States/Provinces: MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 231Bh:CCC, 231Bi:CCC, 232Bb:CCC, 232Bd:CCC
Federal Lands: NPS (Natchez Trace, Vicksburg)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.166, NATR.171, NATR.320, NATR.331, NATR.344, NATR.346, NATR.347, NATR.552, NATR.556, NATR.564, NATR.577.
Local Description Authors: M.J. Russo
Global Description Authors: C.W. Nordman
References: Lea et al. 2013, Nordman et al. 2011, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

1.B.2. Cool Temperate Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

M883. Appalachian-Interior-Northeastern Mesic Forest

G020. Appalachian-Central Interior Mesic Forest

Beech - Maple Unglaciated Forest

***Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest**
American Beech - Sugar Maple - Tuliptree Unglaciated Forest
Identifier: CEGL002411

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Appalachian-Interior-Northeastern Mesic Forest (M883)
Group	Appalachian-Central Interior Mesic Forest (G020)
Alliance	Interior Highlands Basic Mesic Forest (A2033)
Association	Beech - Maple Unglaciated Forest

ELEMENT CONCEPT

Global Summary: This beech - maple forest is found in unglaciated areas of the east-central United States. Stands occur on unglaciated terraces and mesic slopes of maturely dissected plateaus and submontane regions. The aspect is neutral on sandy alluvial terraces and is northern to eastern on slopes. Soils are moderately well-drained, moist, rich and deep (100+ cm). The vegetation is dominated by a closed-canopy forest with a well-developed tall-shrub layer. The forest canopy is dominated by *Fagus grandifolia* and *Acer saccharum*. Other canopy species include *Liriodendron tulipifera, Liquidambar styraciflua, Fraxinus americana, Quercus rubra, Carya glabra*, and *Carya cordiformis*. Shrubs commonly found in this community are *Asimina triloba* and *Lindera benzoin*. Herbaceous species are diverse, forming a dense cover. They include *Adiantum pedatum, Arisaema triphyllum, Asarum canadense, Carex blanda, Dicentra canadensis, Dioscorea quaternata, Galium circaezans, Menispermum canadense, Phegopteris hexagonoptera, Polystichum acrostichoides*, and *Sanguinaria canadensis*. The large size of dominant canopy species (over 30 m tall), herbaceous diversity, and accumulated litter emphasize the high degree of mesophytism. Community occurrences have been extensively logged, and the canopy openings favor regeneration of *Acer saccharum*. In the Appalachians of eastern Kentucky, other typical trees include *Aesculus flava* (locally abundant), *Juglans cinerea, Juglans nigra, Magnolia acuminata, Quercus muehlenbergii*, and *Ulmus rubra*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This beech - maple forest was sampled at nine locations in the park. Sites range from flat to steep slopes with generally western or northern aspects. Soils include well- to moderately well-drained to somewhat poorly drained sand, sandy clay, clay loam, loam, silt and clay. The unvegetated surface is dominated by litter/duff and wood with some large and small rocks and bare soil. Evidence of disturbance includes wind damage, erosion, and the presence of exotic plants.
Global Environment: Stands occur on unglaciated terraces and mesic slopes of maturely dissected plateaus and submontane regions. The aspect is neutral on sandy alluvial terraces and is northern to eastern on slopes. This community occurs on moist, rich soils of uplands and valleys and occasionally in well-drained lowlands. Soils are moderately well-drained, moist, rich, and deep (100+ cm). Soils that favor beech are heavy and poorly aerated. Lighter, well-drained, and aerated soils favor sugar maple. Bedrock is primarily non-calcareous Pennsylvanian-aged sandstone and shale. Fralish (1988) found that this community occurs where available water capacity and effective soil depth are high. In Crowley's Ridge of Missouri, stands occur on moderate slopes of hills and valleys and on knolls or ridges of large alluvial terraces. The key environmental determinant for this community is moisture availability. Rich loess bluff ravines of river drainages are the typical habitat where these forests occur, particularly on north-facing slopes. Mesic stream terraces also provide excellent growing conditions.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-80% cover) canopy, 20-50+ m tall, and sparse (10-60%) subcanopy (5-20 m) are dominated by *Acer saccharum* and *Fagus grandifolia*; additional species may include *Fraxinus americana, Liriodendron tulipifera, Tilia americana var. americana*, and *Ulmus americana*. *Acer nigrum* occurs in some examples (Jackson Falls, TN). The very sparse to dense (5-80%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are dominated by *Acer saccharum, Asimina triloba*, and *Lindera benzoin*, with a prominence of *Hydrangea cinerea* in some examples (Jackson Falls, TN). Common species in the herbaceous layer (10-60%) include *Ageratina altissima, Microstegium vimineum* (invasive exotic), and *Polystichum acrostichoides*. Vines (5-10%) include *Smilax rotundifolia, Toxicodendron radicans*, and *Vitis* spp.
Global Vegetation: The vegetation is dominated by a closed-canopy forest with a well-developed tall-shrub layer. The forest canopy is dominated by *Fagus grandifolia* and *Acer saccharum*. Other canopy species include *Liriodendron tulipifera, Liquidambar*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

styraciflua, Fraxinus americana, Quercus rubra, Carya glabra, and *Carya cordiformis*. Shrubs commonly found in this community are *Asimina triloba* and *Lindera benzoin*. Herbaceous species are diverse, forming a dense cover. They include *Adiantum pedatum, Arisaema triphyllum, Asarum canadense, Carex blanda, Dicentra canadensis, Dioscorea quaternata, Galium circaezans, Menispermum canadense, Phegopteris hexagonoptera, Polystichum acrostichoides*, and *Sanguinaria canadensis*. The large size of dominant canopy species (over 30 m tall), herbaceous diversity, and accumulated litter emphasize the high degree of mesophytism (TNC 1995a). In the Appalachians of eastern Kentucky, other typical trees include *Aesculus flava* (locally abundant), *Juglans cinerea, Juglans nigra, Magnolia acuminata, Quercus muehlenbergii*, and *Ulmus rubra*. Shrub cover may be low to moderate, and includes *Cornus alternifolia* and *Cornus florida* Ground cover is moderate with frequent (or locally abundant) *Asarum canadense, Eurybia divaricata (= Aster divaricatus), Diplazium pycnocarpon (= Athyrium pycnocarpon), Hepatica nobilis var. acuta (= Hepatica acutiloba), Osmorhiza claytonii, Poa sylvestris, Ranunculus recurvatus, Sedum ternatum*, and *Uvularia grandiflora*, among others (Campbell 2001).

Moisture availability (determined primarily by soil characteristics, topographic position, and aspect) is a key environmental determinant affecting floristic composition. American beech dominates where canopy closure is greatest. Canopy openings favor sugar maple dominance. Tuliptree densities increase where moisture availability is greatest, often indicating a transition from mesic to wet-mesic conditions.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharum*, *Fagus grandifolia*, *Liriodendron tulipifera*, *Ulmus americana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer saccharum*, *Asimina triloba*, *Lindera benzoin*
Herb (field)	Flowering forb	*Ageratina altissima*
Herb (field)	Graminoid	*Microstegium vimineum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum*, *Carya cordiformis*, *Carya glabra*, *Fagus grandifolia*, *Fraxinus americana*, *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Asimina triloba*, *Lindera benzoin*, *Morus rubra*, *Ulmus americana*
Shrub/sapling (tall & short)	Liana	*Parthenocissus quinquefolia*, *Toxicodendron radicans*
Herb (field)	Liana	*Menispermum canadense*
Herb (field)	Flowering forb	*Actaea pachypoda*, *Arisaema triphyllum*, *Asarum canadense*, *Claytonia virginica*, *Dicentra canadensis*, *Dioscorea quaternata*, *Galium circaezans*, *Maianthemum racemosum*, *Sanguinaria canadensis*, *Sanicula canadensis*
Herb (field)	Graminoid	*Carex blanda*
Herb (field)	Fern (Spore-bearing forb)	*Adiantum pedatum*, *Phegopteris hexagonoptera*, *Polystichum acrostichoides*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer nigrum*, *Acer saccharum*, *Asimina triloba*, *Cystopteris bulbifera*, *Fagus grandifolia*, *Fraxinus americana*, *Lindera benzoin*, *Tilia americana* var. *americana*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ailanthus altissima* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (15-Mar-2007). This is a fairly wide-ranging and broadly defined community type. Many community occurrences have been extensively logged, and the canopy openings favor regeneration of *Acer saccharum*. In Crowley's Ridge Section of Missouri, this community is rare and confined to protected valleys (Vancil Hollow Natural Area), but it has been so extensively eliminated that its classification is problematic. It is probably eliminated in the Lowlands Section of the state. Possible occurrences in Arkansas need to be examined further.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Braun (1950, pp. 141-150) describes these beech - maple forests in the Hill Section of her Western Mesophytic Forest Region. Dry-mesic forests, in which *Quercus alba, Quercus rubra*, and *Carya ovata* dominate, often have American beech and sugar maple regeneration due to an increased availability of moisture when mature oaks are removed. Where logging is heavy in these oak - hickory stands, second-growth regeneration is often dominated by sugar maple and, to a lesser extent, American beech. Classification under these circumstances can be difficult. Conversely, where sugar maple is selectively removed by logging, American beech can occur in pure stands. Forests from the southern part of Crowley's Ridge (Arkansas) are placed in *Fagus grandifolia - Quercus (alba, rubra) / Acer barbatum / Asimina triloba* Forest (CEGL004072), where *Acer saccharum* is not a big component and *Quercus alba* is more common. This type may apply to other parts of Crowley's Ridge, but more information is needed.
Global Similar Associations:

- *Acer saccharum - Carya cordiformis / Asimina triloba* Floodplain Forest (CEGL005035)
- *Acer saccharum - Liriodendron tulipifera - Fraxinus americana / Staphylea trifolia* Forest (CEGL006201) may overlap with this type.
- *Fagus grandifolia - Acer saccharum* Glaciated Midwest Forest (CEGL005013) may be similar to this community.
- *Fagus grandifolia - Betula lenta - Liriodendron tulipifera - Acer saccharum* Forest (CEGL006296)
- *Fagus grandifolia - Quercus alba / Cornus florida* Forest (CEGL007881) is a beech - white oak type.
- *Fagus grandifolia - Quercus rubra - Tilia americana var. caroliniana / Magnolia tripetala / Podophyllum peltatum* Forest (CEGL007823)
- *Fagus grandifolia - Quercus* spp. - *Acer rubrum - Juglans nigra* Floodplain Forest (CEGL005014)
- *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum / (Magnolia tripetala)* Forest (CEGL005222) has coniferous evergreen species, such as eastern hemlock (*Tsuga canadensis*), as well as species such as white basswood (*Tilia americana var. heterophylla*) and sweet buckeye (*Aesculus flava*), which are not present in CEGL002411 (Braun 1950).
- *Quercus alba - Fagus grandifolia* Western Allegheny Plateau Forest (CEGL006144)
- *Quercus alba - Quercus rubra - Quercus prinus - Acer saccharum / Lindera benzoin* Forest (CEGL002059)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The nine sampled sites are in Tennessee between M340 and M345, M345 and M350, M355 and M360, M360 and M365, and in the vicinity of M345.
Global Range: This beech - maple forest is found in unglaciated areas of the east-central United States, ranging from Ohio, West Virginia, southwest to southeastern Missouri, Kentucky and Tennessee, and possibly Arkansas.
Nations: US
States/Provinces: AL, AR?, IL, IN, KY, MO, OH, TN, WV?
TNC Ecoregions: 38:C, 42:C, 43:C, 44:C, 45:C, 49:C, 50:C, 59:C
USFS Ecoregions (1994/95): 221D:CC, 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ef:CCC, 221Eg:CCC, 221Ha:CCP, 221Hc:CCC, 221He:CCC, 221J:CP, 222Ak:CP?, 222Ao:CPP, 222Aq:CPP, 222Ca:CPP, 222Ch:CPP, 222Db:CCC, 222Dc:CCC, 222De:CCC, 222Df:CCC, 222Dg:CCC, 222Dh:CCP, 222Di:CCC, 222Dj:CCC, 222Ec:CCC, 222Eg:CCC, 222Ei:CCC, 222Ek:CCC, 222El:CCC, 222Em:CCC, 222En:CCP, 222Eo:CCP, 222Fa:CCP, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Gc:CCC, 222Gd:CCP, 222Hc:CCC, 231Be:CCC, 234Ab:CCC, 234Ac:CCC, 234An:CCP, M221Ab:CCP, M221Ac:CCC, M221Ad:CCP, M221Ba:CCC, M221Bb:CCC, M221Cd:CCC, M221Da:CPP
Federal Lands: NPS (Abe Lincoln Birthplace, Big South Fork, Mammoth Cave, Natchez Trace, Obed River); USFS (Daniel Boone?, Hoosier, Jefferson?, Land Between the Lakes, Shawnee, Wayne)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.050, NATR.401, NATR.419, NATR.428, NATR.430, NATR.432, NATR.434, NATR.436, NATR.443.
Local Description Authors: M.J. Russo
Global Description Authors: M. Guetersloh, mod. D. Faber-Langendoen 04-00
References: Badger et al. 1997, Behler 1988, Braun 1950, Bull and Farrand 1977, CAP pers. comm. 1998, Campbell 2001, Clark and Hutchinson 1994, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Evans et al. 2009, Eyre 1980, Faircloth 1971, Fralish 1987, Fralish 1988b, Franklin et al. 1993, Harrison 2004, Homoya et al. 1988, Illinois Nature Preserve Commission 1973, Jenkins and Pallardy 1993, Küchler 1964, Little 1980a, Midwestern Ecology Working Group n.d., Mohlenbrock 1986, Nelson 1985, Nelson 2010, Niering 1979, Nordman et al. 2011, ONHD unpubl. data, Pyne et al. 2010, SAF 1967, Schafale and Weakley 1985, Schmalzer and DeSelm 1982, Schwartz and Schwartz 1959, TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Mesic Beech - Tuliptree Slopes

***Fagus grandifolia - Liriodendron tulipifera / Euonymus americanus / Athyrium filix-femina ssp. asplenioides* Forest**
American Beech - Tuliptree / American Strawberry-bush / Southern Ladyfern Forest
Identifier: CEGL007201

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Appalachian-Interior-Northeastern Mesic Forest (M883)
Group	Appalachian-Central Interior Mesic Forest (G020)
Alliance	Interior Highlands Basic Mesic Forest (A2033)
Association	Southern Mesic Beech - Tuliptree Slopes

ELEMENT CONCEPT

Global Summary: This association includes mesic hardwood forests dominated by *Fagus grandifolia* and *Liriodendron tulipifera* generally lacking an oak component. This forest occurs on slopes in the "lower Piedmont" of Alabama, and related habitats of adjacent and ecologically related provinces (Ridge and Valley, Cumberland Plateau, Interior Low Plateau, and Upper East Gulf Coastal Plain). This type is described from narrow, moderately well-drained floodplains and sheltered coves which have had little or no severe recent disturbance. In addition to the dominants, other important canopy/subcanopy species include *Acer rubrum, Liquidambar styraciflua, Fraxinus americana, Quercus rubra, Carpinus caroliniana, Magnolia virginiana, Nyssa sylvatica, Diospyros virginiana, Oxydendrum arboreum*, and *Cornus florida*. Shrubs and woody vines include *Decumaria barbara, Euonymus americanus, Rhododendron canescens, Toxicodendron radicans, Vitis rotundifolia, Smilax glauca*, and the exotic *Lonicera japonica*. Important herbs include *Athyrium filix-femina ssp. asplenioides, Polystichum acrostichoides, Woodwardia areolata, Osmunda cinnamomea, Mitchella repens*, and *Hexastylis arifolia*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This beech - tuliptree forest was sampled at three locations in the park. Sites are gentle to somewhat steep slopes with southern aspects. Soils are well- to moderately well-drained silt loam or silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes roads/trails and the presence of a few exotic plants.

Global Environment: This mesic forest occurs on slopes in association with small streams, on narrow, well-drained floodplains and sheltered coves. This type is described from "narrow, moderately well-drained floodplains and sheltered coves which have had little or no severe recent disturbance" (Golden 1979). At Shiloh National Military Park, it occurs on a mesic steep north-facing slope on silt loam soil with some small (river) rocks exposed and includes some small seepage areas.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (50-70% cover) canopy, 20-35 m tall, and sparse to moderate (20-60%) subcanopy (15-20 m) are dominated by *Fagus grandifolia* and *Liriodendron tulipifera*; additional tree species include *Carya ovalis, Liquidambar styraciflua, Nyssa sylvatica, Quercus alba*, and *Quercus pagoda*. The sparse (5-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers may include *Arundinaria gigantea, Callicarpa americana, Carpinus caroliniana, Fagus grandifolia, Hamamelis virginiana*, and *Magnolia grandiflora*. Herbs and vines are sparse.

Global Vegetation: These mesic slope forests are dominated by *Fagus grandifolia* and *Liriodendron tulipifera*. According to Golden (1979), other important canopy/subcanopy species include *Acer rubrum, Liquidambar styraciflua, Fraxinus americana, Quercus rubra, Carpinus caroliniana, Magnolia virginiana, Nyssa sylvatica, Diospyros virginiana, Oxydendrum arboreum*, and *Cornus florida*. Shrubs and woody vines include *Decumaria barbara, Euonymus americanus, Rhododendron canescens, Toxicodendron radicans, Vitis rotundifolia, Smilax glauca*, and the exotic *Lonicera japonica*. Important herbs include *Athyrium filix-femina ssp. asplenioides, Polystichum acrostichoides, Woodwardia areolata, Osmunda cinnamomea, Mitchella repens*, and *Hexastylis arifolia*.

At Shiloh National Military Park the canopy of this association is dominated by *Fagus grandifolia, Liriodendron tulipifera*, and *Fraxinus americana*. *Quercus rubra* and *Juglans nigra* are also common in the canopy. In the subcanopy, *Fagus grandifolia* and *Liriodendron tulipifera* are dominant, with *Carya glabra, Tilia americana var. heterophylla, Halesia tetraptera var. tetraptera, Ostrya virginiana, Oxydendrum arboreum, Prunus serotina, Carya cordiformis*, and *Carya alba*. The dominant shrubs are *Asimina triloba* and *Lindera benzoin*. Other shrubs (tall and short) are *Ulmus alata, Halesia tetraptera var. tetraptera, Ostrya virginiana, Oxydendrum arboreum, Toxicodendron radicans, Smilax rotundifolia, Hydrangea arborescens, Vitis rotundifolia, Carpinus caroliniana, Lonicera japonica, Conopholis americana, Euonymus americanus*, and *Celtis laevigata*. *Polystichum acrostichoides* is the most common herbaceous plant. Other herbs are *Polygonum virginianum, Phegopteris hexagonoptera, Asarum canadense, Athyrium filix-femina ssp. asplenioides, Pilea pumila, Scutellaria ovata, Phryma leptostachya, Circaea lutetiana ssp. canadensis, Passiflora lutea, Epifagus virginiana, Sedum ternatum, Brachyelytrum erectum (= var. erectum), Sanicula canadensis, Rubus argutus, Phytolacca americana, Mitchella repens, Stellaria pubera, Maianthemum racemosum, Arisaema triphyllum, Microstegium vimineum*, and *Prenanthes altissima*.

In the Cumberland Plateau of Alabama (Bankhead National Forest), this forest is dominated by *Fagus grandifolia* and *Liriodendron tulipifera* (NatureServe Ecology unpubl. data). Other canopy trees may include *Fraxinus americana, Magnolia*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

acuminata, and *Pinus taeda*. Oaks can be present in the canopy, but are not dominant (*Quercus alba, Quercus rubra, Quercus prinus*). The most common subcanopy trees are *Acer barbatum, Magnolia macrophylla, Ostrya virginiana, Ulmus alata*, and *Ilex opaca*. The shrub stratum is open to dense, with the most common species being *Euonymus americanus* and *Ostrya virginiana*, although many other species occur. *Bignonia capreolata* and *Decumaria barbara* are typical vines in this forest. The herb layer is dense and diverse, and not dominated by any single species. In the range of this association, the "sugar maple" in the stands, if present, may be *Acer barbatum* and/or *Acer leucoderme*, not *Acer saccharum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fagus grandifolia*, *Liriodendron tulipifera*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Callicarpa americana*, *Carpinus caroliniana*, *Hamamelis virginiana*
Shrub/sapling (tall & short)	Graminoid	*Arundinaria gigantea*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Arundinaria gigantea*, *Fagus grandifolia*, *Liriodendron tulipifera*
Global: *Athyrium filix-femina* ssp. *asplenioides*, *Euonymus americanus*, *Fagus grandifolia*, *Liriodendron tulipifera*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium)
Global: Vulnerable Plants: *Carex brysonii* (G1), *Trillium rugelii* (G3); **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (9-Oct-2001). While this is not an inherently rare type, and some examples are protected on public land, and it has a wide distribution, mature examples are uncommon and vulnerable to timber removal. Many examples are poorly buffered because of upslope land-use change, timber removal, or conversion of upslope forests to managed forest types. Grank changed from G5 to G4, as it is not globally abundant and secure throughout its range.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: The original concept of this association was defined based on four plots from work in the Piedmont of east-central Alabama (Golden 1979; "Small Streambottoms") and later expanded with information from Alabama's Cumberland Plateau (e.g., Bankhead National Forest).
Global Similar Associations:

- *Fagus grandifolia - Quercus alba / Cornus florida* Forest (CEGL007881)
- *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta* Forest (CEGL007213) with codominance by *Quercus alba*.
- *Quercus rubra - Tilia americana var. heterophylla - Carya carolinae-septentrionalis / Acer barbatum / Hydrangea quercifolia* Forest (CEGL008488)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Mississippi between M35 and M40 and between M50 and M55.
Global Range: This association is known from the lower Piedmont and Cumberland Plateau of Alabama, but may range into adjacent and related provinces (Ridge and Valley, Cumberland Plateau, Interior Low Plateau, and Upper East Gulf Coastal Plain) in Georgia, Kentucky, Mississippi, and Tennessee.
Nations: US
States/Provinces: AL, GA, KY, MS, TN
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C
USFS Ecoregions (1994/95): 222Cg:CCC, 222Eb:CCC, 222Eg:CCC, 231Ab:CCC, 231Ac:CCP, 231Ah:CCP, 231Ai:CCP, 231Ba:CC?, 231Bb:CC?, 231Bc:CCP, 231Bd:CCP, 231Be:CCP, 231Bf:CC?, 231Bh:CCC, 231Bk:CCP, 231Cd:CCC, 232Bd:CCC
Federal Lands: NPS (Horseshoe Bend, Natchez Trace, Shiloh); USFS (Bankhead, Holly Springs, Talladega, Talladega (Oakmulgee), Talladega (Talladega), Tuskegee)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.336, NATR.550, NATR.567.
Local Description Authors: M.J. Russo
Global Description Authors: M.S. Golden and D.J. Allard, mod. C.W. Nordman and M. Pyne
References: Golden 1979, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Central Interior Beech - White Oak Forest

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

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Appalachian-Interior-Northeastern Mesic Forest (M883)
Group	Appalachian-Central Interior Mesic Forest (G020)
Alliance	Interior Highlands Basic Mesic Forest (A2033)
Association	Central Interior Beech - White Oak Forest

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This beech - white oak forest was sampled at 17 locations in the park. Sites range from flat to steep mid to lower slopes with generally southern and western aspects. Soils are well- to moderately well-drained loam, sandy loam, clay loam, loamy sand, and silty clay. The unvegetated surface is dominated by litter/duff with some wood, large and small rocks, and rarely standing water or bare soil. Evidence of disturbance includes roads/trails, past logging, minor wind damage and the presence of exotic plants.
Global Environment: Stands occur on mesic mid to lower slopes in moderately dissected terrain. Stand positions vary from north-facing slopes and low slopes to more rocky stands (Franklin et al. 1993). At Land Between the Lakes, this community is restricted to deep limestone-derived soils of the Baxter Series and silty soils of the Brandon Series, generally on lower slopes with northwest, north, to southeast aspects (Franklin 1990). This association is generally found between oak-hickory forests above and even more mesic and rich stands below in more concave and deeply dissected terrain, if that is available in the landscape.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-80% cover) canopy, 15-50+ m tall, is dominated by *Fagus grandifolia* and *Quercus alba*; additional common and/or abundant tree species include *Acer saccharum, Carya* spp., *Liquidambar styraciflua, Liriodendron tulipifera*, and other *Quercus* spp. The sparse to moderate (10-60%) subcanopy (10-20 m) includes canopy species along with *Acer rubrum, Carpinus caroliniana, Cornus florida, Fagus grandifolia, Nyssa sylvatica, Ostrya virginiana*, and *Oxydendrum arboreum*. The sparse to moderate (10-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Asimina triloba, Diospyros virginiana, Euonymus americanus, Fraxinus americana, Hydrangea arborescens, Lindera benzoin, Styrax grandifolius, Ulmus* spp., and *Vaccinium* spp. Dominants in the herbaceous layer (10-70%) may include *Arundinaria gigantea, Carex picta, Microstegium vimineum* (invasive exotic), *Mitchella repens, Polystichum acrostichoides, Rudbeckia hirta, Toxicodendron radicans*, and/or tree or shrub seedlings.
Global Vegetation: The vegetation is dominated by at least 40% *Fagus grandifolia* with more or less *Quercus alba* depending on past logging history. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Quercus pagoda, Quercus rubra, Quercus coccinea, Cornus florida, Nyssa sylvatica, Sassafras albidum*, and *Ostrya virginiana* (Franklin 1990, NatureServe Ecology unpubl. data). Other potential species include *Quercus muehlenbergii, Acer rubrum*, and *Ilex opaca*. Shrubs which may be present include *Vaccinium stamineum, Viburnum acerifolium, Euonymus americanus*, and in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others. Campbell (2001) provides an extensive list of species for eastern Kentucky; see also NatureServe Ecology unpublished data from Fort Donelson.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharum*, *Fagus grandifolia*, *Liriodendron tulipifera*, *Quercus alba*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*
Shrub/sapling (tall & short)	Graminoid	*Arundinaria gigantea*
Herb (field)	Liana	*Toxicodendron radicans*
Herb (field)	Graminoid	*Microstegium vimineum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer saccharum*, *Fagus grandifolia*, *Quercus alba*
Global: *Polystichum acrostichoides*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Hexastylis contracta* (G3), *Panax quinquefolius* (G3G4, under collection pressure)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (31-Jan-2007). This is not an inherently rare forest type, and many examples are still believed to be extant. The lack of element occurrences of this type does not reflect its relative abundance. Patch size may be small, but this is a somewhat widespread association (and may be merged with others as classification is resolved); many examples are still extant. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*) and loss of herbaceous species diversity from the disturbance effects of logging. The Grank has been changed from G3G4 to G4 to reflect its true abundance.

CLASSIFICATION

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

- *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
- *Fagus grandifolia - Liriodendron tulipifera / Euonymus americanus / Athyrium filix-femina ssp. asplenioides* Forest (CEGL007201)
- *Fagus grandifolia* Ridge and Valley Forest (CEGL007200)
- *Quercus alba - (Liriodendron tulipifera, Liquidambar styraciflua) / Calycanthus floridus / Athyrium filix-femina* Forest (CEGL008428) of the southern Ridge and Valley.
- *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta* Forest (CEGL007213)
- *Quercus alba - Quercus rubra - Carya ovata / Cercis canadensis - Juniperus virginiana var. virginiana* Forest (CEGL007240)
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070)
- *Quercus rubra - Tilia americana var. heterophylla - Carya carolinae-septentrionalis / Acer barbatum / Hydrangea quercifolia* Forest (CEGL008488)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2), Mississippi (2) and Tennessee (13) between M320 and M325, M355 and M360, and in the vicinity of M305, M310, M325, M430, and M435.

Global Range: This association was defined for the Interior Low Plateau of Tennessee. It ranges to the Cumberlands and Interior Low Plateau of Kentucky and Upper East Gulf Coastal Plain in Tennessee, but more information is needed to determine its full range. Currently the range across USFS Sections 221H, 222E, and 222C covers approximately 58,000 square km.

Nations: US

States/Provinces: AL, GA?, IN?, KY, MS, TN, VA?

TNC Ecoregions: 43:C, 44:C, 50:C

USFS Ecoregions (1994/95): 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Cg:CCC, 222Dg:CCC, 222Dj:CCC, 222Eb:CCP, 222Ec:CCC, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP, 231Ba:CCC, 231Be:CCC, 231Cc:CCC

Federal Lands: NPS (Big South Fork, Chickamauga-Chattanooga, Cumberland Gap, Fort Donelson, Mammoth Cave, Natchez Trace, Shiloh); USFS (Daniel Boone, Jefferson?, Land Between the Lakes)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.014, NATR.027, NATR.030, NATR.034, NATR.039, NATR.060, NATR.062, NATR.063, NATR.113, NATR.120, NATR.417, NATR.601, NATR.604, NATR.605, NATR.606, NATR.638, NATR.651.

Local Description Authors: M.J. Russo

Global Description Authors: M. Pyne, mod. C.W. Nordman

References: Campbell 2001, Evans 1991, Evans et al. 2009, Franklin 1990a, Franklin et al. 1993, Franklin pers. comm., Homoya et al. 1988, Nordman et al. 2011, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White 2005, White 2006

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M013. Eastern North American Ruderal Forest

G032. Eastern North American Exotic Ruderal Forest

Ruderal Tree-of-Heaven Forest

***Ailanthus altissima* Ruderal Forest**
Tree-of-Heaven Ruderal Forest
Identifier: CEGL007191

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Exotic Ruderal Forest (G032)
Alliance	Eastern Exotic Ruderal Forest (A3230)
Association	Ruderal Tree-of-Heaven Forest

ELEMENT CONCEPT

Global Summary: This forest association generally occurs on nutrient-rich substrates, in disturbed situations on slopes, urban abandoned lands, and on rocky limestone slopes, in association with a wide variety of other exotic species and generalist native species. There are floodplain forests in which invasive exotic *Ailanthus altissima* makes up 25-50% of the canopy; with other associated canopy species of *Fraxinus pennsylvanica* and *Acer saccharinum*. At this time, these forests are treated as D-ranked examples of native types.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional tree-of-heaven forest was sampled at three locations in the park. Sites are moderate to somewhat steep mid and upper slopes with east, northeast and southwest aspects. The only reported soil type is well-drained sandy clay. Sites are seasonally or permanently flooded bottomlands and floodplains with very poorly drained muck soil. The unvegetated surface is made up of litter/duff, wood, large and small rocks, and bare soil. Evidence of disturbance includes roads/trails and the presence of exotic plants.
Global Environment: This community occurs generally on nutrient-rich substrates, in disturbed situations on slopes, urban abandoned lands, and on rocky limestone slopes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this community is quite variable, ranging from moderate (50% cover) mature forest 35-50 m tall to dense (80%) shorter forests 15-20 m tall. Midstories are also variable, ranging from 10-35 m tall with sparse to moderate cover (20-60%). The invasive exotic *Ailanthus altissima* dominates; additional trees may include *Acer saccharum, Carya alba, Celtis occidentalis, Liriodendron tulipifera*, and *Ulmus rubra*. The sparse to moderate (5-60%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy species along with *Acer negundo, Fraxinus americana, Sassafras albidum*, and *Symphoricarpos orbiculatus*. The herbaceous layer (40-60%) may include *Ageratina altissima, Asplenium platyneuron, Elymus virginicus, Microstegium vimineum* (exotic), *Polygonum virginianum*, and *Toxicodendron radicans*. Vines (up to 20%) include *Cocculus carolinus, Lonicera japonica* (exotic), and *Parthenocissus quinquefolia*.
Global Vegetation: This southeastern forest association is strongly dominated by the alien *Ailanthus altissima*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Ailanthus altissima*
Herb (field)	Flowering forb	*Ageratina altissima*, *Polygonum virginianum*
Herb (field)	Graminoid	*Elymus virginicus*, *Microstegium vimineum*
Herb (field)	Fern (Spore-bearing forb)	*Asplenium platyneuron*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Ailanthus altissima*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ailanthus altissima*
Global: *Ailanthus altissima*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ailanthus altissima* (Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Perilla frutescens* (Low)
Global: Invasive/Exotic Plants: *Ailanthus altissima* (Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (4-Jan-2000). This vegetation is dominated by an invasive, alien species and is thus not a conservation priority.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Lewis, Maury and Hickman Counties, Tennessee..
Global Range: *Ailanthus altissima* Forest occurs throughout the Appalachians, the Piedmont, the Interior Low Plateau, eastern Kentucky, and in the Ozarks and Ouachita Mountains, and probably other areas in the northeastern United States.
Nations: US
States/Provinces: AR, CT, KY, MD, NC, NJ?, NY, PA, TN, VA, WV?
TNC Ecoregions: 38:C, 39:C, 43:P, 44:C, 50:P, 51:C, 52:C, 59:C, 61:C
USFS Ecoregions (1994/95): 221Ae:CCC, 222Eg:CCC, 231A:CC, 231G:CC, 232:C, M221Aa:CPP, M221Ab:CPP, M221Ac:CPP, M221Ad:CPP, M221Ba:CPP, M221Bb:CPP, M221Bc:CPP, M221Bd:CPP, M221Be:CPP, M221Bf:CPP, M221Da:CCP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Antietam, Appalachian Trail [Central Appalachians], Appalachian Trail [Lower New England], Appomattox Court House, C&O Canal, Colonial, Natchez Trace); USFS (Ouachita (Mountains)?, Ouachita?, Ozark?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.128, NATR.431, NATR.626.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: Edinger et al. 2002, Nordman et al. 2011, Patterson 1976, Patterson 2008a, Patterson 2008c, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Princess-tree Woodland

***Paulownia tomentosa* Ruderal Woodland**
Princess-tree Ruderal Woodland
Identifier: CEGL003687

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Exotic Ruderal Forest (G032)
Alliance	Eastern Exotic Ruderal Forest (A3230)
Association	Ruderal Princess-tree Woodland

ELEMENT CONCEPT

Global Summary: This woodland occurs on steep roadcuts, highway rights-of-way, and in other disturbed areas.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This princess-tree woodland was sampled once in the park. The site is a somewhat steep, southeast-facing upper slope with moderately well-drained loam soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes past roadway, erosion, wind damage, and the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse (30% cover) canopy, 20-35 m tall, and dense (70%) subcanopy (15-20 m) are dominated by the invasive exotic *Paulownia tomentosa*; additional trees include *Carya glabra, Cercis canadensis, Cornus florida, Diospyros virginiana, Liriodendron tulipifera, Robinia pseudoacacia*, and *Rhus typhina*. The very sparse (5-10%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are dominated by *Lonicera maackii* (exotic). Dominants in the herbaceous layer (60%) include *Ageratina aromatica, Asplenium platyneuron, Lespedeza cuneata* (exotic), *Perilla frutescens* (exotic), and *Toxicodendron radicans*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Paulownia tomentosa*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera maackii*
Herb (field)	Liana	*Toxicodendron radicans*
Herb (field)	Flowering forb	*Ageratina aromatica*, *Lespedeza cuneata*, *Perilla frutescens*
Herb (field)	Fern (Spore-bearing forb)	*Asplenium platyneuron*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Paulownia tomentosa*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lactuca serriola* (Low/Insignificant), *Lespedeza cuneata* (Medium), *Lonicera japonica* (High/Medium), *Lonicera maackii* (High), *Microstegium vimineum* (High/Medium), *Paulownia tomentosa* (Medium/Low), *Perilla frutescens* (Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (4-Jan-2000). This vegetation is dominated by invasive alien species and is thus not a conservation priority.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Tennessee in the vicinity of M325.
Nations: US
States/Provinces: NC, TN, VA
TNC Ecoregions: 44:C, 51:C, 59:C
USFS Ecoregions (1994/95): 222Eg:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Natchez Trace)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.600.
Local Description Authors: M.J. Russo
Global Description Authors: S. Simon, G. Kauffman, D. Danley
References: Burns and Honkala 1990b, CAP pers. comm. 1998, Nordman et al. 2011, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Williams 1993

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G030. Eastern North American Native Ruderal Forest

Ruderal Eastern Red-cedar Forest

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

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest (A3227)
Association	Ruderal Eastern Red-cedar Forest

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional eastern red-cedar forest was sampled at eight locations in the park. Sites range from flat to gentle to moderate upper slopes of any aspect. Soils are well- to moderately well-drained loam, sandy loam, silt, and silt loam. The unvegetated surface is dominated by litter/duff (up to 100%) with occasional wood, rocks and bare soil. Evidence of disturbance includes past clearing (old field) and the presence of exotic plants.
Global Environment: This community occurs in both coastal plain and interior regions of the southeastern United States in a variety of disturbed areas such as eroded soils on abandoned agricultural land (Andreu and Tukman 1995). In Kentucky, this vegetation occurs throughout the state (Bluegrass region, Highland Rim, East Gulf Coastal Plain) on calcareous substrates or on abandoned agricultural land; acreage of this type has increased since presettlement times. This type also includes the *Juniperus virginiana var. virginiana* woodland from Tellico Lake (Andreu and Tukman 1995) which occurs on drier sites with shallow, rocky soils.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (10-90% cover) highly variable canopy, 5-35 m tall, is dominated by *Juniperus virginiana var. virginiana*, as is the sparse to dense (10-70%) subcanopy (2-10 m); additional species may include *Acer rubrum, Carya alba, Fraxinus americana, Gleditsia triacanthos, Juglans nigra, Liquidambar styraciflua*, and *Quercus muehlenbergii*. The sparse to moderate (10-60%) tall-shrub (1-5 m) and short-shrub (0.5-1 m) layers contain *Acer* spp., *Celtis laevigata, Cornus* spp., *Diospyros virginiana, Frangula caroliniana, Ilex decidua, Prunus serotina, Quercus* spp., *Symphoricarpos orbiculatus*, and *Vaccinium* spp. Dominants in the herbaceous layer (20-40%) may include *Asplenium platyneuron, Elymus virginicus, Lespedeza cuneata* (exotic), *Microstegium vimineum* (exotic), *Onoclea sensibilis, Saccharum alopecuroidum, Schizachyrium scoparium*, and *Verbesina virginica*. *Campsis radicans* and *Toxicodendron radicans* are common vines (up to 20%).
Global Vegetation: Stands are dominated by *Juniperus virginiana var. virginiana*. A host of other woody species may also be present, some of which may occur in the canopy at low levels of abundance. These species include *Carya alba, Carya ovata, Cercis canadensis, Pinus virginiana, Quercus coccinea, Quercus falcata*, and *Quercus phellos*. The midstory is typically sparse, with canopy species as well as *Cornus florida, Ilex opaca, Liquidambar styraciflua*, and *Prunus serotina var. serotina* (NatureServe Ecology unpubl. data). In addition, *Frangula caroliniana* occurs in various strata. Herbs are patchy and typically include *Asplenium platyneuron, Chasmanthium laxum, Eupatorium* spp., *Polystichum acrostichoides*, and *Carex* spp. The ground layers of some stands may exhibit dominance by native warm-season grasses and other graminoids, including *Schizachyrium scoparium, Andropogon* spp., and *Danthonia* spp. The exotics *Lonicera japonica* and *Microstegium vimineum* may also be present.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Juniperus virginiana* var. *virginiana*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Frangula caroliniana*, *Fraxinus americana*, *Juniperus virginiana* var. *virginiana*, *Quercus muehlenbergii*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low), *Sorghum halepense* (High/Medium)
Global: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

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

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: Originally described from Tellico Pilot Project (Ridge and Valley of Tennessee, northeastern Monroe County) based on 10 stands sampled by Andreu and Tukman (1995). This community is very closely related to *Juniperus virginiana* Woodland and to mixed juniper-oak forest types but is distinguished by the closed-canopy evergreen dominance of *Juniperus virginiana*. *Juniperus virginiana* woodlands may be equivalent to this type.
Global Similar Associations:
- *Juniperus virginiana* Midwest Ruderal Forest (CEGL002593)
- *Juniperus virginiana var. virginiana / Rhus copallinum / Schizachyrium scoparium* Ruderal Woodland (CEGL007704)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (3), Mississippi (2) and Tennessee (3) between M225 and M230, M370 and M375, M385 and M390, M435 and M440, and in the vicinity of M340, M345, M385, and M405.
Global Range: This community is widely distributed in both coastal plain and interior regions of the southeastern United States, ranging in the interior to Oklahoma, Kentucky, and West Virginia.
Nations: US
States/Provinces: AL, AR, GA, KY, LA, MS, NC, OK, SC, TN, VA
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 50:C, 51:?, 52:?, 53:P, 59:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Ak:CCP, 222Cg:CCC, 222Dg:CCC, 222Eb:CCC, 222Ed:CCC, 222Ef:CCC, 222Eg:CCC, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 222Lc:CCP, 222Me:CCP, 231Ba:CCC, 231Bd:CCC, 231Be:CCC, 231Cd:CCC, 251Cc:CC?, 251Ch:CCP, M221Be:CCC, M222Aa:CCC
Federal Lands: DOD (Arnold, Camp Gruber, J. Percy Priest); NPS (Abe Lincoln Birthplace, Big South Fork, Buffalo River, Chickamauga-Chattanooga, Chickasaw NRA, Cumberland Gap, Fort Donelson, Kings Mountain, Mammoth Cave, Natchez Trace, Russell Cave, Shiloh, Stones River); TVA (Tellico); USFS (Bankhead, Cherokee?, Daniel Boone, Ouachita (Mountains)?, Ouachita?, Ozark)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.112, NATR.144, NATR.221, NATR.225, NATR.258, NATR.381, NATR.437, NATR.448.
Local Description Authors: M.J. Russo
Global Description Authors: K.D. Patterson, mod. M. Pyne
References: Allard 1990, Andreu and Tukman 1995, Badger et al. 1997, Evans 1991, Eyre 1980, Gallyoun et al. 1996, Hoagland 2000, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman 2004a, Nordman et al. 2011, Pyne 1994, Pyne et al. 2010, Rice 1960, Rosson 1995, Salas et al. 2010c, Schotz et al. 2006, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White 2005, White 2006, White and Govus 2005, Whited pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Shortleaf Pine Forest

***Pinus echinata* Ruderal Forest**
Shortleaf Pine Ruderal Forest
Identifier: CEGL006327

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest (A3227)
Association	Ruderal Shortleaf Pine Forest

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional shortleaf pine forest was sampled at three locations in the park. Sites are gentle to moderate slopes and ridges with well-drained silt loam or silty clay soil. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes fire suppression, resulting in lack of pine regeneration.
Global Environment: This broadly defined type may develop under a variety of circumstances associated with severe natural and/or anthropogenic disturbance. It is most frequently associated with abandoned agricultural land, unmanaged clearcuts, and burned or eroded areas. These are considered ruderal forests as they typically result from anthropogenic disturbances which fundamentally alter the vegetation structure, floristic composition, and often the physical and chemical structure of the soil.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (60-70% cover) canopy, 20-35 m tall, is dominated by *Pinus echinata*. The moderate (30-60%) subcanopy (10-15 m) includes *Acer rubrum, Carya alba, Juniperus virginiana, Liquidambar styraciflua, Quercus alba*, and *Quercus falcata*. The sparse (10-30%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy species along with *Sassafras albidum* and *Vaccinium arboreum*. Herbs are sparse; vines (5-10%) include *Smilax rotundifolia* and *Vitis rotundifolia*.
Global Vegetation: *Pinus echinata* is clearly the single most dominant tree. In addition, other "old-field" *Pinus* species (e.g., *Pinus taeda, Pinus virginiana*) and/or other early-successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Liriodendron tulipifera*) may also be present. Forests of 50+ years may begin to become codominated by mid-successional species such as *Quercus* spp. and *Carya* spp. in some instances. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus echinata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*

Global

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

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus echinata*
Global: *Pinus echinata*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (3-Apr-2000). This forest represents a ruderal community resulting from succession following anthropogenic disturbance of an area. It is not of conservation concern and does not receive a conservation status rank. Stands have suffered some damage from the southern pine beetle (*Dendroctonus frontalis*).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: In Kentucky, this vegetation is known only from the eastern part of the state. A stand at Mammoth Cave National Park which is referred here may have originated with the planting of *Pinus echinata*. In Louisiana, this successional vegetation occurs in the Florida parishes and may have a dense shrub understory. In Arkansas, old fields succeed to *Pinus echinata*. Stands have suffered some damage from southern pine beetle (*Dendroctonus frontalis*).
Global Similar Associations:

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

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Mississippi between M380 and M385 and in the vicinity of M170.
Global Range: This community is found throughout the southeastern United States.
Nations: US
States/Provinces: AL, AR, GA, KY, LA, MO, MS, NC, OK, SC, TN, TX, WV?
TNC Ecoregions: 38:C, 39:C, 40:C, 42:P, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 59:C
USFS Ecoregions (1994/95): 221J:CC, 222A:CC, 222Dg:CCC, 231A:CC, 231Bd:CCC, 231Cc:CCC, 231E:CP, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bm:CCC, M221A:C?, M221B:C?, M221Dd:CCC, M222A:CC
Federal Lands: BIA (Eastern Band of Cherokee); NPS (Buffalo River?, Cowpens, Fort Donelson, Kennesaw Mountain, Kings Mountain, Little River Canyon, Mammoth Cave, Natchez Trace, Shiloh); TVA (Tellico); USFS (Bienville?, Chattahoochee, Chattahoochee (Piedmont)?, Chattahoochee (Southern Blue Ridge), Daniel Boone, Holly Springs?, Mark Twain, Oconee?, Ouachita, Ouachita (Coastal Plain), Ouachita (Mountains), Ozark, St. Francis, Sumter (Piedmont)?, Sumter?, Talladega?, Tombigbee?, Tuskegee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.087, NATR.234, NATR.532.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley and K.D. Patterson, mod. R.E. Evans
References: Allard 1990, Burns and Honkala 1990a, Foti 1994a, Foti 1994b, Foti et al. 1994, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNHS unpubl. data, White 2004, White 2005, White and Govus 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Eastern White Pine Forest

***Pinus strobus* Ruderal Forest**
Eastern White Pine Ruderal Forest
Identifier: CEGL007944

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest (A3227)
Association	Ruderal Eastern White Pine Forest

ELEMENT CONCEPT

Global Summary: This is an early-successional forest dominated by *Pinus strobus*, typically with a very dense canopy and little understory. It is considered ruderal because it is commonly associated with anthropogenic disturbance (e.g., former old fields and formerly cleared flats along streams) that have caused a mix of species not found with natural disturbances. Associated woody and herbaceous species vary with geography. In the northeastern states, the tree canopy is often monotypic and even-aged, with occasional associates including *Acer rubrum, Juniperus virginiana, Liriodendron tulipifera* (within its range), or scattered *Quercus rubra* or *Quercus velutina*. In regions where northern hardwoods are more prevalent, canopy associates include *Fraxinus americana* and *Acer saccharum*. In the Southern Blue Ridge and nearby areas, typical canopy and subcanopy associates include *Liriodendron tulipifera, Acer rubrum, Pinus rigida*, and *Liquidambar styraciflua*, with *Tsuga canadensis* often forming a dense shrub stratum. The understory is typically poorly developed or characterized by scattered individuals found in the canopy. The herbaceous cover is variable depending on the density of tree and shrub cover, and may be characterized by ruderal or exotic species that favor openings or disturbance. In more open stands, typical species are those associated with old fields, including *Solidago rugosa, Solidago gigantea, Anthoxanthum odoratum, Poa pratensis, Schizachyrium scoparium, Elymus repens (= Elytrigia repens), Bromus inermis, Agrostis gigantea, Euthamia graminifolia, Achillea millefolium*, and *Daucus carota*. In stands that are more heavily forested, typical herbs include *Aralia nudicaulis, Ageratina altissima, Galium triflorum, Maianthemum canadense, Trientalis borealis, Mitchella repens, Polystichum acrostichoides*, and *Lycopodium* species. The particular composition of the herb layer will vary with geography. The substrate is usually covered by a thick layer of pine needle duff. In the Daniel Boone National Forest of Kentucky, *Pinus strobus* is spreading from plantings, especially in the Red River Gorge.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This association was sampled at only one location in the park, near the northern terminus of the parkway. Site is characterized as a gentle slope with moderately well-drained silt clay loam soil. The unvegetated surface primarily consists of litter/duff, with a lesser amount of wood and bare soil.
Global Environment: This wide-ranging semi-natural forest is commonly associated with anthropogenic disturbance. It typically occurs on former agricultural lands and old fields that are no longer intensively mowed, plowed or managed, developing as *Pinus strobus* colonizes the open fields. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species that favor openings or disturbance.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this forest is mature, having a relatively dense (50% cover) canopy, 15-20 m tall of *Pinus strobus*, along with lesser amounts of *Liriodendron tulipifera* and *Acer rubrum*. The understory is dominated by broadleaf deciduous species, most notably *Acer rubrum, Fraxinus americana*, and *Quercus alba*. No regeneration of *Pinus strobus* was observed.
Global Vegetation: The tree canopy ranges from woodland to forest closure, with 25-85% cover. It is often monotypic and even-aged *Pinus strobus*, with occasional associates, including *Acer rubrum, Betula lenta, Juniperus virginiana*, or scattered *Quercus rubra* or *Quercus velutina*. In regions where northern hardwoods are more prevalent, canopy associates include *Fraxinus americana* and *Acer saccharum*. In the Southern Blue Ridge and nearby areas, typical canopy and subcanopy associates include *Liriodendron tulipifera, Acer rubrum, Pinus rigida*, and *Liquidambar styraciflua*, with *Tsuga canadensis* often forming a dense shrub stratum. The understory is poorly developed or characterized by scattered individuals found in the canopy. Shrubs are often present in the more open stands and include native species, such as *Cornus racemosa, Rhus glabra, Viburnum prunifolium*, and *Rubus* spp., as well as exotics, such as *Elaeagnus umbellata, Rosa multiflora, Lonicera morrowii*, and *Berberis thunbergii*. The herbaceous cover is variable depending on the density of tree and shrub cover, and may be characterized by ruderal or exotic species that favor openings or disturbance. In more open stands, typical species are those associated with old fields, such as *Solidago rugosa, Solidago gigantea, Anthoxanthum odoratum, Poa pratensis, Schizachyrium scoparium, Elymus repens (= Elytrigia repens), Bromus inermis, Agrostis gigantea, Euthamia graminifolia, Achillea millefolium*, and *Daucus carota*. In stands that are more heavily forested, typical herbs include *Aralia nudicaulis, Ageratina altissima, Galium triflorum, Maianthemum canadense, Medeola virginiana, Polystichum acrostichoides, Trientalis borealis, Mitchella repens*, and *Lycopodium* species. The particular composition of the herb layer will vary with geography. The substrate is usually covered by a thick layer of pine needle duff.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus*
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*, *Quercus alba*
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Acer rubrum*, *Fraxinus americana*
Herb (field)	Liana	*Toxicodendron radicans*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus strobus*
Global: *Pinus strobus*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Achillea millefolium* (), *Agrostis gigantea* (Medium/Low), *Anthoxanthum odoratum* (), *Berberis thunbergii* (High/Medium), *Daucus carota* (Low), *Elaeagnus umbellata* (High), *Elymus repens* (High/Medium), *Lonicera morrowii* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (23-Jun-2013). This forest represents semi-natural vegetation, i.e., the vegetation contains combinations of species that are not found under natural disturbance regimes, many of them exotic. Thus it is not of high conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This semi-natural type may be expected to occur throughout the range of the alliance but has primarily been attributed in areas where The Nature Conservancy ecoregional planning or other project-specific needs have documented its occurrence. Rangewide review should greatly expand its geographic scope. Association may need to be split based on northern hardwood associates and central hardwood associates.
Global Similar Associations:
- *Pinus strobus* Forest Plantation (CST007178)

ELEMENT DISTRIBUTION

Global Range: This semi-natural 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, and from Maine and New Hampshire south to Georgia and Tennessee, as well as in Ontario, Canada). It has been documented primarily in areas where project-specific needs have required it.
Nations: US
States/Provinces: CT, GA, KY, MA, MD?, ME, MI, MN, NC, NH, NJ?, NY, OH?, PA, RI, SC, TN, VA, VT, WI, WV
TNC Ecoregions: 47:P, 48:P, 49:C, 50:C, 51:C, 59:C, 60:C, 61:C, 63:C
USFS Ecoregions (1994/95): 212Fc:CCC, 221Ae:CCC, 221Bc:CCC, 221Bd:CCC, 221Da:CCC, 221Fa:CCC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222En:CCC, 222Eo:CCC, M212Ba:CCC, M212Bb:CCC, M221Aa:CCC, M221Ab:CCC, M221Be:CCC, M221Cb:CCC, M221Cd:CCC, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: BIA (Eastern Band of Cherokee); NPS (Appalachian Trail [Central Appalachians], Appalachian Trail [Lower New England], Appalachian Trail [Northern Appalachians], Appalachian Trail [Southern Blue Ridge], Big South Fork, Blue Ridge Parkway, Bluestone, Carl Sandburg Home, Delaware Water Gap, Gettysburg, Great Smoky Mountains, Marsh-Billings-Rockefeller, Natchez Trace, New River Gorge, Obed River, Saint-Gaudens, Saratoga); USFS (Cherokee?, Daniel Boone, George Washington, Jefferson, Monongahela); USFWS (Great Meadows, Moosehorn)

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: K.D. Patterson, mod. L.A. Sneddon and S.C. Gawler
References: Chapman et al. 1989, Edinger 2003b, Edinger et al. 2002, Edinger et al. 2007, Faber-Langendoen 2001, Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2006, Gawler and Bowman 2012, MNNHP 1993, NRCS 2004a, NatureServe Ecology - Southeastern U.S. unpubl. data, Perles et al. 2007, Schmalzer and DeSelm 1982, Southeastern Ecology Working Group n.d., Swain and Kearsley 2001, TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007, Vanderhorst et al. 2008, WVNHP unpubl. data b, White 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Virginia Pine Forest

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

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest (A3227)
Association	Ruderal Virginia Pine Forest

ELEMENT CONCEPT

Global Summary: This ruderal Virginia pine forest of the southeastern states occurs in areas where canopy removal has created dry, open conditions and bare mineral soil, allowing for the establishment of *Pinus virginiana*. These habitats include old fields, old pastures, clearcuts, and eroded areas; soils are typically dry, acidic, and infertile. It is common on abandoned farmland. This forest typically has a very dense canopy of *Pinus virginiana* and little understory vegetation. The dense canopy may also include admixtures of other *Pinus* species (e.g., *Pinus taeda, Pinus echinata, Pinus rigida, Pinus strobus*) or other early-successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Prunus serotina, Liriodendron tulipifera, Fraxinus americana, Nyssa sylvatica*). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species. Shrub and herb layers are frequently very sparse. Stands are short-lived, generally less than 75 years.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional Virginia pine forest was sampled at three locations in the park. Sites are gentle to moderate slopes and ridges with east, west and southwest aspects. Soils are well-drained to rapidly drained sandy loam and silt loam. The unvegetated surface is dominated by litter/duff with some wood and occasional bare soil. Evidence of disturbance includes roads/trails and the presence of exotic plants.

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

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-90% cover) canopy, 15-35+ m tall, and the sparse to moderate (10-60%) subcanopy (5-15 m) are dominated by *Pinus virginiana*; additional trees can include *Acer rubrum, Nyssa sylvatica, Pinus echinata, Prunus serotina, Quercus coccinea*, and *Quercus marilandica*. The very sparse to moderate (5-60%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Carya* spp., *Cornus florida, Fraxinus americana, Liquidambar styraciflua, Oxydendrum arboreum, Sassafras albidum, Vaccinium arboreum*, and *Vaccinium pallidum*. The herbaceous layer (5-20%) includes *Chasmanthium laxum, Lespedeza* spp., and *Polystichum acrostichoides*. Vines (5-10%) are dominated by *Smilax* spp.

Global Vegetation: This forest typically has a very dense canopy of *Pinus virginiana* and little understory vegetation. *Pinus taeda, Pinus echinata*, or *Pinus strobus* may co-occur with *Pinus virginiana* in the canopy. The canopy can also have significant admixtures of early-successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Prunus serotina, Liriodendron tulipifera, Fraxinus americana, Oxydendrum arboreum, Betula lenta, Nyssa sylvatica*). Older stands on abandoned farmland may have tall canopies (>20 m) of decadent *Pinus virginiana* overtopping the shade-tolerant *Tsuga canadensis*, which often dominates the subcanopy and shrub layers. Scattered *Pinus rigida* may be mixed in these stands. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species; *Lonicera japonica* and *Rosa multiflora* are common. The herb layer is characterized by weedy natives and exotics such as *Lycopodium digitatum, Achillea millefolium var. occidentalis, Hieracium caespitosum*, and *Lespedeza cuneata*. Shrub and herb strata, where present at all, are usually sparse in coverage. In eastern Tennessee, the subcanopy may contain *Acer saccharum* and *Cornus florida*; other associated species may include *Cercis canadensis, Parthenocissus quinquefolia, Lonicera japonica*, and *Microstegium vimineum* (Andreu and Tukman 1995). In the Central Appalachians, associates include *Pinus strobus, Pinus echinata*, and *Pinus rigida*. Some stands may have a dense ericaceous shrub stratum containing *Vaccinium* spp., *Gaylussacia* spp., *Kalmia latifolia*, and *Rhododendron* spp. This community contains many exotics species such as *Albizia julibrissin, Lonicera japonica*, and *Pueraria montana var. lobata*. *Lonicera japonica* when present has an average cover of 27%. The associated species in all strata are highly variable.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus virginiana*
Herb (field)	Liana	*Smilax rotundifolia*
Herb (field)	Graminoid	*Chasmanthium laxum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus virginiana*
Global: *Pinus virginiana*, *Tsuga canadensis*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Albizia julibrissin* (High/Low), *Lespedeza cuneata* (Medium), *Lonicera japonica* (High/Medium)
Global: **Invasive/Exotic Plants**: *Albizia julibrissin* (High/Low), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Pueraria montana* var. *lobata* (), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

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

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Early-successional *Pinus virginiana* vegetation occurring over calcareous substrates is classed in *Pinus virginiana - Juniperus virginiana var. virginiana - Ulmus alata* Ruderal Forest (CEGL007121) and has species indicative of calcareous substrates. Like many ruderal USNVC communities, this community has a wide geographic range and vegetation composition of associated species varies over this range.

After conducting fieldwork on Maryland's Inner Coastal Plain during the USFWS Patuxent Research Refuge vegetation mapping project, it was determined that near-pure stands of *Pinus rigida* and stands mixed with *Pinus virginiana* or early-successional deciduous trees such as *Acer rubrum* need to be reflected in the global concept of this type. It is unclear how these stands have developed or been managed, but contemporary fire suppression is an obvious factor as are signs of historical clearing for agriculture and military use (J. Harrison pers. comm. 2011).

Global Similar Associations:

- *Pinus echinata - Quercus prinus - Quercus (coccinea, velutina)* Forest (CEGL004761)
- *Pinus echinata* Ruderal Forest (CEGL006327) occurs in similar environments but is dominated (>50% of canopy) by *Pinus echinata* instead of *Pinus virginiana*.
- *Pinus taeda - Liquidambar styraciflua* Ruderal Forest (CEGL008462) is commonly found in the same area as CEGL002591 in the Piedmont. CEGL008462 contains at least 50% *Pinus taeda* in the canopy, whereas CEGL002591 is mostly *Pinus virginiana*.
- *Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum* Ruderal Forest (CEGL006011) occurs in similar environments with similar disturbance histories but is dominated by (>50% of canopy) *Pinus taeda* instead of *Pinus virginiana*.
- *Pinus virginiana - Juniperus virginiana var. virginiana - Ulmus alata* Ruderal Forest (CEGL007121) on more calcareous or circumneutral substrates.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

- *Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum* Forest (CEGL007119) can have a very similar canopy in the Piedmont and Blue Ridge ecoregions, but CEGL007119 is generally created and maintained by fire and/or logging but not heavy plowing and/or erosion. CEGL002591 generally has signs of heavy agricultural use such as sparse herbaceous or shrub layers, large percentage of invasive exotics such as *Lonicera japonica* in the herbaceous layer, old plowlines, human debris, and extremely even-aged canopy, whereas CEGL007119 generally has a more intact herbaceous/shrub layer (especially *Vaccinium pallidum*) and less signs of severe human disturbance.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1) and Tennessee (2) in the vicinity of M330, M395 and M405.

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

Nations: US

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

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

USFS Ecoregions (1994/95): 221Da:CCC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 221J:CC, 222Cg:CCC, 222Dg:CCC, 222Eg:CCC, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 231Ae:CCC, 231Ak:CCC, 231An:CCC, 231Be:CCC, 231Cc:CCC, 231Cd:CCC, 232Ad:???, 232Br:?CC, 232Bt:?CC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Be:CCC, M221Ca:CCC, M221Cb:CCC, M221Cc:CCP, M221Cd:CCC, M221Ce:CCP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: BIA (Eastern Band of Cherokee); NPS (Abe Lincoln Birthplace, Appalachian Trail [Central Appalachians], Appalachian Trail [Southern Blue Ridge], Appomattox Court House, Big South Fork, Blue Ridge Parkway?, Bluestone, Booker T. Washington, C&O Canal, Cumberland Gap, Fredericksburg-Spotsylvania, Gauley River, George Washington Parkway, Gettysburg, Great Smoky Mountains, Guilford Courthouse, Kings Mountain, Little River Canyon, Mammoth Cave, Manassas, Natchez Trace, National Capital-East, New River Gorge, Obed River, Prince William, Rock Creek, Shenandoah, Shiloh, Thomas Stone, Wolf Trap); TVA (Tellico); USFS (Bankhead, Chattahoochee, Chattahoochee (Piedmont), Chattahoochee (Southern Blue Ridge), Cherokee, Daniel Boone, George Washington, Jefferson, Monongahela, Sumter, Sumter (Mountains), Sumter (Piedmont), Uwharrie?); USFWS (Patuxent)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.145, NATR.206, NATR.455.

Local Description Authors: M.J. Russo

Global Description Authors: M. Andreu and M. Tukman, mod. J.P. Vanderhorst, K.D. Patterson and S.C. Gawler

References: Allard 1990, Ambrose 1990a, Andreu and Tukman 1995, Burns and Honkala 1990a, Collins and Anderson 1994, Coxe 2009, Eyre 1980, Faller 1975, Fike 1999, Fleming and Coulling 2001, Fleming and Moorhead 2000, Fleming and Patterson 2011a, Fleming and Weber 2003, Fleming et al. 2006, Hall and Mathews 1974, Harrison 2004, Harrison, J. pers. comm., Homoya et al. 1988, Lea et al. 2012, Nelson 1986, Nordman et al. 2011, Patterson 2008a, Patterson 2008b, Patterson 2008e, Patterson et al. 1999, Perles et al. 2006c, Pyne 1994, Pyne et al. 2010, Schmalzer and DeSelm 1982, Schotz et al. 2008, Schotz pers. comm., Shreve et al. 1910, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998c, Taverna and Patterson 2008, Vanderhorst 2001b, Vanderhorst et al. 2007, Vanderhorst et al. 2008, Vanderhorst et al. 2010, WVNHP unpubl. data b, White 2006, White and Govus 2005, White and Pyne 2003, Windisch 2014a, Young et al. 2006, Young et al. 2009

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Interior Low Plateau Ruderal Sugarberry, Hackberry Forest

***Celtis (laevigata, occidentalis) - Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest**
(Sugarberry, Common Hackberry) - Elm species - (Ohio Buckeye) Ruderal Forest
Identifier: CEGL004697

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Tuliptree - Black Walnut - Black Locust Forest (A3228)
Association	Interior Low Plateau Ruderal Sugarberry, Hackberry Forest

ELEMENT CONCEPT

Global Summary: This association includes second-growth forests on deep soils of upland woodlots and fencerows of calcium-rich sedimentary areas of the unglaciated Interior Low Plateau region of Kentucky, Tennessee, and parts of northern Alabama and Mississippi. Areas in which this vegetation is likely to occur include the Inner Nashville Basin of Tennessee, and the Bluegrass Basin, Knobs and Mitchell Plain of Kentucky. The canopy is dominated by *Celtis laevigata* and/or *Celtis occidentalis* with *Fraxinus americana, Ulmus americana, Ulmus rubra*, and *Ulmus serotina*. Some examples contain *Juglans nigra* and *Aesculus glabra*. The understory may include *Prunus serotina var. serotina, Robinia pseudoacacia, Juniperus virginiana var. virginiana* (with <25% cover), *Celtis laevigata, Ulmus alata, Fraxinus americana*, and *Quercus imbricaria*. In addition, *Maclura pomifera* may have cover in the canopy or understory.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sugarberry forest was sampled at six locations in the park. Sites are flat or gentle to moderate mid and lower slopes. Soils range from well-drained to somewhat poorly drained loam, sandy clay, sandy loam, silt, and silty clay. The unvegetated surface is dominated by litter/duff with some wood and occasional bare soil and rocks. Evidence of disturbance includes roads/trails, mowing, wind damage, and the presence of exotic plants.
Global Environment: These are second-growth forests on deep soils of upland woodlots and fencerows of calcium-rich sedimentary areas of the unglaciated Interior Low Plateau region of Kentucky, Tennessee, and possibly parts of northern Alabama. Stands are found along old fencerows, at old homesites, and other upland areas, which have been disturbed and are now dominated by this successional forest.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this community is quite variable, ranging from relatively sparse (30-40% cover) mature forest 20-50 m tall to moderately dense (60-70%) shorter forests 15-20 m tall. Subcanopies are also variable, ranging from 5-20+ m tall. *Celtis laevigata, Celtis occidentalis*, and *Juglans nigra* dominate; additional trees include *Gleditsia triacanthos, Juniperus virginiana, Liquidambar styraciflua, Quercus nigra*, and *Ulmus americana*. The sparse to dense (20-80%) tall-shrub (2-5+ m) and short-shrub (0.5-2 m) layers include *Acer saccharum, Asimina triloba, Fraxinus americana, Ligustrum sinense* (exotic), *Lindera benzoin*, and *Symphoricarpos orbiculatus*. Dominant and/or common species in the herbaceous layer (10-90%) include *Ageratina altissima, Asplenium platyneuron, Chasmanthium latifolium, Chasmanthium laxum, Elephantopus carolinianus, Elymus virginicus, Microstegium vimineum* (exotic), *Polygonum virginianum*, and *Verbesina alternifolia*. Vines (5-10%) include *Lonicera japonica* (exotic) and *Parthenocissus quinquefolia*. This community also supports Tennessee state-rare *Acalypha deamii* and *Allium tricoccum*.
Global Vegetation: The canopy of stands of this type is dominated by *Celtis* spp. (*Celtis laevigata, Celtis occidentalis*) with *Aesculus glabra var. glabra, Fraxinus americana, Ulmus americana, Ulmus rubra*, and *Ulmus serotina*. *Juglans nigra* may be present in some examples. The understory may include *Prunus serotina var. serotina* and *Quercus imbricaria*. In an example at Stones River National Battlefield (NPS), the canopy is dominated by *Celtis laevigata* with *Fraxinus americana*. Important subcanopy trees are *Juniperus virginiana var. virginiana* (with <25% cover), *Celtis laevigata, Ulmus alata, Fraxinus americana, Acer saccharum var. saccharum*, and *Quercus rubra*. Important shrubs are *Juniperus virginiana var. virginiana* (with <25% cover), *Celtis laevigata, Ulmus alata, Rhus glabra, Rhus aromatica*, and the exotic species *Lonicera maackii, Lonicera japonica, Ligustrum vulgare*, and *Maclura pomifera* (native to Arkansas but not Tennessee). *Asplenium platyneuron* is a common fern. Vines include *Lonicera japonica* and *Berchemia scandens*. This vegetation was documented from one plot (NatureServe Ecology unpubl. data) but was observed elsewhere on Stones River National Battlefield. *Juglans nigra* was not found in the plot but was part of this association elsewhere at Stones River. *Aesculus glabra* occurs infrequently at Stones River; it may be present in some examples of this type there.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Celtis laevigata*, *Celtis occidentalis*, *Juglans nigra*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Celtis laevigata*, *Celtis occidentalis*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Celtis laevigata*, *Celtis occidentalis*, *Juglans nigra*
Global: *Aesculus glabra* var. *glabra*, *Celtis laevigata*, *Celtis occidentalis*, *Ulmus rubra*, *Ulmus serotina*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Acalypha deamii* (G4?, TN state-rare); **Invasive/Exotic Plants**: *Allium tricoccum* (TN state-rare and commercially exploited), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Stellaria media* (Low), *Wisteria sinensis* (Medium)
Global: Invasive/Exotic Plants: *Ligustrum vulgare* (High/Medium), *Lonicera japonica* (High/Medium), *Lonicera maackii* (High)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (31-Jan-2003). This is a second-growth forest of woodlots and fencerows. Despite its distinctive composition, it is not an element of conservation concern. Grank changed from GW to GD 2003-01-03 MP.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Similar Associations:
- *Juglans nigra - Celtis occidentalis* Ruderal Forest (CEGL004693) is another successional type with overlapping species composition from Kentucky Bluegrass region with greater dominance by *Juglans*.
- *Robinia pseudoacacia - Celtis occidentalis - (Fraxinus americana, Liriodendron tulipifera)* Ruderal Forest (CEGL007281)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2), Mississippi (1) and Tennessee (3) between M320 and M325, M325 and M330, M335 and M340, M385 and M390, and in the vicinity of M65 and M385.
Global Range: This association occurs in the unglaciated Interior Low Plateau region of Kentucky, Tennessee, and parts of northern Alabama and Mississippi.
Nations: US
States/Provinces: AL, KY, MS, TN
TNC Ecoregions: 43:C, 44:C
USFS Ecoregions (1994/95): 222Ec:CCC, 222Ed:CCC, 222Ef:CCC, 222Eg:CCC, 231Bi:CCC
Federal Lands: NPS (Natchez Trace, Stones River)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.215, NATR.226, NATR.450, NATR.460, NATR.539, NATR.607.
Local Description Authors: M.J. Russo
Global Description Authors: C.W. Nordman, mod. M. Pyne
References: Nordman 2004a, Nordman et al. 2011, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Honey-locust - Elm Woodland

***Gleditsia triacanthos - Ulmus (alata, rubra)* Ruderal Woodland**
Honey-locust - (Winged Elm, Slippery Elm) Ruderal Woodland
Identifier: CEGL003686

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Tuliptree - Black Walnut - Black Locust Forest (A3228)
Association	Ruderal Honey-locust - Elm Woodland

ELEMENT CONCEPT

Global Summary: This association covers successional Appalachian and interior woodlands typically dominated by *Gleditsia triacanthos* and *Ulmus* spp., along with a variety of hardwoods and gymnosperms. These successional woodlands typically have a total canopy cover between 25 and 50%. The canopy species vary greatly, but *Gleditsia triacanthos* is present in variable amounts in every occurrence, and one of the *Ulmus* species is usually present. Other species that may occur in this woodland are *Juniperus virginiana var. virginiana, Pinus virginiana, Celtis occidentalis, Celtis laevigata var. laevigata, Liriodendron tulipifera, Liquidambar styraciflua, Juglans nigra, Fraxinus americana, Quercus alba, Quercus stellata, Quercus velutina, Quercus rubra*, and *Carya* spp. Common shrubs are *Rhus copallinum* and *Rubus* spp. This successional type results from heavy grazing or other severe disturbance. It occurs on sites in mesic riparian corridors and floodplains that were farmed long ago by Native Americans.

ENVIRONMENTAL DESCRIPTION

Global Environment: *Gleditsia triacanthos* occurs in rocky uplands and xeric fields, but also occurs in mesic riparian corridors and floodplains, where Cherokee once settled and farmed. A centuries-old legacy of Native American cultivation influences the current distribution of *Gleditsia triacanthos* in the southern Appalachians, which is better explained Cherokee settlement patterns than other factors of the environment (Warren 2016). *Gleditsia triacanthos* is severely dispersal limited in the region, only moving appreciable distances from former Cherokee settlements where cattle grazing is prevalent (Warren 2016).

VEGETATION DESCRIPTION

Global Vegetation: Stands of this type are typically dominated by *Gleditsia triacanthos* and *Ulmus* spp., along with a variety of hardwoods and gymnosperms. The canopy species vary greatly, but *Gleditsia triacanthos* is always present (in variable amounts), and *Ulmus alata* or *Ulmus rubra* is usually present. Other species that may occur in this woodland are *Juniperus virginiana var. virginiana, Pinus virginiana, Celtis occidentalis, Celtis laevigata var. laevigata, Liriodendron tulipifera, Liquidambar styraciflua, Juglans nigra, Fraxinus americana, Quercus alba, Quercus stellata, Quercus velutina, Quercus rubra*, and *Carya* spp. Common shrubs are *Rhus copallinum* and *Rubus* spp.
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (11-Aug-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Described from Tellico Pilot Project data (10 stands sampled).

ELEMENT DISTRIBUTION

Global Range: This type is found in North Carolina, Tennessee, Mississippi, and possibly in Alabama, Georgia, Kentucky, and could be found elsewhere.
Nations: US
States/Provinces: AL?, GA?, KY?, MS, NC, TN
TNC Ecoregions: 44:P, 50:C, 51:?, 52:P
USFS Ecoregions (1994/95): 221Hc:CP?, 221Hd:CP?, 221Ja:CCC, 221Jb:CCP, 221Jc:CCP, 231Ad:P??, 231Cc:P??, 231Cd:P??, 231Cf:P??, 231Cg:P??, 231Da:P??, 231Dc:P??, 231De:P??
Federal Lands: NPS (Natchez Trace); TVA (Tellico); USFS (Cherokee?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: M. Pyne
References: Andreu and Tukman 1995, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. Data, Warren 2016

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Tuliptree Forest (Typic Type)

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

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Tuliptree - Black Walnut - Black Locust Forest (A3228)
Association	Ruderal Tuliptree Forest (Typic Type)

ELEMENT CONCEPT

Global Summary: This broadly defined ruderal or successional community is one of several described upland associations dominated by *Liriodendron tulipifera*. It ranges from the southern Cumberland Plateau, Piedmont, and Interior Low Plateau of the southeastern U.S. north to the northern Piedmont of New Jersey. These successional forests often follow cropping, clearcut logging, or other severe disturbance, and are successional to mixed oak-hickory forests. Examples are common across large areas of the upland landscape which have previously been disturbed. Soils usually exhibit evidence of disturbance and may have little to no organic horizon development. They are typically acidic and well-drained, dry to moist sand, sandy loam, sandy clay loam, or silt loam. Environmental setting is variable, ranging from level to gently sloping uplands to well-drained floodplains and stream terraces. Species found in stands attributable to this type may include a fairly diverse and varied composition. *Acer rubrum, Quercus* spp., *Betula lenta, Oxydendrum arboreum, Acer saccharum*, and occasionally *Liquidambar styraciflua, Ilex opaca*, or *Robinia pseudoacacia* may be common in stands of this type. Where oaks are present, they are frequently multi-stemmed, resulting from coppicing. The conifer *Tsuga canadensis* is abundant in the understories of some stands. Shrub composition is variable but may include *Sambucus nigra ssp. canadensis, Rhododendron maximum, Hamamelis virginiana*, and *Vaccinium pallidum*. Herbs are likewise variable; West Virginia samples feature *Dioscorea quaternata, Lysimachia quadrifolia, Maianthemum racemosum, Solidago curtisii, Symphyotrichum prenanthoides, Polystichum acrostichoides, Dryopteris intermedia, Arisaema triphyllum ssp. triphyllum, Packera aurea, Amphicarpaea bracteata, Thelypteris noveboracensis, Lycopodium digitatum*, and *Geranium maculatum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional tuliptree forest was sampled at two locations in the park. One site is a somewhat steep, southwest-facing slope, the other a gently sloping, east-facing ridge with well-drained sandy loam soil. The unvegetated surface at the latter site is dominated by downed wood, the result of massive wind damage. Other evidence of disturbance includes the presence of exotic plants.
Global Environment: These ruderal upland deciduous forests are found primarily in areas which were once clearcuts, old fields, or were cleared by fire or other natural disturbances. These successional forests often follow cropping, clearcut logging, or other severe disturbance, and are successional to mixed oak-hickory forests. Examples are common across large areas of the upland landscape which have previously been disturbed. Soils usually exhibit evidence of disturbance and may have little to no organic horizon development. Environmental setting is variable, ranging from level to gently sloping uplands to well-drained floodplains and stream terraces.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: These successional communities are dominated by *Liriodendron tulipifera*, either in the sparse (20% cover) canopy/subcanopy, 35+ m tall, or the sparse to dense (20-70%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers, which may be overtopped by various *Quercus* spp., such as *Quercus alba* and *Quercus falcata*. Additional shrubs can include *Corylus americana, Oxydendrum arboreum, Prunus serotina, Rhus copallinum*, and *Vaccinium pallidum*. The herbaceous layer (10-70%) is dominated by tree seedlings and ferns, such as *Phegopteris hexagonoptera* and *Polystichum acrostichoides*.
Global Vegetation: The canopy of this ruderal upland association is dominated by *Liriodendron tulipifera*. *Quercus* species (*Quercus alba, Quercus rubra, Quercus falcata, Quercus nigra, Quercus velutina*) are often present; additional associates may include *Acer barbatum, Acer rubrum, Carya* spp., *Fagus grandifolia, Nyssa sylvatica, Cornus florida*, and *Robinia pseudoacacia*. *Betula lenta* is a common associate at the northern range limit. Shrub layers may include saplings of the canopy species and *Acer pensylvanicum, Amelanchier arborea, Hamamelis virginiana, Lindera benzoin* (in small amounts), and *Vaccinium pallidum*. Herbs vary across the range but may include *Actaea racemosa, Dichanthelium clandestinum, Dioscorea quaternata, Galium circaezans, Geranium maculatum, Goodyera pubescens, Medeola virginiana, Potentilla simplex, Scutellaria serrata, Thelypteris noveboracensis*, and *Uvularia perfoliata*. *Lycopodium digitatum* may be abundant in some stands.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liriodendron tulipifera*
Tree canopy	Broad-leaved deciduous tree	*Quercus alba*, *Quercus falcata*
Tree subcanopy	Broad-leaved deciduous tree	*Oxydendrum arboreum*, *Prunus serotina*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Liriodendron tulipifera*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liriodendron tulipifera*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cornus florida*
Herb (field)	Fern (Spore-bearing forb)	*Lycopodium digitatum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Liriodendron tulipifera*, *Quercus alba*

Global: *Acer pensylvanicum*, *Acer rubrum*, *Actaea racemosa*, *Amelanchier arborea*, *Carya glabra*, *Dichanthelium clandestinum*, *Fagus grandifolia*, *Galium circaezans*, *Geranium maculatum*, *Goodyera pubescens*, *Hamamelis virginiana*, *Lycopodium digitatum*, *Medeola virginiana*, *Nyssa sylvatica*, *Quercus falcata*, *Quercus rubra*, *Quercus velutina*, *Robinia pseudoacacia*, *Thelypteris noveboracensis*, *Uvularia perfoliata*, *Vaccinium pallidum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium)

Global: Vulnerable Plants: *Hexastylis naniflora* (G3), *Trillium rugelii* (G3), *Trillium simile* (G3)

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

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

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Global Comments: It differs from other described types within its range based on the lack of a significant pine component [see *Liriodendron tulipifera - Pinus taeda* Ruderal Forest (CEGL007521)] and the absence of species affiliated with circumneutral conditions [see *Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Ruderal Forest (CEGL007220)]; it is later successional and more diverse than *Liriodendron tulipifera* Ruderal Forest (CEGL007218) and tends to be found on more stable soil substrates and less steep slopes than *Liriodendron tulipifera - Acer rubrum - Robinia pseudoacacia* Ruderal Forest (CEGL007219).

Global Similar Associations:

- *Liriodendron tulipifera - Acer negundo* Ruderal Forest (CEGL007184) a bottomland type.
- *Liriodendron tulipifera - Acer rubrum - Robinia pseudoacacia* Ruderal Forest (CEGL007219) is generally found on steeper slopes and/or shallow soils and with a more intense history of disturbance.
- *Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Ruderal Forest (CEGL007220) is generally found on calcareous or at least pH neutral soils.
- *Liriodendron tulipifera* Ruderal Forest (CEGL007218) more early-successional.
- *Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus americana - (Robinia pseudoacacia)* Ruderal Forest (CEGL006599)
- *Prunus serotina - Sassafras albidum - (Fraxinus americana) / Juniperus virginiana* Ruderal Forest (CEGL004133)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Tennessee between M355 and M360.
Global Range: This association is known from the southern Cumberland Plateau, Piedmont, and Interior Low Plateau of the southeastern U.S. and may also occur in the Upper East Gulf Coastal Plain. It ranges north to the northern Piedmont of New Jersey and adjacent Pennsylvania. It is also known from Alabama, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, West Virginia, Virginia, and possibly Delaware.
Nations: US
States/Provinces: AL, DC, DE?, GA, KY, MD, NC, NJ, PA, SC, TN, VA, WV
TNC Ecoregions: 43:P, 44:C, 50:C, 51:C, 52:C, 58:C, 59:C, 61:C
USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 222Cg:CCC, 222Dg:CCC, 222Eb:CCC, 222Eg:CCC, 222En:CCC, 222Eo:CCC, 231Aa:CCP, 231Ab:CCC, 231Ae:CCC, 231Ak:CCC, 231An:CCC, 231Bc:CCC, 231Bh:CCC, 231Cd:CCP, 231Dc:CCC, 232Ad:C??, 232Br:CCC, M221Bb:CCC, M221Ca:CCC, M221Cb:CCC, M221Cd:CCC, M221Dd:CCC
Federal Lands: BIA (Eastern Band of Cherokee); DOD (Fort Benning); NPS (Appalachian Trail [Central Appalachians], Appalachian Trail [Southern Blue Ridge], Appomattox Court House, Big South Fork, Blue Ridge Parkway, Booker T. Washington, C&O Canal, Carl Sandburg Home, Catoctin Mountain, Chattahoochee River, Chickamauga-Chattanooga?, Cowpens, Cumberland Gap, Fredericksburg-Spotsylvania, Gauley River, George Washington Parkway, Guilford Courthouse, Horseshoe Bend, Kennesaw Mountain, Kings Mountain, Mammoth Cave, Morristown, Natchez Trace, National Capital-East, New River Gorge, Ninety Six, Obed River, Petersburg, Prince William, Richmond, Rock Creek, Shiloh, Valley Forge, Wolf Trap); USFS (Bankhead, Daniel Boone, Oconee?, Talladega, Talladega (Oakmulgee)?, Talladega (Talladega)); USFWS (Patuxent)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.057, NATR.416.
Local Description Authors: M.J. Russo
Global Description Authors: R.E. Evans and M. Pyne, mod. L.A. Sneddon, R. White, S.C. Gawler
References: Ehrenfeld 1977, Fleming 2002b, Fleming and Patterson 2003, Gallyoun et al. 1996, Keever 1973, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Overlease 1987, Patterson 2008a, Patterson 2008b, Patterson 2008e, Patterson 2008f, Podniesinski et al. 2005b, Pyne et al. 2010, Russell and Schuyler 1988, Schmalzer and DeSelm 1982, Schotz pers. comm., Sneddon et al. 2008, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Taverna and Patterson 2008, Vanderhorst 2001a, Vanderhorst and Streets 2006, Vanderhorst et al. 2007, Vanderhorst et al. 2010, White 2003, White 2004, White 2006, White and Govus 2003, White and Govus 2005, White and Pyne 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Tuliptree Forest (Rich Type)

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

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Tuliptree - Black Walnut - Black Locust Forest (A3228)
Association	Ruderal Tuliptree Forest (Rich Type)

ELEMENT CONCEPT

Global Summary: This ruderal or successional community dominated by *Liriodendron tulipifera* occurs in the Ridge and Valley of Tennessee and Virginia, the Interior Low Plateau of Kentucky, and the Central Appalachians, Piedmont and inner Coastal Plain regions of Virginia, West Virginia, Pennsylvania, and Maryland. Plots attributable to this type are also known from the Piedmont of Georgia. It may also occur in similar regions of Delaware. It is distinguished from other upland communities dominated by *Liriodendron tulipifera* by the presence of species associated with soils with moderately high base saturation levels (rich soils). Species found in stands attributable to this type may be fairly diverse and result in a varied composition. In addition to *Liriodendron tulipifera*, other canopy species may include *Liquidambar styraciflua, Acer saccharum, Aesculus flava, Platanus occidentalis, Quercus rubra, Acer rubrum, Robinia pseudoacacia, Juglans nigra, Halesia tetraptera, Fraxinus americana, Fagus grandifolia, Magnolia acuminata, Ulmus rubra, Quercus imbricaria, Quercus muehlenbergii*, and *Carya ovata*. Species often found in the subcanopy include *Acer saccharum, Cercis canadensis, Ulmus alata, Fraxinus americana, Morus rubra*, and *Cornus florida*. Shrubs include saplings of the subcanopy and canopy species, as well as *Lindera benzoin, Symphoricarpos orbiculatus, Asimina triloba, Staphylea trifolia, Acer negundo*, and *Juniperus virginiana var. virginiana*. Exotic shrubs, including *Rosa multiflora, Rubus phoenicolasius*, and *Lonicera japonica*, are present at some sites. Herb-layer species include the exotics *Microstegium vimineum, Alliaria petiolata*, and *Veronica hederifolia*, as well as *Toxicodendron radicans, Parthenocissus quinquefolia, Smilax tamnoides, Actaea racemosa, Caulophyllum thalictroides, Laportea canadensis, Impatiens pallida, Hydrophyllum canadense, Adiantum pedatum, Polygonatum pubescens, Verbesina alternifolia, Amphicarpaea bracteata*, and *Polystichum acrostichoides*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional tuliptree forest was sampled at five locations in the park. Sites are typically moderate upper slopes with northern and eastern aspects. Soils are well- to moderately well-drained sandy clay, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes wind damage, past logging and clearing (agricultural), and the presence of exotic plants.
Global Environment: These forests are found on disturbed mesic areas underlain by rich soils with moderately high base saturation levels. It occurs on abandoned farmland and townsites, old strip mines, old clearcuts, burned areas, and other areas where the canopy was removed or heavily disturbed in the past. Small patches may occur in areas where canopy disturbance has resulted from natural causes such as windfall or landslides. Soils may be underlain by a variety of geologic strata that weather to base-rich soils including limestone, dolomite, calcareous shale, shell deposits, metabasalts and granitic complexes. In Kentucky this association may occur on calcareous substrates in the Dripping Springs Escarpment. At Shenandoah National Park in Virginia, this community is underlain by Catoctin metabasalt or a pyroxene-bearing granitic complex. In West Virginia, parent materials include sandstone, shale, and alluvium. Soils in plots were described as moderately well-drained to well-drained clay, silt loam, and sandy loam with pH ranging from 5.0 to 7.5, with relatively high levels of organic matter, estimated N release, Ca, Cu, K, Mg, and Mn, and relatively low levels of S, Al, B, Fe, P, and Zn compared to average values in the area.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-80% cover) canopy, 20-35+ m tall, is dominated by *Liriodendron tulipifera* and may include *Fraxinus americana, Platanus occidentalis, Prunus serotina*, and *Quercus velutina*, among others. The sparse (20-40%) subcanopy (5-20 m) is dominated by *Acer saccharum*. The very sparse to moderate (5-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of tree species along with *Asimina triloba, Callicarpa americana, Lindera benzoin*, and *Symphoricarpos orbiculatus*. The herbaceous layer (20-60%) is often dominated by the invasive exotic *Microstegium vimineum*; other herbs can include *Ageratina altissima, Asplenium platyneuron, Polygonum virginianum, Polystichum acrostichoides*, and *Toxicodendron radicans*, which is also a common vine (10%) along with *Lonicera japonica* (exotic).
Global Vegetation: Stands are dominated by *Liriodendron tulipifera* but also include various other species, including ones indicative of nutrient-rich or circumneutral environments. Other species include *Liquidambar styraciflua, Acer saccharum, Aesculus flava, Platanus occidentalis, Quercus rubra, Acer rubrum, Robinia pseudoacacia, Juglans nigra, Halesia tetraptera, Fraxinus americana, Fagus grandifolia, Magnolia acuminata, Ulmus rubra, Quercus imbricaria, Quercus muehlenbergii*, and *Carya ovata* (NatureServe Ecology unpubl. data, VDNH unpubl. data, WVNHP unpubl. data.). Species often found in the subcanopy include *Acer saccharum, Cercis canadensis, Ulmus alata, Morus rubra, Sassafras albidum*, and *Cornus florida*. *Cercis canadensis* is often abundant on soils underlain by carbonate strata. Shrubs include saplings of the subcanopy and canopy species, as well as

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Symphoricarpos orbiculatus, Lindera benzoin, Asimina triloba, and *Juniperus virginiana var. virginiana*. *Lindera benzoin* is often abundant in occurrences of this community in the Central Appalachians, Piedmont and Inner Coastal Plain regions of Virginia, West Virginia, and Maryland. Exotic shrubs, including *Rosa multiflora, Rubus phoenicolasius*, and *Lonicera japonica*, are present at some sites. Vines, which may be abundant, include *Aristolochia macrophylla, Toxicodendron radicans, Parthenocissus quinquefolia, Smilax tamnoides*, and *Vitis aestivalis var. bicolor*. Herbaceous species include the exotics *Microstegium vimineum, Alliaria petiolata*, and *Veronica hederifolia*, as well as *Actaea racemosa, Ageratina altissima, Arisaema triphyllum, Asarum canadense, Caulophyllum thalictroides, Cryptotaenia canadensis, Galium triflorum, Laportea canadensis, Impatiens pallida, Hydrophyllum canadense, Osmorhiza longistylis, Adiantum pedatum, Polygonatum pubescens, Polystichum acrostichoides, Verbesina alternifolia, Amphicarpaea bracteata, Solidago caesia*, and *Polystichum acrostichoides*. (Andreu and Tukman 1995, NatureServe Ecology unpubl. data, VDNH unpubl. data, WVNHP unpubl. data). Examples at Fort Donelson that have been very heavily disturbed may have local dominance by *Celtis laevigata* and *Juglans nigra*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fraxinus americana*, *Liriodendron tulipifera*, *Platanus occidentalis*, *Prunus serotina*
Tree subcanopy	Broad-leaved deciduous tree	*Acer saccharum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lindera benzoin*, *Symphoricarpos orbiculatus*
Herb (field)	Graminoid	*Microstegium vimineum*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liriodendron tulipifera*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer saccharum*, *Lindera benzoin*, *Liriodendron tulipifera*
Global: *Acer saccharum*, *Aesculus flava*, *Ageratina altissima*, *Arisaema triphyllum*, *Aristolochia macrophylla*, *Asarum canadense*, *Asimina triloba*, *Carya ovata*, *Cercis canadensis*, *Cryptotaenia canadensis*, *Galium triflorum*, *Lindera benzoin*, *Osmorhiza longistylis*, *Parthenocissus quinquefolia*, *Polystichum acrostichoides*, *Toxicodendron radicans*, *Ulmus rubra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Albizia julibrissin* (High/Low), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Cardamine clematitis* (G3), *Panax quinquefolius* (G3G4, under collection pressure), *Penstemon smallii* (G3), *Schisandra glabra* (G3), *Scutellaria saxatilis* (G3), *Trillium rugelii* (G3); **Invasive/Exotic Plants**: *Alliaria petiolata* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low), *Rubus phoenicolasius* (Medium), *Veronica hederifolia* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

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

CLASSIFICATION

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

- *Liriodendron tulipifera - Pinus taeda* Ruderal Forest (CEGL007521) supports a significant pine component.
- *Liriodendron tulipifera - Quercus rubra - Fraxinus americana / Asimina triloba / Actaea racemosa* Forest (CEGL006186)
- *Liriodendron tulipifera - Quercus* spp. Ruderal Forest (CEGL007221) on more acidic substrates, lacks species affiliated with circumneutral conditions.
- *Liriodendron tulipifera* Ruderal Forest (CEGL007218) is less diverse and earlier successional.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (1) and Tennessee (4) between M320 and M325, M345 and M350, and in the vicinity of M305.

Global Range: This type occurs in the Ridge and Valley and Cumberland Plateau of Tennessee, the Interior Low Plateau of Kentucky, the Upper East Gulf Coastal Plain of Mississippi, and the Central Appalachian, Piedmont and Inner Coastal Plain regions of Virginia, West Virginia, Maryland, Pennsylvania, and possibly Delaware. Plots attributable to this type are also known from the Georgia Piedmont. Its full range has not been documented.

Nations: US

States/Provinces: AL, DC, DE, GA, KY, MD, MS, NY, PA, TN, VA, WV

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

USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 221Jb:CCC, 222Dg:CCC, 222Dj:CCC, 222Eg:CCC, 231Ae:CCC, 231Al:CCC, 231Ap:CCC, 231Bd:CCC, 232Ad:CCC, M221Ab:CCC, M221Bb:CCC, M221Be:CCC, M221Cb:CCC, M221Da:CCC

Federal Lands: NPS (Abe Lincoln Birthplace, Antietam, Appalachian Trail [Central Appalachians], Appalachian Trail [Lower New England], Appalachian Trail [Southern Blue Ridge], Big South Fork, Blue Ridge Parkway, Bluestone, C&O Canal, Catoctin Mountain, Chattahoochee River, Chickamauga-Chattanooga, Cumberland Gap, Fort Donelson, George Washington Parkway, Harpers Ferry, Mammoth Cave, Monocacy, Natchez Trace, National Capital-East, New River Gorge, Obed River, Rock Creek, Shenandoah, Thomas Stone, Vicksburg, Wolf Trap); TVA (Tellico); USFS (Cherokee?, Monongahela); USFWS (National Conservation Training Center)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.049, NATR.429, NATR.433, NATR.608, NATR.647.

Local Description Authors: M.J. Russo

Global Description Authors: R.E. Evans, mod. M. Pyne, J. Teague, C.W. Nordman, R. White, S.C. Gawler

References: Andreu and Tukman 1995, Coxe 2009, Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2006, Fleming pers. comm., Hall and Mathews 1974, Lea 2000, Lea 2003, Lea 2004, Lea et al. 2012, Lea et al. 2013, Martin 1989, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Rentch et al. 2005, Schmalzer and DeSelm 1982, Shreve et al. 1910, Southeastern Ecology Working Group n.d., TDNH unpubl. data, VDNH unpubl. data, Vanderhorst 2001a, Vanderhorst et al. 2007, Vanderhorst et al. 2008, WVNHP unpubl. data b, White 2005, White 2006, Young et al. 2006, Young et al. 2007a, Young et al. 2009

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Black Locust Forest

***Robinia pseudoacacia* Ruderal Forest**
Black Locust Ruderal Forest
Identifier: CEGL007279

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Eastern North American Ruderal Forest (M013)
Group	Eastern North American Native Ruderal Forest (G030)
Alliance	Ruderal Tuliptree - Black Walnut - Black Locust Forest (A3228)
Association	Ruderal Black Locust Forest

ELEMENT CONCEPT

Global Summary: This black locust ruderal forest is found locally throughout the eastern United States. Stands often establish on old fields abandoned after agricultural cropping or pasturing or around old homesites. In some areas it occurs on post-agricultural floodplain terraces. This vegetation has also become established following the planting of *Robinia pseudoacacia* to stabilize and enrich nutrient-poor soils that are subject to erosion. The vegetation is dominated by *Robinia pseudoacacia*. Associated woody species vary from site to site and include *Prunus serotina, Juniperus virginiana, Ulmus americana, Ulmus rubra, Carya ovata, Celtis occidentalis, Juglans nigra, Quercus rubra, Ulmus rubra*, and in some areas *Acer platanoides* or *Ailanthus altissima*. Understory vegetation is highly variable depending on site history and often includes *Toxicodendron radicans*; *Lindera benzoin* is sometimes present. The invasive non-native *Rosa multiflora* may be present as a shrub, along with the non-native bramble *Rubus phoenicolasius*. Non-native species such as *Alliaria petiolata, Chelidonium majus, Glechoma hederacea*, and *Convallaria majalis* can characterize the herb layer, which may also have a native component.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional association is documented from one location in the park. It has become established in a successional old field, where it has become dominant. The community structure has assumed a weedy assemblage of early-successional native and exotic species.
Global Environment: This type often establishes on old fields abandoned after agricultural cropping or pasturing or around old home sites. This vegetation has also become established following the planting of *Robinia pseudoacacia* to stabilize and enrich nutrient-poor soils that are subject to erosion (Rabie 2000). Soils are variable and may be highly acidic, especially where established on old mine sites.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The vegetation is characterized by a prominence of shrub-sized (1-5 m) *Robinia pseudoacacia*. Additional woody associates assume similar size dimensions and include *Quercus falcata, Quercus nigra, Albizia julibrissin, Rhus copallinum*, and *Cornus florida*. Herbaceous associates include *Lolium perenne, Paspalum notatum, Lolium arundinaceum (= Schedonorus arundinaceus), Rubus argutus, Passiflora incarnata, Cirsium horridulum, Rudbeckia hirta*, and *Solidago altissima*.
Global Vegetation: The vegetation is dominated by *Robinia pseudoacacia* forming a partial to nearly complete canopy. Associated woody species vary from site to site and include *Prunus serotina, Juniperus virginiana, Ulmus americana, Ulmus rubra, Carya ovata, Celtis occidentalis, Juglans nigra, Quercus rubra, Ulmus rubra, Acer rubrum, Nyssa sylvatica*, and in some areas *Acer platanoides* or *Ailanthus altissima*. In addition, *Cornus florida* may be present in the subcanopy. Understory vegetation is highly variable depending on site history and often includes *Toxicodendron radicans*; *Lindera benzoin* is sometimes present. The invasive non-natives *Rosa multiflora* and *Elaeagnus umbellata* are typically the most common shrubs, along with the non-native bramble *Rubus phoenicolasius*. Non-native species such as *Alliaria petiolata, Chelidonium majus, Glechoma hederacea, Dactylis glomerata, Daucus carota*, and *Convallaria majalis* can characterize the herb layer, which may have a native component as well, for example with (depending on geography) *Ageratina altissima, Dichanthelium clandestinum, Elymus hystrix var. hystrix, Leersia virginica, Parthenocissus quinquefolia, Pilea pumila, Solidago canadensis, Solidago rugosa, Verbesina alternifolia, Verbesina occidentalis*, and *Viola* spp.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

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

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Robinia pseudoacacia*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Robinia pseudoacacia*
Global: *Acer rubrum*, *Robinia pseudoacacia*, *Rosa multiflora*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Lolium arundinaceum* (High/Medium), *Lolium perenne* (Medium), *Paspalum notatum* (Insignificant)
Global: **Invasive/Exotic Plants**: *Acer platanoides* (High/Medium), *Ailanthus altissima* (Medium), *Alliaria petiolata* (High/Medium), *Chelidonium majus* (Medium/Insignificant), *Convallaria majalis* (), *Dactylis glomerata* (Medium/Insignificant), *Daucus carota* (Low), *Elaeagnus umbellata* (High), *Glechoma hederacea* (Low), *Rosa multiflora* (Medium/Low), *Rubus phoenicolasius* (Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (24-Oct-2002). Although *Robinia pseudoacacia* is a native species found in the Central Appalachians and Ozark Mountains, it does not typically become a dominant species in these natural habitats (Elias 1980). It is now widespread in the eastern U.S. in disturbed habitats. This forest represents early-successional vegetation and is thus not of high conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:

- *Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus americana - (Robinia pseudoacacia)* Ruderal Forest (CEGL006599) can have *Robinia* as an important canopy component but is not dominated by it as is this type.
- *Prunus serotina - Sassafras albidum - (Fraxinus americana) / Juniperus virginiana* Ruderal Forest (CEGL004133)
- *Robinia pseudoacacia - Celtis occidentalis - (Fraxinus americana, Liriodendron tulipifera)* Ruderal Forest (CEGL007281)

ELEMENT DISTRIBUTION

Global Range: This black locust ruderal forest is found locally throughout the eastern United States.
Nations: US
States/Provinces: AR, DC?, DE, IA, KY, MA, MD, MS, NC, NJ, NY, OH, OK, PA, TN, VA, VT, WV
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 48:C, 49:C, 50:C, 51:C, 59:C, 61:C, 62:C, 63:C
USFS Ecoregions (1994/95): 221Aa:CCP, 221Ab:CCC, 221Ae:CCC, 221Ai:CCC, 221Bc:CCC, 221Fa:CCC, 222Ab:CCC, 222Ag:CCC, 222An:CCC, 222Ic:CCC, 231Bh:CCC, 232Ad:CCC, M212Ba:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCP, M221Ad:CCP, M221Ba:CCP, M221Bb:CCC, M221Bc:CCP, M221Bd:CCP, M221Be:CCC, M221Bf:CCP, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCP, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: NPS (Antietam, Appalachian Trail [Southern Blue Ridge], Blue Ridge Parkway, Bluestone, Buffalo River?, C&O Canal, Cape Cod, Catoctin Mountain, Cuyahoga Valley, George Washington Birthplace, Marsh-Billings-Rockefeller, Minute Man, Morristown, Natchez Trace, National Capital-East, New River Gorge, Saratoga, Vicksburg); USFS (George Washington, Jefferson, Monongahela, Nantahala, Ouachita, Ouachita (Mountains), Ozark, Pisgah); USFWS (Montezuma)

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: D. Faber-Langendoen, mod. S.C. Gawler and L.A. Sneddon
References: Baalman 1965, CAP pers. comm. 1998, Edinger et al. 2002, Edinger et al. 2007, Ehrenfeld 1977, Elias 1980, Fike 1999, Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2006, Gaertner 1955, Gawler et al. 2005, Hoagland 2000, INAI n.d., Lea et al. 2013, McDonald 1938, NRCS 2004a, Patterson 2008d, Rabie 2000, Rawinski et al. 1996, Sneddon et al. 2008, Sneddon et al. 2010, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst et al. 2007, Vanderhorst et al. 2008, WVNHP unpubl. data b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M016. Southern & South-Central Oak - Pine Forest & Woodland

G601. Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland

White Oak - Mixed Oak Dry-Mesic Alkaline Forest

***Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest**
White Oak - Northern Red Oak - Chinquapin Oak / Eastern Redbud Forest
Identifier: CEGL002070

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland (G601)
Alliance	South-Central Interior Chinquapin Oak - Maple - Ash Forest (A2060)
Association	White Oak - Mixed Oak Dry-Mesic Alkaline Forest

ELEMENT CONCEPT

Global Summary: This dry-mesic white oak - mixed oak alkaline forest community is found in unglaciated areas of the Interior Highlands of the east-central United States. Stands occur on gentle to steep slopes with moderately to well-drained moist loamy/sandy, relatively neutral to basic soils, which are underlain by bedrock of limestone and less commonly sandstone, siltstone, or shale. Soils may be shallow to somewhat deep (20-100 cm), with rock fragments present. The canopy is dense, yet enough scattered light penetrates to encourage a rich and diverse herbaceous layer, especially in the spring. Typical tree dominants include *Quercus alba, Quercus rubra, Quercus velutina*, and *Quercus muehlenbergii*. Typical associates include *Carya ovata, Carya alba*, and *Liriodendron tulipifera*. Other shade-tolerant tree associates that may dominate the subcanopy include *Acer saccharum* (or possibly *Acer barbatum* to the south), *Ulmus rubra, Juglans nigra, Fraxinus americana, Ostrya virginiana, Carpinus caroliniana*, and *Amelanchier arborea*. *Quercus muehlenbergii* is a key, but perhaps uncommon, indicator of the more neutral to alkaline soil characteristics of this type. Typical shrubs include *Aesculus glabra, Asimina triloba, Cercis canadensis, Cornus florida, Euonymus americanus, Frangula caroliniana*, and *Viburnum rufidulum*. Woody vines include *Parthenocissus quinquefolia* and *Toxicodendron radicans*. Herbaceous species include *Anemone virginiana, Arisaema triphyllum, Botrychium virginianum, Carex jamesii, Actaea racemosa (= Cimicifuga racemosa), Desmodium glutinosum, Desmodium rotundifolium, Dioscorea quaternata, Goodyera pubescens, Hybanthus concolor, Iris cristata, Maianthemum racemosum, Passiflora lutea*, and *Sanicula canadensis*. These forests occur in habitats transitional between mesic to wet riparian and floodplain communities and the drier ridgetop ecosystems.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This dry-mesic to mesic white oak - mixed oak forest was sampled at 10 locations in the park. Sites are moderate to steep slopes of any aspect. Soils are well- to moderately well-drained clay loam, loam, sandy clay, and silt loam. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance at one site includes roads/trails, past logging, wind damage, and the presence of exotic plants. The remainder of the sites appear to be relatively undisturbed.
Global Environment: This community occurs more commonly on midslope positions on north- and east-facing slopes where temperatures remain cooler. Sediments are usually weathered from sedimentary rock with somewhat alkaline pH. Environmental conditions within this community are ideal for hardwood species production (TNC 1995a). Stands occur on gentle to steep slopes with moderately to well-drained moist loamy/sandy, relatively neutral to basic soils, which are underlain by bedrock of limestone and less commonly sandstone, siltstone, or shale. Soils are generally thin, developed in loess, often stony with exposed bedrock, and are extremely susceptible to erosion. They may be shallow to somewhat deep (20-100 cm), with rock fragments present. In Illinois, this community occurs on thin, sandy/loamy soils underlain by sedimentary rock (mostly Pennsylvanian age sandstone). Limestone and shale are commonly found where erosion has removed resistant sandstone layers near the surface (TNC 1995a). In Missouri, non-cherty limestones and dolomites prevail (Nelson 1985). In Alabama, this type occurs on mixed limestone and sandstone substrate, providing a subcalcareous substrate. The community occupies a wide variety of well-drained upland soils, primarily mesic and udic soils weathered from Paleozoic sedimentary sandstone, siltstone, chert, shale, coal, and limestone. Major soil types are Alfisols, Inceptisols, Ultisols, and Entisols. Mollisols and Spodosols also support this community, although they are not widely represented (TNC 1995a).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to dense (30-90% cover) canopy, 20-50 m tall, is codominated by *Quercus alba* and *Quercus rubra* and may include *Acer barbatum, Acer saccharum, Carya alba, Carya glabra, Fraxinus americana, Liquidambar styraciflua, Prunus serotina*, and *Quercus muehlenbergii*. The sparse to moderate (20-60%) subcanopy (10-35 m) is made up of canopy species, particularly *Acer saccharum* along with *Ostrya virginiana*. The sparse to moderate (10-50%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Cercis canadensis, Cornus florida, Nyssa sylvatica, Sassafras albidum, Styrax grandifolius*, and *Ulmus* spp. Common herbs in the herbaceous layer (10-70%) include *Agrimonia rostellata, Amphicarpaea bracteata, Desmodium* spp., *Dichanthelium boscii*, and *Polystichum acrostichoides*. Vines (5-10%) include

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Bignonia capreolata, Parthenocissus quinquefolia, Smilax glauca, Toxicodendron radicans, and *Vitis rotundifolia*. In addition, this community supports Mississippi state-rare *Solidago flaccidifolia*.

Global Vegetation: The canopy is dense, yet enough scattered light penetrates to encourage a rich and diverse herbaceous layer. Typical tree dominants include *Quercus alba, Quercus rubra, Quercus velutina*, and *Quercus muehlenbergii*. Typical associates include *Carya ovata* and *Carya alba*. Other shade-tolerant tree associates that may dominate the subcanopy include *Acer saccharum* (and/or *Acer barbatum* or *Acer leucoderme* to the south), *Ulmus rubra, Juglans nigra, Fraxinus americana, Ostrya virginiana, Carpinus caroliniana*, and *Amelanchier arborea*. *Quercus muehlenbergii* is a key, but perhaps uncommon, indicator of the more neutral to alkaline soil characteristics of this type. *Juniperus virginiana* may be present. Typical shrubs include *Aesculus glabra, Asimina triloba, Cercis canadensis, Cornus florida, Euonymus americanus, Frangula caroliniana*, and *Viburnum rufidulum*. Woody vines include *Parthenocissus quinquefolia* and *Toxicodendron radicans*. Herbaceous species include *Anemone virginiana, Arisaema triphyllum, Botrychium virginianum, Carex jamesii, Actaea racemosa (= Cimicifuga racemosa), Desmodium glutinosum, Desmodium rotundifolium, Dioscorea quaternata, Goodyera pubescens, Hybanthus concolor, Iris cristata, Maianthemum racemosum, Passiflora lutea*, and *Sanicula canadensis*. These forests occur in habitats transitional between mesic to wet riparian and floodplain communities and the drier ridgetop ecosystems (Nelson 1985, TNC 1995a).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer barbatum*, *Acer saccharum*, *Quercus alba*, *Quercus muehlenbergii*, *Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Ostrya virginiana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cercis canadensis*
Herb (field)	Liana	*Amphicarpaea bracteata*
Herb (field)	Flowering forb	*Agrimonia rostellata*
Herb (field)	Graminoid	*Dichanthelium boscii*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus alba*, *Quercus muehlenbergii*, *Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Acer saccharum*
Shrub/sapling (tall & short)	Liana	*Parthenocissus quinquefolia*, *Smilax bona-nox*, *Toxicodendron radicans*
Herb (field)	Flowering forb	*Arisaema dracontium*, *Hybanthus concolor*
Herb (field)	Graminoid	*Carex jamesii*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cercis canadensis*, *Quercus alba*, *Quercus rubra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Solidago flaccidifolia* (G5, MS state-rare); **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)

Global: **Vulnerable Plants**: *Castanea pumila* var. *ozarkensis* (G5T3), *Crataegus triflora* (G2G3), *Delphinium newtonianum* (G3), *Isotria medeoloides* (G2?), *Matelea baldwyniana* (G3), *Tradescantia ozarkana* (G3), *Trillium pusillum* var. *ozarkanum* (G3T3), *Trillium viridescens* (G2G4Q); **Other Plants**: *Juglans cinerea* (G4)

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (22-Jun-1998).

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Global Comments: The concept of this type relies, in part, on Missouri's "dry-mesic limestone/dolomite forest" (Nelson 1985). Stands in Illinois and Indiana may not have strongly contrasting alkaline and acidic rocks compared to those in the Ozarks. This type may also occur in the south-central glaciated portion of Illinois. Examples from Arkansas may lack *Quercus rubra*. Neither *Quercus muehlenbergii* nor *Cercis canadensis* may be very common in this type. Extensive selective logging of *Quercus alba* and *Quercus rubra* for sawtimber has severely impacted this community. Stands placed in this type in northern Alabama (Bankhead National Forest) and the Nashville Basin of Tennessee are not a perfect match, but seem similar enough to classify here. The range of this originally Ozarkian type has been expanded to include much of the unglaciated Interior Low Plateau; there may be substantial differences among examples across this range to warrant subdivision, but this has not been tested through any kind of analysis.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Similar Associations:
- *Fagus grandifolia - Quercus alba / Cornus florida* Forest (CEGL007881) contains a high concentration of *Fagus grandifolia* in the canopy.
- *Quercus alba - Carya alba - (Quercus velutina) / Desmodium nudiflorum - (Carex picta)* Forest (CEGL007795) is not as strongly calcareous in character but with a similar distribution.
- *Quercus alba - Quercus rubra - Carya alba / Cornus florida* Acidic Forest (CEGL002067) is very similar, but has a more acidic character.
- *Quercus alba - Quercus rubra - Carya ovata / Cercis canadensis - Juniperus virginiana var. virginiana* Forest (CEGL007240)
- *Quercus alba - Quercus rubra - Carya ovata* Glaciated Forest (CEGL002068)
- *Quercus alba - Quercus stellata / Ostrya virginiana - Acer barbatum / Chasmanthium sessiliflorum* Forest (CEGL008443)
- *Quercus alba - Quercus velutina - Carya alba / Desmodium nudiflorum* Ozark Forest (CEGL004270)
- *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066)
- *Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina* Forest (CEGL005018) occurs on drier sites and contains *Quercus falcata*, which this community does not have in large amounts.
- *Quercus muehlenbergii - Quercus shumardii - Carya (carolinae-septentrionalis, ovata)* Forest (CEGL007808)
- *Quercus prinus - Quercus rubra - Carya* spp. - *Fraxinus americana / Solidago sphacelata* Forest (CEGL008549)
- *Quercus rubra / Ostrya virginiana / Ptelea trifoliata - Ribes curvatum / Helianthus divaricatus* Woodland (CEGL007828)
- *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076) occurs where soils are drier and thick to very thin over bedrock which is often exposed, and on hillsides with clay soils where sand is absent.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (2) and Tennessee (7) between M230 and M235, M325 and M330, M335 and M340, M360 and M365, and in the vicinity of M380, M385, M400, and the Alabama-Tennessee stateline.
Global Range: This forest community is found in calcareous regions of the Interior Highlands of the east-central United States, ranging from Missouri and Arkansas east to Indiana, south to Kentucky, Tennessee and northern Alabama, and possibly in Oklahoma.
Nations: US
States/Provinces: AL, AR, IL, IN, KY, MO:S3, MS, OK?, TN
TNC Ecoregions: 36:C, 37:C, 38:C, 39:C, 43:C, 44:C, 48:C, 50:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ae:CCP, 222Af:CC?, 222Ag:CCC, 222Ak:CCC, 222Am:CCC, 222An:CCC, 222Ao:CCC, 222Aq:CCC, 222Ch:CCC, 222De:CC?, 222Df:CCC, 222Dg:CCC, 222Dh:CCC, 222Di:CCC, 222Ec:CCC, 222Ed:CCC, 222Eg:CCC, 222Ej:CCP, 222Ek:CCC, 222Em:CCP, 222Eo:CCC, 222Fa:CCP, 222Fb:CCC, 222Fe:CCC, 231Bd:CCC, 231Be:CCC, 231Bk:CCC, 231Cd:CCC, 231Gb:CCC, 251Cd:CCC, 251Ce:CCC, 251Ea:CCC, M222Aa:CCC, M222Ab:CCC
Federal Lands: NPS (Abe Lincoln Birthplace, Buffalo River, Fort Donelson, Mammoth Cave, Natchez Trace, Ozark Riverways, Russell Cave, Shiloh); USFS (Bankhead, Daniel Boone, Hoosier, Mark Twain, Ouachita (Mountains)?, Ouachita?, Ozark, Shawnee, Talladega, Talladega (Talladega))

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.046, NATR.153, NATR.188, NATR.224, NATR.239, NATR.403, NATR.446, NATR.449, NATR.458, NATR.459.
Local Description Authors: M.J. Russo
Global Description Authors: M. Guetersloh, mod. M. Pyne and D. Faber-Langendoen
References: Chastain et al. 2006, Evans 1991, Evans et al. 2009, Eyre 1980, Fralish 1987, Fralish et al. 1991, Homoya et al. 1988, Küchler 1964, Midwestern Ecology Working Group n.d., NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1985, Nelson 2010, Nigh et al. 2000, Nordman et al. 2011, Pyne et al. 2010, Robertson and Heikens 1994, Robertson et al. 1984, Schotz et al. 2006, Schotz pers. comm., TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, White 2005, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Interior Plateau Chinquapin Oak - Shumard Oak Forest

***Quercus muehlenbergii - Quercus shumardii - Carya (carolinae-septentrionalis, ovata)* Forest**
Chinquapin Oak - Shumard Oak - (Southern Shagbark Hickory, Shagbark Hickory) Forest
Identifier: CEGL007808

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland (G601)
Alliance	South-Central Interior Chinquapin Oak - Maple - Ash Forest (A2060)
Association	Interior Plateau Chinquapin Oak - Shumard Oak Forest

ELEMENT CONCEPT

Global Summary: This association includes dry-mesic forests dominated by varying proportions of *Quercus muehlenbergii* and *Quercus shumardii*. It occurs in the Interior Low Plateau of Alabama, Kentucky and Tennessee, and also extends into the Ridge and Valley and Cumberland Plateau of Alabama and Georgia, on soils derived from limestones or other basic substrates, on gently rolling to rolling topography or on upper to mid slopes. In addition to the nominal species, the canopy may also contain some mixture of *Acer saccharum, Carya glabra, Fraxinus americana, Fraxinus quadrangulata*, and *Ulmus serotina*. Particularly towards the southern portion of the association's distribution, *Carya carolinae-septentrionalis* joins or replaces *Carya ovata* as the predominant hickory. Subcanopy species include *Quercus stellata, Aesculus glabra, Gleditsia triacanthos, Juniperus virginiana var. virginiana, Ulmus alata, Ulmus americana, Ulmus serotina* (to the south), *Ulmus thomasii* (to the north), *Cercis canadensis var. canadensis, Celtis laevigata var. laevigata, Ostrya virginiana, Fraxinus quadrangulata, Prunus mexicana*, and *Juglans nigra*. Shrubs include *Forestiera ligustrina, Frangula caroliniana, Hypericum frondosum, Rhus aromatica var. aromatica, Sideroxylon lycioides, Symphoricarpos orbiculatus*, and *Viburnum rufidulum*. *Bignonia capreolata* is a prominent liana. Other woody vines include *Lonicera sempervirens* and *Parthenocissus quinquefolia*. Herbs, a mixture of submesic and xeric limestone species, include *Fleischmannia incarnata, Lithospermum tuberosum, Polygonatum biflorum, Polymnia canadensis, Scutellaria ovata, Sedum pulchellum, Packera anonyma (= Senecio anonymus), Tragia cordata, Ruellia humilis, Ruellia strepens, Matelea gonocarpos, Arabis laevigata var. laevigata, Cuphea viscosissima, Galium* sp., *Diarrhena americana (= var. americana), Elymus* sp., *Senna marilandica (= Cassia marilandica), Chimaphila maculata, Salvia urticifolia, Tiarella cordifolia, Triosteum angustifolium, Asplenium platyneuron*, and *Asplenium resiliens*. Examples of this association may grade into *Juniperus virginiana* var. *virginiana - Fraxinus quadrangulata / Polymnia canadensis - (Astranthium integrifolium)* Woodland (CEGL003754), *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070), or *Quercus muehlenbergii - Quercus (shumardii, stellata) / Cercis canadensis / Viburnum rufidulum* Forest (CEGL007699). Most examples observed seem to be generally subxeric. More mesic examples, formerly regarded as a 'mesic variant' of this association, are now accommodated as *Quercus shumardii - Quercus muehlenbergii - Acer (barbatum, saccharum) / Ostrya virginiana* Forest (CEGL008442).

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This chinkapin oak - hickory forest was sampled at six locations in the park. Sites are on somewhat steep slopes of any aspect. Soils, where reported, are well-drained loam or silt. The unvegetated surface is dominated by litter/duff with some wood and occasional bedrock. Evidence of disturbance includes the presence of exotic plants.
Global Environment: This association occurs in the Interior Low Plateau of Alabama, Kentucky and Tennessee, on soils derived from limestones or other basic substrates, on gently rolling topography or on upper to mid slopes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (40-70% cover) canopy, 35-50 m tall, is dominated by combinations of *Carya carolinae-septentrionalis, Carya ovata, Fraxinus americana, Quercus alba, Quercus falcata, Quercus muehlenbergii*, and/or *Quercus shumardii*. The sparse (30-40%) subcanopy (5-35 m) may include *Acer saccharum, Carpinus caroliniana, Fraxinus americana, Juniperus virginiana, Liquidambar styraciflua, Ostrya virginiana*, and/or *Ulmus americana*. The sparse to moderate (20-60%) tall-shrub (2-5 m) and short-shrub (1-2 m) layers are made up of canopy/subcanopy species as well as possible *Aesculus pavia, Crataegus* sp., *Ilex decidua, Philadelphus* sp., *Rhus aromatica*, or *Viburnum rufidulum*. Dominants in the herbaceous layer may include *Impatiens capensis, Juncus effusus*, tree seedlings, and invasive exotics *Dioscorea oppositifolia, Glechoma hederacea* and *Microstegium vimineum*. Vines (5-10%) include *Campsis radicans, Parthenocissus quinquefolia* and *Toxicodendron radicans*.
Global Vegetation: In addition to *Quercus muehlenbergii* and *Quercus shumardii*, the canopy may also contain some mixture of *Acer saccharum, Carya glabra, Fraxinus americana, Fraxinus quadrangulata*, and *Ulmus serotina*. In some examples, the *Carya* sp. present may be *Carya carolinae-septentrionalis*. Subcanopy species include *Quercus stellata, Aesculus glabra, Gleditsia triacanthos, Juniperus virginiana var. virginiana, Ulmus alata, Ulmus americana, Cercis canadensis var. canadensis, Celtis laevigata var. laevigata, Fraxinus quadrangulata, Prunus mexicana*, and *Juglans nigra*. Shrubs and woody vines include *Bignonia capreolata, Forestiera ligustrina, Frangula caroliniana, Hypericum frondosum, Lonicera sempervirens, Parthenocissus quinquefolia, Rhus aromatica var. aromatica, Sideroxylon lycioides, Symphoricarpos orbiculatus*, and *Viburnum rufidulum*. Herbs, a mixture of submesic and xeric limestone species, include *Fleischmannia incarnata, Lithospermum tuberosum, Polygonatum biflorum, Polymnia canadensis, Scutellaria ovata, Sedum pulchellum, Packera anonyma (= Senecio anonymus), Tragia cordata, Ruellia humilis, Ruellia*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

strepens, Matelea gonocarpos, Arabis laevigata var. laevigata, Cuphea viscosissima, Galium sp., *Elymus* sp., *Senna marilandica (= Cassia marilandica), Chimaphila maculata, Salvia urticifolia, Tiarella cordifolia, Triosteum angustifolium, Asplenium platyneuron*, and *Asplenium resiliens*. Some additional spring-aspect herbs at Cedars of Lebanon State Park, Tennessee, include *Trillium cuneatum, Podophyllum peltatum, Cardamine concatenata, Cardamine douglassii, Claytonia virginica*, and *Ranunculus fascicularis*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya carolinae-septentrionalis*, *Carya ovata*, *Quercus muehlenbergii*, *Quercus shumardii*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya carolinae-septentrionalis*, *Quercus muehlenbergii*, *Quercus shumardii*
Global: *Carya carolinae-septentrionalis*, *Quercus muehlenbergii*, *Quercus shumardii*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Dioscorea oppositifolia* (High/Medium), *Glechoma hederacea* (Low), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Other Plants: *Juglans cinerea* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (30-Sep-2004). This oak-dominated forest association occurs in Alabama, Georgia, Kentucky, and Tennessee, on soils derived from limestones or other basic substrates, on upper to mid slopes. Some examples may be protected on TVA, Army Corps of Engineers, State of Tennessee, The Nature Conservancy, and U.S. Forest Service lands. It is documented from the Nashville Basin of Tennessee, the Ridge and Valley of Georgia, and the Cumberlands of Alabama. Most, if not all, high-quality examples have been eliminated or severely impacted by timber removal, grazing, soil erosion, and fire suppression. Other current threats include windthrow, microclimate modification from intensive silvicultural practices on adjacent uplands, forest type conversion, and herbicide use. In the Nashville Basin development is a threat, especially in Rutherford and Wilson counties, TN.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This concept originated with the more xeric manifestation of *Quercus muehlenbergii - Quercus shumardii*-dominated vegetation of limestone slopes in Tennessee and Kentucky, in particular the Inner or Outer Nashville Basin of Tennessee (subsections 222Ec and 222Ed). Examples have subsequently been located in the Cumberland Plateau of Alabama. It is reported from the "transition hills" (EPA 65j) of northwestern Alabama (A. Schotz pers. comm.). This association should be found on the Somerset Ranger District of the Daniel Boone National Forest (Kentucky), as well as in the Kentucky Palisades and the Dripping Springs Escarpment. Additional information is needed regarding landscape position, variation, and floristics of this association across its range. Forests dominated by these nominal oaks seem to range from xeric to relatively mesic. The more mesic examples, formerly regarded as a "mesic variant" of this association, are placed in *Quercus shumardii - Quercus muehlenbergii - Acer (barbatum, saccharum) / Ostrya virginiana* Forest (CEGL008442). The relationship of these associations to each other and to their western relative, *Quercus muehlenbergii - Quercus shumardii* Forest (CEGL004602), is under investigation. Related vegetation west of the Mississippi River in Arkansas and Oklahoma will be found in *Quercus muehlenbergii - Quercus shumardii* Forest (CEGL004602).
Global Similar Associations:

- *Juniperus virginiana var. virginiana - Fraxinus quadrangulata / Polymnia canadensis - (Astranthium integrifolium)* Woodland (CEGL003754) is a drier limestone woodland.
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070) is white oak-dominated.
- *Quercus alba - Quercus stellata / Ostrya virginiana - Acer barbatum / Chasmanthium sessiliflorum* Forest (CEGL008443)
- *Quercus imbricaria - Quercus shumardii - Quercus muehlenbergii / Celtis occidentalis / Urtica chamaedryoides* Forest (CEGL003876)
- *Quercus muehlenbergii - Quercus (shumardii, stellata) / Cercis canadensis / Viburnum rufidulum* Forest (CEGL007699) is a related, drier forest.
- *Quercus muehlenbergii - Quercus shumardii* Forest (CEGL004602) occurs west of the Mississippi River.
- *Quercus shumardii - Quercus muehlenbergii - Acer (barbatum, saccharum) / Ostrya virginiana* Forest (CEGL008442) is slightly more mesic.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (4) and Tennessee (2) between M340 and M345 and in the vicinity of the Alabama-Tennessee stateline.
Global Range: This oak-dominated forest association occurs in Alabama, Georgia, Kentucky, and Tennessee; it is documented from the Nashville Basin of Tennessee, the Ridge and Valley of Georgia, and the Cumberlands of Alabama. It is reported from the "transition hills" (EPA 65j) of northwestern Alabama (A. Schotz pers. comm.).
Nations: US
States/Provinces: AL:S2S3, GA, KY, TN
TNC Ecoregions: 43:P, 44:C, 50:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Eb:CC?, 222Ec:CCC, 222Ed:CCC, 222Ee:CCC, 222Ef:CC?, 222Eg:CCC, 222Eh:CCP, 222Fa:CP?, 222Fb:CP?, 222Fc:CP?, 222Fd:CP?, 231Cd:CCC, 231Ce:CCP
Federal Lands: DOD (J. Percy Priest?); NPS (Chickamauga-Chattanooga, Natchez Trace, Stones River); USFS (Bankhead, Chattahoochee, Daniel Boone)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.021, NATR.069, NATR.071, NATR.072, NATR.438, NATR.439.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Nordman 2004a, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Shumard Oak - Chinquapin Oak Mesic Limestone Forest

***Quercus shumardii - Quercus muehlenbergii - Acer (barbatum, saccharum) / Ostrya virginiana* Forest**
Shumard Oak - Chinquapin Oak - (Southern Sugar Maple, Sugar Maple) / Hophornbeam Forest
Identifier: CEGL008442

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland (G601)
Alliance	South-Central Interior Chinquapin Oak - Maple - Ash Forest (A2060)
Association	Shumard Oak - Chinquapin Oak Mesic Limestone Forest

ELEMENT CONCEPT

Global Summary: This deciduous forest association accommodates mesic forests dominated by *Quercus shumardii* and *Quercus muehlenbergii*, with one of several related *Acer* spp. (e.g., sugar maples - *Acer barbatum, Acer leucoderme, Acer saccharum*), depending on where the stand is located. The canopy composition varies considerably with geography. This forest occurs on soils derived from limestones, dolomites or other basic substrates, on sloping to steeply sloping topography on middle to lower slopes. In addition to the nominal species, the canopy may also contain various *Carya* spp. (including *Carya alba, Carya glabra, Carya ovalis, Carya ovata*, and/or *Carya carolinae-septentrionalis*) and other basophilic and/or mesic hardwood species, including *Fraxinus americana, Fraxinus quadrangulata* (within its range), *Diospyros virginiana*, and *Ulmus* spp. (including *Ulmus alata, Ulmus americana, Ulmus rubra*, and/or *Ulmus serotina*). Other oaks, including *Quercus alba, Quercus rubra*, and *Quercus velutina*, may be present, but will not dominate the canopy. *Liriodendron tulipifera* and/or *Liquidambar styraciflua* may be present, perhaps grading in from adjoining mixed mesic forests. Subcanopy species include *Ostrya virginiana*, the *Acer* spp. mentioned above, *Aesculus* spp., *Cornus florida, Ulmus* spp., *Cercis canadensis, Celtis laevigata, Fraxinus quadrangulata*, and *Prunus* spp. Shrubs and woody vines, which vary considerably with geography and site moisture conditions, may include *Asimina triloba, Berchemia scandens, Calycanthus floridus, Crataegus* spp., *Euonymus americanus, Euonymus atropurpureus, Forestiera ligustrina, Frangula caroliniana, Lindera benzoin, Rhododendron canescens, Sideroxylon lycioides, Staphylea trifolia, Symphoricarpos orbiculatus*, and *Viburnum rufidulum*. Other common woody vines include *Bignonia capreolata, Lonicera sempervirens, Parthenocissus quinquefolia*, and *Toxicodendron radicans*. Herbs are a mixture of mesic and submesic limestone species, which also vary widely with geography.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This Shumard oak - chinkapin oak - maple forest was sampled at six locations in the park. Sites are typically steep mid and upper slopes (bluffs) and ridges with mostly southern and eastern aspects. Soils are well- to moderately well-drained silt loam and clay loam. The unvegetated surface is made up of a fairly even mix of exposed bedrock, large and small rocks, litter/duff, wood and bare soil. Evidence of disturbance is natural erosion due to steepness, wind damage, and the presence of exotic plants.
Global Environment: This forest occurs on soils derived from limestones, dolomites or other basic substrates, on sloping to steeply sloping topography on middle to lower slopes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-80% cover) canopy, 20-50 m tall, is dominated by *Quercus muehlenbergii* and *Quercus shumardii*; additional common and/or abundant tree species include *Acer saccharum, Carya* spp., *Fraxinus americana, Liriodendron tulipifera, Quercus alba*, and *Quercus velutina*. The sparse to moderate (10-60%) subcanopy (15-20 m) may include canopy species, *Acer barbatum, Carpinus caroliniana, Ostrya virginiana*, and *Ulmus rubra*. The sparse to moderate (5-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Celtis laevigata, Cornus florida, Hydrangea arborescens* (dominant in one stand), *Ilex decidua, Juniperus virginiana, Staphylea trifolia*, and *Symphoricarpos orbiculatus*. The herbaceous layer (10-50%) is variable and may be dominated by tree seedlings, *Arundinaria gigantea, Heuchera villosa, Laportea canadensis, Saururus cernuus*, and invasive exotic *Microstegium vimineum*. Vines (up to 30%) include *Bignonia capreolata, Toxicodendron radicans* (dominant), and exotic *Lonicera japonica*.
Global Vegetation: This association accommodates mesic forests dominated by *Quercus shumardii* and *Quercus muehlenbergii*, with one of several related *Acer* spp. (e.g., sugar maples *Acer barbatum, Acer leucoderme, Acer saccharum*), depending on where the stand is located. The canopy composition varies considerably with geography. In addition to the nominal species, the canopy may also contain various *Carya* spp. (including *Carya alba, Carya glabra, Carya ovalis, Carya ovata*, and/or *Carya carolinae-septentrionalis*) and other basophilic and/or mesic hardwood species, including *Fraxinus americana, Fraxinus quadrangulata* (within its range), *Diospyros virginiana*, and *Ulmus* spp. (including *Ulmus alata, Ulmus americana, Ulmus rubra*, and/or *Ulmus serotina*). Other oaks, including *Quercus alba, Quercus rubra*, and *Quercus velutina*, may be present but will not dominate the canopy. *Liriodendron tulipifera* and/or *Liquidambar styraciflua* may be present, perhaps grading in from adjoining mixed mesic forests. One example in the Outer Nashville Basin of Tennessee contains *Quercus macrocarpa*. The canopy of examples from Georgia's Ridge and Valley may contain more Appalachian species, including *Aesculus flava, Halesia tetraptera, Tilia americana var. heterophylla*, and *Magnolia acuminata*. These latter two species may be found in the subcanopy of examples generally across its range. Subcanopy species include the *Acer* spp. mentioned above, *Aesculus* spp., *Cornus florida, Ostrya virginiana, Ulmus* spp., *Cercis canadensis, Celtis laevigata,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Fraxinus quadrangulata, and *Prunus* spp. Shrubs and woody vines, which vary considerably with geography and site moisture conditions, may include *Asimina triloba, Berchemia scandens, Calycanthus floridus, Crataegus* spp., *Euonymus americanus, Euonymus atropurpureus, Forestiera ligustrina, Frangula caroliniana, Lindera benzoin, Rhododendron canescens, Sideroxylon lycioides, Staphylea trifolia, Symphoricarpos orbiculatus*, and *Viburnum rufidulum*. Other common woody vines include *Bignonia capreolata, Lonicera sempervirens, Parthenocissus quinquefolia*, and *Toxicodendron radicans*. Herbs, a mixture of mesic and submesic limestone species (also varying widely with geography), may include *Actaea pachypoda, Actaea racemosa (= Cimicifuga racemosa), Ageratina altissima (= Eupatorium rugosum), Arabis laevigata, Asarum canadense, Asplenium platyneuron, Asplenium resiliens, Boehmeria cylindrica, Carex purpurifera, Carex* spp., *Caulophyllum thalictroides, Chasmanthium sessiliflorum, Claytonia virginica, Clematis virginiana, Cocculus carolinus, Desmodium pauciflorum, Dichanthelium boscii, Dioscorea quaternata, Elymus* sp., *Galium circaezans, Hepatica nobilis var. acuta, Hexastylis arifolia var. ruthii, Hydrophyllum canadense, Pachysandra procumbens, Passiflora lutea, Polygonatum biflorum, Polygonum virginianum, Polystichum acrostichoides, Ruellia caroliniensis, Sanicula* spp., *Silene stellata, Silene virginica, Solidago curtisii, Solidago sphacelata, Spigelia marilandica, Stellaria pubera, Tiarella cordifolia, Verbesina virginica*, and *Viola* spp. The exotics *Euonymus fortunei, Lonicera japonica*, and *Lonicera maackii* may invade examples of this forest.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum*, *Quercus muehlenbergii*, *Quercus shumardii*
Tree subcanopy	Broad-leaved deciduous tree	*Acer barbatum*, *Ostrya virginiana*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer barbatum*, *Acer leucoderme*, *Acer saccharum*, *Quercus muehlenbergii*, *Quercus shumardii*
Tree subcanopy	Broad-leaved deciduous tree	*Ostrya virginiana*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer barbatum*, *Acer saccharum*, *Quercus muehlenbergii*, *Quercus shumardii*
Global: *Acer barbatum*, *Acer leucoderme*, *Acer saccharum*, *Ostrya virginiana*, *Quercus muehlenbergii*, *Quercus shumardii*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ailanthus altissima* (Medium), *Dioscorea oppositifolia* (High/Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Morus alba* (High/Medium)
Global: Invasive/Exotic Plants: *Euonymus fortunei* (High/Medium), *Lonicera japonica* (High/Medium), *Lonicera maackii* (High); **Other Plants**: *Juglans cinerea* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (13-Jun-2000). This mesic, basophilic, oak-dominated forest association occurs on soils derived from limestones or other basic substrates, on upper to mid slopes. It is documented from the Interior Low Plateau of Tennessee, the Cumberlands of Alabama, and the Ridge and Valley of Georgia. Some examples may be protected on lands of the TVA, Army Corps of Engineers, and U.S. Forest Service. Most, if not all, high-quality examples have been eliminated or severely impacted by timber removal, grazing, soil erosion, and fire suppression. Other current threats include windthrow, microclimate modification from intensive silvicultural practices on adjacent uplands, forest type conversion, and herbicide use. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus muehlenbergii, Quercus shumardii*). Removal of the oaks through logging could result in a successional canopy dominated by *Liriodendron tulipifera, Acer saccharum, Fagus grandifolia*, etc., in which case the vegetation of these sites would be indistinguishable from other mesic, non-oak forests.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This association differs from mixed mesophytic forests by being oak-dominated; it differs from rich *Quercus alba - Quercus rubra* forests by being dominated by different oaks; and it differs from drier *Quercus muehlenbergii - Quercus shumardii* forests by having more mesic canopy associates as well as more mesic shrub and herb layers. This concept originated with the more mesic manifestations of *Quercus muehlenbergii - Quercus shumardii*-dominated vegetation in Alabama, Georgia, and Tennessee. Additional information is needed regarding landscape position, variation, and floristics of this association across its range. Forests dominated by these nominal oaks seem to range from mesic (this association) to relatively xeric, *Quercus muehlenbergii - Quercus shumardii - Carya (carolinae-septentrionalis, ovata)* Forest (CEGL007808). The relationship of these phases to the overall geographic distribution of this association and its more xeric equivalent (CEGL007808) and their western relative *Quercus*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

muehlenbergii - Quercus shumardii Forest (CEGL004602) remains under investigation. Stands on which this association concept is based occur at Warner Park (Nashville, Tennessee); Flint Creek in the Bankhead National Forest (Alabama); and Little Mountain in the Chattahoochee National Forest (Georgia).

Global Similar Associations:

- *Quercus alba - Quercus stellata / Ostrya virginiana - Acer barbatum / Chasmanthium sessiliflorum* Forest (CEGL008443)
- *Quercus muehlenbergii - Carya* spp. / *Ostrya virginiana* Upper East Gulf Coastal Plain Forest (CEGL003903) of the Upper East Gulf Coastal Plain.
- *Quercus muehlenbergii - Quercus shumardii - Carya (carolinae-septentrionalis, ovata)* Forest (CEGL007808) is slightly less mesic.
- *Quercus muehlenbergii - Quercus shumardii* Forest (CEGL004602) occurs west of the Mississippi River.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2) and Tennessee (4) between M300 and M305, M310 and M315, and in the vicinity of M310 and M405.

Global Range: The range of this association includes the Interior Low Plateau of Kentucky and Tennessee, the Cumberlands of Alabama, and the Ridge and Valley of Georgia.

Nations: US

States/Provinces: AL, GA, KY, MS, TN

TNC Ecoregions: 44:C, 50:C

USFS Ecoregions (1994/95): 221Hc:CCC, 222Dg:CCC, 222Eb:CC?, 222Ec:CCC, 222Ed:CC?, 222Ee:CC?, 222Ef:CCC, 222Eg:CCP, 222Eh:CCP, 222Fa:C??, 222Fb:C??, 222Fc:C??, 222Fd:C??, 231Cd:CCC, 231Ce:CC?, 231De:CCC

Federal Lands: DOD (J. Percy Priest?); NPS (Mammoth Cave, Natchez Trace, Russell Cave); USFS (Bankhead, Chattahoochee, Chattahoochee (Southern Blue Ridge), Daniel Boone)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.036, NATR.052, NATR.143, NATR.627, NATR.628, NATR.653.

Local Description Authors: M.J. Russo

Global Description Authors: M.P. Schafale and A.S. Weakley, mod. M. Pyne

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Schotz et al. 2006, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Black Belt Prairie Cedar Woodland

***Juniperus virginiana var. virginiana - (Celtis laevigata, Prunus angustifolia, Sideroxylon lycioides)* Woodland**
Eastern Red-cedar - (Sugarberry, Chickasaw Plum, Buckthorn Bully) Woodland
Identifier: CEGL007747

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland (G601)
Alliance	Chinquapin Oak - Blue Ash - Eastern Red-cedar Woodland (A3273)
Association	Black Belt Prairie Cedar Woodland

ELEMENT CONCEPT

Global Summary: This short-statured forest of the Black Belt of Alabama and Mississippi has a typically closed canopy, usually strongly dominated by *Juniperus virginiana var. virginiana*. Other woody associates are *Celtis laevigata, Cercis canadensis var. canadensis, Crataegus engelmannii, Diospyros virginiana, Fraxinus americana, Ilex decidua, Prunus angustifolia, Sideroxylon lycioides*, and *Ulmus alata*. Herbs are few, though the moss *Thuidium delicatulum* can form a carpet. Prairie forbs and grasses may persist in small openings and in edge situations.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This eastern red-cedar - sugarberry woodland was sampled at four locations in the park. Sites are gentle to moderate slopes and ridges with well- to moderately well-drained silt and silty clay soils. The unvegetated surface is dominated by litter/duff with some wood soil. Evidence of disturbance includes fire suppression and an abundance of exotic plants.
Global Environment: In Mississippi, where this type was first described, this woodland occurs on thin, highly erodible, calcareous soils over chalk where it is interspersed with areas of exposed chalk (Leidolf and McDaniel 1998).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (80% cover) canopy, 5-20 m tall, and sparse (30-60%) subcanopy (5-10 m) are dominated by *Celtis laevigata* and *Juniperus virginiana*. The moderate (30-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are dominated by the invasive exotic *Ligustrum sinense*. Herbs are sparse but diverse; *Sanicula marilandica* dominates one stand. *Berchemia scandens* is the dominant vine (20-30%). In addition, this community supports Mississippi state-imperiled *Ponthieva racemosa*.
Global Vegetation: Stands of this vegetation are strongly dominated by *Juniperus virginiana var. virginiana*. Other woody associates are *Celtis laevigata, Cercis canadensis var. canadensis, Crataegus engelmannii, Diospyros virginiana, Fraxinus americana, Ilex decidua, Prunus angustifolia, Sideroxylon lycioides*, and *Ulmus alata* (Leidolf and McDaniel 1998). Herbs are few, though the moss *Thuidium delicatulum* can form a carpet. Prairie forbs and grasses may persist in small openings and in edge situations.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Juniperus virginiana* var. *virginiana*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Celtis laevigata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*
Herb (field)	Liana	*Berchemia scandens*
Herb (field)	Flowering forb	*Sanicula marilandica*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cornus drummondii*, *Frangula caroliniana*, *Juniperus virginiana* var. *virginiana*, *Ponthieva racemosa*, *Rhamnus lanceolata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Fraxinus quadrangulata* (G5, MS state-rare), *Ponthieva racemosa* (G4G5, MS state-rare), *Rhamnus lanceolata* (G5, MS state-rare); **Invasive/Exotic Plants**: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Nandina domestica* (High/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G2 (14-Dec-1998). This is apparently a natural community, occurring after abnormally long periods of fire exclusion or in especially fire-protected situations in the natural landscape. Alterations in the Black Belt landscape have resulted in general fire exclusion, and this community now occupies situations which were formerly open prairie grassland. Despite its increase at the expense of natural prairies, this community is also threatened by the overall conversion of the Black Belt to agricultural uses.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This community based on Leidolf and McDaniel (1998).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi in the vicinity of M310, M370, and M380.
Global Range: This type is found in the Black Belt of Alabama and Mississippi (Upper East Gulf Coastal Plain).
Nations: US
States/Provinces: AL, MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bk:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.242, NATR.369, NATR.371, NATR.634.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. M. Pyne
References: Leidolf and McDaniel 1998, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Chinquapin Oak Unglaciated Bluff Woodland

***Quercus muehlenbergii - (Juniperus virginiana var. virginiana)* Unglaciated Bluff Woodland**
Chinquapin Oak - (Eastern Red-cedar) Unglaciated Bluff Woodland
Identifier: CEGL004267

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland (G601)
Alliance	Chinquapin Oak - Blue Ash - Eastern Red-cedar Woodland (A3273)
Association	Chinquapin Oak Unglaciated Bluff Woodland

ELEMENT CONCEPT

Global Summary: This chinquapin oak bluff woodland occurs primarily on bluffs of rivers in the southern unglaciated Interior Low Plateau of the United States. Stands occur in scattered areas along steep south- to southwest-facing bluffs or steep slopes, for example on the Green River of Kentucky. The underlying soils and bedrock presumably have a calcareous or circumneutral influence. Stands contain an open tree layer, with *Quercus muehlenbergii* as the characteristic dominant, and *Juniperus virginiana var. virginiana* as a common associate. Scattered individuals of *Quercus alba* and *Quercus velutina* may be present. *Ostrya virginiana* may be present in any or all woody strata. Shrubs are often of sparse cover and may include *Rhus aromatica, Ulmus alata, Sideroxylon lycioides*, and. *Symphoricarpos orbiculatus*, which may be relatively abundant as a low shrub. The herb layer is very open (usually <40% stratum cover) and somewhat diverse, with characteristically calciphilic and light-demanding forbs, low shrubs, and vines present. Graminoids include *Brachyelytrum erectum, Chasmanthium latifolium, Bromus* sp., *Dichanthelium boscii*, and *Dichanthelium commutatum*. It very likely occurs on other major rivers (Red, Cumberland, Tennessee), but these habitats can be difficult to access and are not often surveyed in detail.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This chinkapin oak woodland was sampled at one location in the park, along a high bluff overlooking Big Swan Creek in Tennessee. The site is on a steep, south-facing slope. Soils were reported as well-drained silty clay. The unvegetated surface is primarily characterized by small rocks (gravel, 0.2-10 cm), with a lesser amount of exposed soil and litter/duff. There was no apparent evidence of disturbance.
Global Environment: This vegetation type occurs in scattered areas on steep slopes along the major rivers in the unglaciated Interior Low Plateau, such as the Green River of Kentucky at elevations ranging from 160-200 m (500-660 feet). Slopes are typically south- or southwest-facing and about 30-40° but may be steeper. Soils are shallow, dry, stony, calcareous loams derived from limestone or dolomite bedrock. This vegetation type is generally associated with exposed, xeric cliffs and other large outcrops of carbonate rock. Sites are typically on the upper portions or spur crests of sideslopes undercut by rivers or large streams. Slopes are predominantly and sometimes dramatically convex, with rugged, complex, and variable microtopography. Surface cover of exposed bedrock and loose stones is high, with most plants rooted in crevices and on thin-soiled ledges. The surficial rock and associated edaphic stresses often limit both vegetation cover and species richness, which is comparatively low. Periodic drought stress appears to result in occasional mortality of trees and shrubs in these habitats.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately open (50-60% cover) canopy, 10-15 m tall, is dominated by *Quercus muehlenbergii*, with a lesser amount of widely spaced *Juniperus virginiana var. virginiana*. The subcanopy (5-10 m) is sparse (30%) and includes *Ostrya virginiana* and *Cercis canadensis*, in addition to smaller specimens of the foregoing canopy species. The sparse (10-20%) tall-shrub (2-5 m) and short-shrub (1-2 m) layers are made up of canopy/subcanopy species as well as *Ulmus rubra, Symphoricarpos orbiculatus*, and *Rhus aromatica*. The herbaceous component is sparse (10%) with no individual species appearing dominant. Characteristic herbs include *Schizachyrium scoparium, Opuntia humifusa, Desmodium rotundifolium*, and *Solidago sphacelata*. No vines were reported.
Global Vegetation: Stands contain an open tree layer, with *Quercus muehlenbergii* as the characteristic dominant and *Juniperus virginiana* as a common associate or codominant. Scattered individuals of *Quercus alba* and *Quercus velutina* may be present. Trees are generally widely spaced and relatively short (3-10 m). Other associates include *Acer saccharum, Carya alba, Cercis canadensis, Celtis laevigata* (or *Celtis tenuifolia*?), *Fraxinus americana*, and *Quercus rubra* (which is stunted and at low cover). *Ostrya virginiana* may be present in any or all woody strata. Shrubs are often of sparse cover and may include *Rhus aromatica, Ulmus alata, Sideroxylon lycioides*, and. *Symphoricarpos orbiculatus*, which may be relatively abundant. The herb layer is very open (usually <40% stratum cover) and somewhat diverse, with low shrubs and vines present. Graminoids include *Brachyelytrum erectum, Chasmanthium latifolium, Bromus* sp., *Dichanthelium boscii*, and *Dichanthelium commutatum*. Associated forbs, many of which are characteristically calciphilic and light-demanding, include *Antennaria plantaginifolia, Blephilia ciliata, Galium circaezans, Helianthus microcephalus, Heuchera americana, Houstonia longifolia, Monarda russeliana, Packera obovata (= Senecio obovatus), Polymnia canadensis, Ruellia caroliniensis, Scutellaria elliptica, Solidago sphacelata, Symphyotrichum shortii (= Aster shortii)*, and *Tragia cordata*. Pteridophytes include *Asplenium platyneuron, Cheilanthes lanosa*, and *Pellaea atropurpurea*. Most sampled stands form woodlands with stunted trees 6-10 m tall contributing 40-60% cover. Exotic weeds are occasionally present in small numbers but

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

do not thrive in the thin, rocky soils. More information is needed about this type, as few stands have been available for characterization.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus muehlenbergii*
Tree subcanopy	Broad-leaved deciduous tree	*Cercis canadensis*, *Ostrya virginiana*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cercis canadensis*, *Ostrya virginiana*
Short shrub/sapling	Broad-leaved deciduous shrub	*Rhus aromatica*, *Symphoricarpos orbiculatus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cercis canadensis*, *Juniperus virginiana* var. *virginiana*, *Quercus muehlenbergii*, *Solidago sphacelata*, *Symphoricarpos orbiculatus*

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (5-Sep-2008). This association has a relatively restricted range, being limited to the Interior Low Plateau region of the eastern United States. It occurs on large bluffs along major rivers, in linear bands of 2-5 hectares, but some may exceed 10 hectares, depending on local geologic and topographic expression. It is restricted to thin, rocky calcareous soils derived from limestone or dolomite bedrock. Examples are difficult to access and, as a result, many are secure. Some are protected on Mammoth Cave National Park. Further evidence is needed to more firmly establish the rank of this type.

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Global Comments: This association is similar in some respects to limestone glades, but its presence on steep wooded slopes distinguishes it from these associations (e.g., *Quercus muehlenbergii - Juniperus virginiana / Schizachyrium scoparium - Manfreda virginica* Wooded Grassland (CEGL005131)). This type is defined from a limited number of samples and consists of small to medium-sized inclusions on steep slopes, especially on river bluffs or steep slopes. Due to the dry nature of the habitat, management is usually not necessary to maintain its woodland character.

Global Similar Associations:

- *Quercus muehlenbergii - Cercis canadensis / Packera obovata - Lithospermum canescens* Woodland (CEGL006231)
- *Quercus muehlenbergii - Juniperus virginiana / Schizachyrium scoparium - Manfreda virginica* Wooded Grassland (CEGL005131) typically on gentler slopes and with patchy trees.
- *Quercus muehlenbergii - Quercus (alba, velutina) - (Juniperus virginiana var. virginiana)* Driftless Bluff Woodland (CEGL002144) similar but restricted to more northerly latitudes.

ELEMENT DISTRIBUTION

Global Range: This chinquapin oak woodland occurs primarily on bluffs of major rivers in the unglaciated Interior Low Plateau of the United States, such as the Green River of Kentucky. It is described from the Crawford-Mammoth Cave Uplands (71a of EPA) in Kentucky, but this or similar vegetation could occur on steep rocky slopes above major rivers in related areas of Alabama, Indiana, or Tennessee. Its complete range is not known. There are related types known from the West and North.

Nations: US

States/Provinces: AL?, IN?, KY, TN?

TNC Ecoregions: 44:C

USFS Ecoregions (1994/95): 222Dg:CCC

Federal Lands: NPS (Mammoth Cave, Natchez Trace)

ELEMENT SOURCES

Local Description Authors: A. Schotz

Global Description Authors: M. Pyne and M. Whited

References: Pyne et al. 2010, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G165. Piedmont-Central Atlantic Coastal Plain Oak Forest

Dry Acidic Eastern Coastal Plain Oak-Hickory Forest

***Quercus falcata - Quercus stellata - Carya alba / Vaccinium* spp. Coastal Plain Forest**
Southern Red Oak - Post Oak - Mockernut Hickory / Blueberry species Coastal Plain Forest
Identifier: CEGL007246

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Piedmont-Central Atlantic Coastal Plain Oak Forest (G165)
Alliance	Piedmont Oak - Hickory - Pine Woodland (A3294)
Association	Dry Acidic Eastern Coastal Plain Oak-Hickory Forest

ELEMENT CONCEPT

Global Summary: This forest occurs on dry, acidic soils in naturally fire-protected landscapes in the Atlantic Coastal Plain and portions of the lower East Gulf Coastal Plain and Upper East Gulf Coastal Plain. Examples are generally dominated by *Quercus falcata* and *Quercus stellata*, with less *Quercus alba*. In addition, *Carya alba* or *Carya pallida* may be a component. Pines (e.g., *Pinus echinata, Pinus palustris, Pinus taeda*) may be a significant component but are not dominant. Many examples have a well-developed subcanopy of *Cornus florida*. *Danthonia spicata* is the dominant herbaceous plant on some sites in Tennessee (Shiloh National Military Park).

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This southern red oak - post oak - mockernut hickory forest was sampled at 22 locations in the park. Sites are gentle to moderate mid and upper slopes and ridges of any aspect. Soils are well- to moderately well-drained loamy sand, sandy clay, sandy loam, silt, and silt loam. The unvegetated surface is dominated by litter/duff (sometimes entirely) with some wood. Evidence of disturbance includes the presence of exotic plants.

Global Environment: Stands of this association are found on sandy Coastal Plain sites associated with natural firebreaks such as bluffs or somewhat isolated ridges. Their isolation from most natural fire events is generally due to the local landscape in which they occur and is not due to management factors. At Shiloh NMP (Tennessee) this association is found on silt loams in xeric conditions on flat areas on upland ridges and southwest-facing slopes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-90% cover) canopy, 15-35 m tall, is codominated by *Quercus falcata* and *Quercus stellata*; additional trees may include *Carya* spp., *Liquidambar styraciflua*, and other *Quercus* spp. The sparse to moderate (10-70%) subcanopy (5-20 m) is dominated by *Carya alba* and includes other canopy species as well as *Cornus florida, Nyssa sylvatica, Prunus serotina*, and *Ulmus* spp. The sparse to moderate (10-60%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy species; additional common shrubs include *Ilex decidua, Sassafras albidum, Ulmus alata*, and *Vaccinium arboreum*. Dominants in the herbaceous layer (5-40%) may include tree seedlings, *Chasmanthium laxum, Chasmanthium sessiliflorum, Diarrhena americana*, and vines (10-30%) of *Amphicarpaea bracteata, Parthenocissus quinquefolia, Toxicodendron radicans*, and *Vitis rotundifolia*.

Global Vegetation: Stands of this association are generally dominated by *Quercus falcata* and *Quercus stellata*, with less *Quercus alba*. In addition, *Carya alba* or *Carya pallida* may be a component. Pines (e.g., *Pinus echinata, Pinus palustris, Pinus taeda*) may be a significant component but are not dominant (Schafale and Weakley 1990). Many examples have a well-developed subcanopy of *Cornus florida*. At Fort Benning, Georgia, some examples of this or related vegetation are present downslope from *Quercus laevis* woodlands and upslope from *Nyssa biflora* saturated forests. Stands contain *Quercus falcata, Quercus velutina, Quercus margarettiae, Quercus coccinea*, and *Carya pallida* with *Cornus florida* and a low-density shrub/herb stratum which may contain *Symplocos tinctoria* and *Vaccinium stamineum*. These are areas which would be dominated by *Pinus palustris* (within its range) under more frequent fire.

This association is documented in 5 plots at Shiloh. One of these plots (SHIL.5) is in a monument area that is mowed and lacks any tall shrubs. The dominant canopy tree is *Quercus falcata* with *Carya alba, Quercus stellata*, and *Liquidambar styraciflua* also important or codominant in the canopy. *Pinus virginiana* and *Pinus echinata* can also be found in the canopy in some plots. The subcanopy can be dominated by *Quercus alba, Quercus falcata, Quercus stellata, Quercus marilandica*, or *Pinus virginiana*. Other subcanopy trees include *Carpinus caroliniana, Carya alba, Liquidambar styraciflua, Cornus florida, Nyssa sylvatica, Pinus echinata, Acer rubrum, Amelanchier arborea, Juniperus virginiana var. virginiana, Carya glabra, Pinus taeda, Carya pallida, Prunus serotina, Quercus rubra, Quercus velutina*, and *Ulmus alata*. Tall shrubs are absent from some plots, but where present *Vaccinium arboreum* and *Vaccinium stamineum* are the most abundant. *Nyssa sylvatica, Acer rubrum, Juniperus virginiana var. virginiana, Carya pallida, Quercus marilandica, Quercus velutina, Fagus grandifolia*, and *Liquidambar styraciflua* also can be present, and at sparse amounts of tall-shrub cover are *Quercus rubra, Quercus coccinea, Cornus florida, Sassafras albidum, Diospyros virginiana, Amelanchier arborea, Ulmus alata*, and *Pinus virginiana*. Short shrubs tend to be quite sparse, but *Vaccinium arboreum* and *Vaccinium stamineum* are the most abundant. Other short shrubs are *Carpinus caroliniana, Hypericum hypericoides, Albizia julibrissin, Lonicera japonica,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Malus pumila, Viburnum rufidulum, Vitis rotundifolia, Sassafras albidum, Hypericum hypericoides ssp. multicaule, Diospyros virginiana, Gleditsia triacanthos, Prunus serotina, Rosa carolina, Pinus taeda, Toxicodendron radicans, Rhus copallinum, Smilax rotundifolia, and *Smilax glauca*. *Danthonia spicata* is the most abundant herb in the plots where it is found. *Krigia dandelion* and *Schizachyrium scoparium* are also important. Herbs are otherwise sparse and include *Hieracium gronovii, Aureolaria pectinata, Lespedeza repens, Sericocarpus linifolius, Lespedeza virginica, Orbexilum pedunculatum, Dichanthelium dichotomum var. dichotomum, Dichanthelium depauperatum, Lespedeza procumbens, Andropogon gyrans, Coreopsis major, Viola x palmata, Mimosa microphylla, Andropogon virginicus, Tephrosia virginiana, Solidago odora, Porteranthus stipulatus, Galactia volubilis, Tridens flavus, Mitchella repens, Liatris aspera, Dichanthelium laxiflorum, Galium pilosum, Eupatorium rotundifolium var. ovatum, Stylosanthes biflora, Lespedeza repens, Ruellia strepens, Elephantopus tomentosus, Kummerowia striata, Diodia teres, Chrysopsis mariana, Eremochloa ophiuroides*, and *Paspalum laeve*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus falcata*, *Quercus stellata*
Tree subcanopy	Broad-leaved deciduous tree	*Carya alba*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ilex decidua*, *Sassafras albidum*, *Ulmus alata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*
Herb (field)	Graminoid	*Chasmanthium laxum*, *Chasmanthium sessiliflorum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus falcata*, *Quercus stellata*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Quercus falcata*, *Quercus stellata*, *Vaccinium arboreum*
Global: *Carya alba*, *Quercus falcata*, *Quercus stellata*, *Vaccinium stamineum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Brickellia cordifolia* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (19-Sep-2001).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This association needs further clarification and expansion with subsequent range assessment. The concept and description are based on Schafale and Weakley 1990, and data are needed from other parts of the putative range.
Global Similar Associations:

- *Pinus taeda - Quercus falcata - Quercus alba / Chasmanthium sessiliflorum - Piptochaetium avenaceum* Forest (CEGL004091)
- *Quercus falcata - Quercus (coccinea, stellata) / Vaccinium (pallidum, stamineum)* Forest (CEGL007247) of the interior.
- *Quercus falcata - Quercus stellata - (Pinus taeda)* West Gulf Coastal Plain Forest (CEGL008415)
- *Quercus stellata - Quercus falcata / Ostrya virginiana* Forest (CEGL004064) a somewhat richer forest found in loessal regions of the Gulf Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (3), Mississippi (16) and Tennessee (3) between M220 and M225, M315 and M320, M330 and M335, M375 and M380, M385 and M390, and in the vicinity of M75, M85, M105, M165, M220, M350, M370, M395, and M410.
Global Range: This type ranges from the Atlantic Coastal Plain of North Carolina to the Upper East Gulf Coastal Plain of western Tennessee , but presumably occurs in other portions of the Coastal Plain south and west to eastern Louisiana.
Nations: US
States/Provinces: AL, GA, LA, MS, NC, SC, TN
TNC Ecoregions: 43:C, 44:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 222Cg:CCC, 222Ef:CCC, 222Eg:CCC, 231Ba:CCC, 231Bb:CCC, 231Be:CCC, 231Bg:CCC, 231Bi:CCC, 231Bk:CCC, 232B:CC
Federal Lands: DOD (Fort Benning, Fort Stewart); NPS (Fort Donelson, Natchez Trace, Shiloh); USFS (Bienville, Conecuh?, De Soto, Holly Springs, Homochitto, Talladega, Talladega (Oakmulgee), Tombigbee, Tuskegee)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.004, NATR.078, NATR.089, NATR.091, NATR.140, NATR.207, NATR.220, NATR.244, NATR.272, NATR.275, NATR.308, NATR.315, NATR.326, NATR.328, NATR.351, NATR.367, NATR.368, NATR.374, NATR.375, NATR.425, NATR.453, NATR.615.

Local Description Authors: M.J. Russo

Global Description Authors: R.E. Evans, mod. C.W. Nordman

References: Jones et al. 1981b, Nordman et al. 2011, Schafale 2012, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G012. Shortleaf Pine - Oak Forest & Woodland

Mixed Pine - Cherrybark Oak Forest

***Pinus (echinata, taeda) - Quercus pagoda* Forest**
(Shortleaf Pine, Loblolly Pine) - Cherrybark Oak Forest
Identifier: CEGL004834

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Shortleaf Pine - Oak Forest & Woodland (G012)
Alliance	Coastal Plain Shortleaf Pine - Oak Woodland (A3270)
Association	Mixed Pine - Cherrybark Oak Forest

ELEMENT CONCEPT

Global Summary: This community is currently known from the Natchez Trace Parkway, and this description is based on its occurrence there. Additional information will be added as it becomes available. This mixed pine - cherrybark oak forest was sampled twice in the park. Sites are a gentle upper slope and ridge with well-drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, wind damage, fire suppression, and the presence of exotic plants. The canopy and subcanopy are codominated by *Pinus echinata, Pinus taeda*, and *Quercus pagoda*; additional tree species can include *Fraxinus americana, Liquidambar styraciflua, Nyssa sylvatica, Quercus nigra*, and *Ulmus alata*. The shrub layers are made up of canopy species along with *Carya* spp. and other *Quercus* spp. Herbs and vines are sparse. This community also supports Mississippi state-rare *Magnolia tripetala*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This mixed pine - cherrybark oak forest was sampled twice in the park. Sites are a gentle upper slope and ridge with well-drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, wind damage, fire suppression, and the presence of exotic plants.
Global Environment: This mixed pine - cherrybark oak forest was sampled twice in the park. Sites are a gentle upper slope and ridge with well-drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes roads/trails, wind damage, fire suppression, and the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70% cover) canopy, 20-35 m tall, and moderate (40-50%) subcanopy (10-15 m) are codominated by *Pinus echinata, Pinus taeda*, and *Quercus pagoda*; additional tree species can include *Fraxinus americana, Liquidambar styraciflua, Nyssa sylvatica, Quercus nigra*, and *Ulmus alata*. The sparse (20%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy species along with *Carya* spp. and other *Quercus* spp. Herbs and vines are sparse (10%). This community also supports Mississippi state-rare *Magnolia tripetala*.
Global Vegetation: The canopy and subcanopy are codominated by *Pinus echinata, Pinus taeda*, and *Quercus pagoda*; additional tree species can include *Fraxinus americana, Liquidambar styraciflua, Nyssa sylvatica, Quercus nigra*, and *Ulmus alata*. The shrub layers are made up of canopy species along with *Carya* spp. and other *Quercus* spp. Herbs and vines are sparse. This community also supports Mississippi state-rare *Magnolia tripetala*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus echinata*, *Pinus taeda*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus pagoda*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus echinata*, *Pinus taeda*, *Quercus pagoda*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Magnolia tripetala* (G5, MS state-rare); **Invasive/Exotic Plants**: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNR (12-Nov-2010).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M55 and M60.
Global Range: This association is known from along the Natchez Trace Parkway in Mississippi.
Nations: US
States/Provinces: MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 231Bh:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.554, NATR.555.
Local Description Authors: M.J. Russo
Global Description Authors: M.J. Russo
References: Nordman et al. 2011, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East & Upper East Gulf Coastal Plains Shortleaf Pine - Mesic Oak Forest

***Pinus echinata - Quercus alba - Carya alba* East Gulf Coastal Plain Forest**
Shortleaf Pine - White Oak - Mockernut Hickory East Gulf Coastal Plain Forest
Identifier: CEGL004050

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Shortleaf Pine - Oak Forest & Woodland (G012)
Alliance	Coastal Plain Shortleaf Pine - Oak Woodland (A3270)
Association	East & Upper East Gulf Coastal Plains Shortleaf Pine - Mesic Oak Forest

ELEMENT CONCEPT

Global Summary: This association is one of several documented types of shortleaf pine - hardwood forests in the East and Upper East Gulf coastal plains. The open canopy is characterized by *Pinus echinata* and a mixture of hardwoods with intermediate moisture preferences. One of the most important characteristic features that distinguish this type from other shortleaf pine - hardwood forests of the region is the prevalence of *Quercus alba* and *Carya alba* in the overstory. Although other tree species may also be encountered in stands of this type, they are generally lacking from the overstory or found only in limited abundance. The density of *Quercus alba* and *Pinus echinata* in stands of this association varies locally, presumably related to a combination of site factors and management history. In addition, the specific floristic composition may vary between stands and a number of subcanopy, shrub, and herbaceous species may be present. As with the overstory, the density and composition of the lower strata vary greatly depending upon a number of factors. For example, many stands of this association found on the Tombigbee National Forest (Mississippi) are subject to more prescribed burning than other known stands. Consequently, they have a much more open aspect with sparse to absent shrubs above dense layers of legumes.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This shortleaf pine - white oak forest was sampled twice in the park. Sites are moderate mid and lower slopes with northwest and south aspects. Soils are well-drained sandy loam and silt loam. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes past logging, erosion, grazing/browsing, fire suppression, and wind damage.
Global Environment: This forest association occurs on mesic to dry-mesic slopes in the East and Upper East Gulf coastal plains.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate (40-60% cover) canopy, 20-50 m tall, is codominated by *Pinus echinata* and *Quercus alba* along with lesser amounts of *Carya alba, Carya glabra, Pinus taeda*, and/or *Quercus falcata*. The sparse (20-40%) subcanopy (15-20 m) may include *Acer rubrum, Acer saccharum, Fagus grandifolia, Ostrya virginiana, Quercus alba, Quercus nigra*, and/or *Ulmus alata*. Common species in the sparse (10-30%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are *Acer rubrum, Ilex decidua, Ostrya virginiana, Prunus mexicana, Ulmus* spp., *Vaccinium* spp., and *Viburnum rufidulum*. The herbaceous layer is sparse (10%) and variable. *Vitis rotundifolia* is the dominant vine (5-10%).
Global Vegetation: Stands are characterized by *Pinus echinata, Quercus alba*, and *Carya alba*. In addition to these, a variety of other species with intermediate moisture preferences may also be present in stands of this association throughout its range (NatureServe Ecology unpubl. data).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus echinata*
Tree canopy	Broad-leaved deciduous tree	*Carya alba*, *Quercus alba*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Pinus echinata*, *Quercus alba*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (23-Oct-2003). Shortleaf pine communities have undergone a rangewide decline in vigor and extent. This particular association is limited in its natural range, which, as currently understood, is confined to a single ecoregion. Within the East and Upper East Gulf coastal plains, this type is generally absent from the northern portions of the region and apparently uncommon in the southern portions. Throughout the remaining known range, the type has been subject to heavy modification from logging and changes in fire regime. The removal of commercially valuable tree species (e.g., *Quercus alba, Pinus echinata*) has degraded many examples of this type and, in some cases, has almost certainly resulted in conversion of this type to another of lesser conservation value. More dramatic are the effects of conversion to commercial forest plantations. Establishment of

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

large areas of planted pine stands has been one of the most consequential developments in the last 35 years to impact forests in large parts of the region; the extent of these planted stands has increased by an amazing 81% since 1982 (McWilliams 1992). Some stands have been lost to the invasion of exotics, especially kudzu. This type is also threatened by the effects of continued fire suppression, which inhibits the reproduction of *Pinus echinata* and *Quercus alba.* This community has been poorly documented , but the total number of occurrences with ecological integrity is probably quite limited. The range in the rank reflects the need for further inventory and evaluation of this community. If this type were found to occur in Tennessee, and more occurrences were located in the core states of Mississippi, Alabama, Florida or Georgia, a rank of G3 would be more appropriate. With the current state of knowledge, this type is probably closer to G2.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This type was based on observations on the Tombigbee National Forest (R. Evans pers. obs.).
Global Similar Associations:
- *Pinus echinata - Quercus alba / Viburnum (dentatum, acerifolium)* Forest (CEGL003855) found west of the Mississippi River.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (1) and Tennessee (1) between M65 and M70 and between M360 and M365.
Global Range: This community occurs in the East and Upper East Gulf coastal plains of Alabama, Georgia, Florida and Mississippi. More information is needed to determine the distribution of this type in Georgia, Tennessee, and Florida.
Nations: US
States/Provinces: AL, FL, GA, MS, TN
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Bc:CCC, 231Bd:CCC, 231Be:CCC, 231Bi:CCC, 232Bj:CCC
Federal Lands: DOD (Fort Benning?); NPS (Natchez Trace); USFS (Holly Springs, Talladega, Talladega (Oakmulgee), Tombigbee, Tuskegee?); USFWS (Noxubee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.406, NATR.592.
Local Description Authors: M.J. Russo
Global Description Authors: R.E. Evans
References: Clewell 2013, MSNHP 2006, McWilliams 1992, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Shortleaf Pine - Southern Red Oak Forest

***Pinus echinata - Quercus falcata* East Gulf Coastal Plain Forest**
Shortleaf Pine - Southern Red Oak East Gulf Coastal Plain Forest
Identifier: CEGL004052

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Shortleaf Pine - Oak Forest & Woodland (G012)
Alliance	Coastal Plain Shortleaf Pine - Oak Woodland (A3270)
Association	East Gulf Coastal Plain Shortleaf Pine - Southern Red Oak Forest

ELEMENT CONCEPT

Global Summary: This association is one of several documented types of shortleaf pine - hardwood forests in the Upper East Gulf Coastal Plain. Stands are dominated by *Pinus echinata*, often with a significant hardwood component. The most characteristic hardwood, often the second most important overstory tree, is *Quercus falcata*. Other tree species may also be encountered in typical stands of this type, but they are generally lacking from the overstory or found only in limited abundance. Some stands may have *Quercus prinus* as a component. A number of subcanopy, shrub, and herbaceous species may also be present; the specific floristic composition may vary among stands based on a number of factors. This type should be compared to other *Pinus echinata* communities of the region; stands with high cover values of white oak are generally accommodated by *Pinus echinata - Quercus alba - Carya alba* East Gulf Coastal Plain Forest (CEGL004050). Stands of this association are subject to frequent prescribed burning on the Tombigbee National Forest (Mississippi), and many are managed for red-cockaded woodpecker (*Picoides borealis*) on the adjacent Noxubee National Wildlife Refuge.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This dry shortleaf pine - southern red oak forest was sampled at nine locations in the park. Sites are gentle slopes and ridges with mostly southern and western aspects. Soils are well- to moderately well-drained sandy clay, sandy loam, silt, and silty clay. The unvegetated surface is dominated by litter/duff with some wood and occasional bare soil. Evidence of disturbance includes erosion, past logging/clearing, fire suppression at some sites (reducing pine recruitment) and one site that burned in 2004, and the presence of exotic plants.
Global Environment: This community occurs most commonly on upper slopes and ridges with sandy or loamy soils with acidic surface pH and moderate nutrient levels. Most known examples occur near the center of the Upper East Gulf Coastal Plain in Mississippi. Known stands occur north of the range of longleaf pine and east of the predominantly loess soils.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-80% cover) canopy, 20-35 m tall, is codominated by *Pinus echinata* and *Quercus falcata*; additional trees may include *Liquidambar styraciflua, Pinus taeda*, and other *Quercus* spp. The moderate (40-60%) subcanopy (10-20 m) includes canopy species along with *Acer rubrum, Carya* spp., *Cornus florida, Fraxinus americana, Nyssa sylvatica, Prunus serotina, Quercus prinus, Quercus velutina*, and *Ulmus alata*. The sparse to moderate (10-70%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species (particularly *Acer rubrum, Carya* spp., *Liquidambar styraciflua, Quercus* spp., and *Ulmus alata*); common shrub species include *Callicarpa americana, Ilex decidua, Juniperus virginiana, Vaccinium arboreum*, and other *Vaccinium* spp. The herbaceous layer is sparse (5-20%) and includes tree seedlings, *Botrychium dissectum, Chasmanthium sessiliflorum, Desmodium* spp., *Dichanthelium* spp., *Galium* spp., and others. Vines (up to 60%) may cover the ground or climb into upper layers; typical vines include *Bignonia capreolata, Parthenocissus quinquefolia, Smilax bona-nox, Smilax glauca, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. In addition, this community supports Mississippi state-rare *Galearis spectabilis*.
Global Vegetation: The overstory of this community is generally rather low in species diversity. *Pinus echinata* may be the only pine species present or, in some cases, *Pinus taeda* may also be present *Quercus falcata* is often the second most important overstory tree present (NatureServe Ecology unpubl. data). Other tree species may also be encountered in typical stands of this type, but they are generally lacking from the overstory or found only in limited abundance. Some stands may have *Quercus prinus* as a component. Other woody species may include *Quercus stellata* and *Cornus florida*. Documented species in the shrub layer include *Ulmus alata, Prunus serotina*, and *Vaccinium arboreum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus echinata*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus falcata*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer rubrum*
Herb (field)	Flowering forb	*Desmodium rotundifolium*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*, *Dichanthelium commutatum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus echinata*, *Quercus falcata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Galearis spectabilis* (G5, MS state-rare); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (23-Oct-2003). Shortleaf pine communities have undergone a rangewide decline in vigor and extent. This particular association is limited in its natural range, which as currently understood, is confined to a single ecoregion. Within the Upper East Gulf Coastal Plain, this type is generally absent from the northern portions of the region and apparently uncommon in the southern portions. Throughout the remaining known range, the type has been subjected to heavy modification from logging and changes in fire regime. The removal of commercially valuable tree species (e.g., *Quercus alba, Pinus echinata*) has degraded many examples of this type, and in some cases has almost certainly resulted in conversion of this type to another of lesser conservation value. More dramatic are the effects of conversion to commercial forest plantations. Establishment of large areas of planted pine stands has been one of the most consequential developments in the last 35 years to impact forests in large parts of the region; the extent of these planted stands has increased by an amazing 81% since 1982 (McWilliams 1992). Some stands have been lost to the invasion of exotics, especially kudzu. This type is also threatened by the effects of continued fire suppression, which inhibits the reproduction of *Pinus echinata* and *Quercus alba.* This community has been poorly documented, but the total number of occurrences with ecological integrity is probably quite limited. The range in the rank reflects the need for further inventory and evaluation of this community. If this type were found to occur in Tennessee and/or Florida, and more occurrences were located in the core states of Mississippi, Alabama, or Georgia, a rank of G3 would be more appropriate. With the current state of knowledge, this type is probably closer to G2.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: Further work is needed to ascertain the northern distribution of this type. It may extend into Tennessee.
Global Similar Associations:

- *Pinus echinata - (Pinus taeda) - Quercus falcata / Dichanthelium sphaerocarpon* Forest (CEGL007947) of the West Gulf Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The nine sampled sites are in Mississippi between M60 and M310. Some stands formerly attributed to CEGL007500 are now placed here.
Global Range: This type is primarily found in the Upper East Gulf Coastal Plain of Mississippi, but likely ranges into adjacent Alabama, and may range into Tennessee, Georgia, Florida, and Louisiana. It could range into the East Gulf Coastal Plain.
Nations: US
States/Provinces: AL, FL?, GA?, LA?, MS, TN
TNC Ecoregions: 43:C, 44:C, 53:?
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bb:CCC, 231Bd:CCC, 231Bg:CCC, 231Bi:CCC, 231Bk:CCC
Federal Lands: NPS (Natchez Trace, Shiloh); USFS (Holly Springs, Tombigbee, Tuskegee?); USFWS (Noxubee)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.149, NATR.156, NATR.201, NATR.273, NATR.515, NATR.526, NATR.537, NATR.547, NATR.644.
Local Description Authors: M.J. Russo
Global Description Authors: R.E. Evans
References: Evans, R. pers. comm., McWilliams 1992, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Shortleaf Pine - Post Oak Forest

***Pinus echinata - Quercus stellata - (Quercus marilandica)* Forest**
Shortleaf Pine - Post Oak - (Blackjack Oak) Forest
Identifier: CEGL004053

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	Shortleaf Pine - Oak Forest & Woodland (G012)
Alliance	Coastal Plain Shortleaf Pine - Oak Woodland (A3270)
Association	East Gulf Coastal Plain Shortleaf Pine - Post Oak Forest

ELEMENT CONCEPT

Global Summary: This *Pinus echinata - Quercus stellata* community occurs on dry, acidic, loamy to clayey uplands in the Upper East Gulf Coastal Plain of Mississippi, and possibly elsewhere in the region. The dominant trees are *Pinus echinata* and *Quercus stellata*. In natural, or well-burned condition, few other tree species are present. The understory tends to be quite open and herb-dominated, and may be quite species-rich.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This shortleaf pine - post oak forest was sampled at five locations in the park. Sites are gentle to moderate slopes and ridges with north, northeast and west aspects. Soils highly variable, including somewhat poorly drained silty clay, moderately well-drained loam, well-drained silt loam, and rapidly drained loam. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes roads/trails, wind damage, past logging/clearing, fire suppression, dogwood anthracnose, and the presence of exotic plants.
Global Environment: This community is known to occur on shallow, clayey soils in the Upper East Gulf Coastal Plain of Mississippi and may occur on other soils and other parts of the region as well. The amount of clay at these sites can be of natural occurrence or result from erosion and loss of topsoil which exposes the subsurface clay. The predominance of clay contributes to harsh growing conditions for the vegetation; such soils are as likely to experience physiological drought as sandy soils [see Gupta and Larson 1979].

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-90% cover) canopy, 15-35 m tall, is dominated by *Pinus echinata* and *Quercus stellata*; other trees present may include *Carya alba, Pinus taeda*, and other *Quercus* spp. The sparse to moderate (10-60%) subcanopy (5-20 m) may include *Carya* spp., *Juniperus virginiana, Nyssa sylvatica, Prunus serotina, Quercus marilandica, Quercus stellata*, and *Ulmus alata*. The sparse (10-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Cornus florida, Diospyros virginiana, Ilex decidua*, and *Vaccinium arboreum*. The herbaceous layer is sparse (10-20%) and variable. Vines (10-30%) include *Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy of this association is dominated *Pinus echinata*. The second most important species is often *Quercus stellata*; few other woody species reach either the subcanopy or overstory (NatureServe Ecology unpubl. data). *Quercus marilandica* can also be present, but this species has heavily declined in the region [see Brewer 2001]. Understory composition may vary depending upon geographic location, management history, and site factors. *Danthonia spicata* was the dominant ground cover in at least one example of this community. *Coreopsis major* is often present (which is lacking from related vegetation in the WGCP (R. Evans pers. obs.). Other species include *Pityopsis graminifolia* and *Vaccinium* spp. [see NatureServe Ecology unpubl. data for more information on the floristics of sampled stands and/or consult with Ron Wieland].

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus echinata*
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus stellata*
Shrub/sapling (tall & short)	Needle-leaved shrub	*Pinus echinata*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus florida*, *Quercus stellata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pinus echinata*, *Quercus stellata*, *Vaccinium arboreum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Albizia julibrissin* (High/Low), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Nandina domestica* (High/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1 (15-Jun-2004). As currently understood, this community is confined to the Upper East Gulf Coastal Plain of Mississippi. No rangewide inventories have been conducted for this type, and it could occur in adjacent states where, if present, it is not likely to be abundant. Within the known occupied range, this type appears to be largely confined to specific sites that have allowed this vegetation to perpetuate, and it may never have been a widespread community. Many of the narrow ridgetops formerly occupied by this type have been heavily altered by the placement of roads which have left only narrow strips of relictual vegetation on either side of the road bed. In addition, the dominant species of this community are notoriously slow-growing and of little commercial value. Many sites have been converted to other vegetation types. The vegetation is believed to have been maintained to some extent by fire which is rarely used on the modern landscape outside national forests, and even then may be applied at different return intervals and different seasons than would have occurred historically. Shortleaf pine needs mineral soil to regenerate, and in some areas regeneration has been shown to decline with time since fire (Ferguson 1958). Many sites have only a scattered, low-density component of shortleaf pines that is subject to mortality from a variety of causes including lightning strikes and southern pine beetles. Once these trees are grown there is often a lack of seed source in the vicinity to replace them.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:

- *Pinus echinata - Pinus taeda - Quercus stellata - Carya texana / Vaccinium arboreum* Woodland (CEGL007499) has similar species composition but occurs in the West Gulf Coastal Plain.
- *Pinus echinata - Quercus stellata - Quercus falcata - Carya texana* Woodland (CEGL007800) has similar species composition but occurs in the West Gulf Coastal Plain.
- *Quercus stellata - Quercus marilandica - Carya (alba, pallida)* Upper East Gulf Coastal Plain Woodland (CEGL003952)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Colbert County, Alabama (1) and Choctaw, Clay, Lee, and Tishomingo Counties, Mississippi (4).
Global Range: This type is endemic to the Upper East Gulf Coastal Plain of Mississippi; it may occur in adjacent areas of Tennessee and Alabama, and could possibly extend into Louisiana, Georgia, and/or Florida.
Nations: US
States/Provinces: AL, FL?, GA?, MS, TN?
TNC Ecoregions: 43:C, 53:?
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bb:CCC, 231Bd:CCC, 231Be:CCC, 231Bg:CCC
Federal Lands: NPS (Natchez Trace); USFS (Holly Springs, Talladega (Oakmulgee)?, Talladega?, Tombigbee?, Tuskegee?); USFWS (Noxubee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.106, NATR.132, NATR.157, NATR.237, NATR.642.
Local Description Authors: M.J. Russo
Global Description Authors: R.E. Evans
References: Brewer 2001, Evans, R. pers. comm., Ferguson 1958, Gupta and Larson 1979, MSNHP 2006, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G159. South-Central Interior Oak Forest & Woodland

White Oak - Red Oak Dry-Mesic Acidic Forest

***Quercus alba - Quercus rubra - Carya alba / Cornus florida* Acidic Forest**
White Oak - Northern Red Oak - Mockernut Hickory / Flowering Dogwood Acidic Forest
Identifier: CEGL002067

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Ozark-Ouachita Oak - Hickory Forest (A3288)
Association	White Oak - Red Oak Dry-Mesic Acidic Forest

ELEMENT CONCEPT

Global Summary: This community is found in the Interior Highlands of the south-central United States to the Western Allegheny Plateau. Stands occur on gentle to moderately steep slopes of dissected hills and plains. Soils are well-drained, shallow to deep, often over sandstone, cherts, or cherty limestone. Stands are dominated by a closed-canopy deciduous tree layer. The dominants are *Quercus alba* and *Quercus rubra*. Typical associates include *Carya ovata, Carya alba, Carya ovalis, Nyssa sylvatica, Quercus falcata, Quercus velutina*, and *Pinus echinata* in parts of the range. The shrub and small-tree layer contains *Cornus florida*. *Parthenocissus quinquefolia* is a typical vine. The low-shrub layer may be dominated by *Vaccinium pallidum*. The herbaceous layer contains *Actaea racemosa (= Cimicifuga racemosa), Desmodium glutinosum, Desmodium nudiflorum, Galium pilosum*, and *Polystichum acrostichoides*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This white oak - red oak - hickory forest was sampled at nine locations in the park. Sites are gentle to somewhat steep mid and upper slopes of mostly northern and western aspects. Soils are well- to moderately well-drained loam, clay loam, and silt loam. The unvegetated surface is dominated by litter/duff with some wood and occasional exposed bedrock, large and small rocks and bare soil. Evidence of disturbance includes wind damage, dogwood anthracnose, and the presence of exotic plants.
Global Environment: Soils are well-drained, shallow to deep (40 to over 100 cm), often over sandstone, cherts, or cherty limestone (Nelson 1985).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-80% cover) canopy, 20-50+ m tall, is codominated by *Quercus alba, Quercus rubra*, and *Carya alba*; additional species may include *Acer saccharum, Fagus grandifolia, Liriodendron tulipifera*, and other *Quercus* spp. The moderate (30-60%) subcanopy (10-20 m) is dominated by *Nyssa sylvatica* and *Oxydendrum arboreum* along with canopy species. The sparse to moderate (10-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy species (but with little oak) along with *Acer rubrum, Carya* spp., *Cornus florida, Euonymus americanus, Ilex decidua, Ostrya virginiana, Rhododendron* sp., *Sassafras albidum, Styrax grandifolius*, and *Vaccinium* spp. The herbaceous layer (10-70%) may be dominated by tree/shrub seedlings, *Decumaria barbara, Dennstaedtia punctilobula, Desmodium* spp., *Dichanthelium* spp., or *Osmunda cinnamomea*, or *Vitis rotundifolia*. In addition, this community supports Tennessee state-rare *Polygonatum biflorum var. commutatum*.
Global Vegetation: Stands are dominated by a closed-canopy deciduous tree layer. The dominants are *Quercus alba* and *Quercus rubra*. Typical associates include *Carya ovata, Carya alba, Carya ovalis, Nyssa sylvatica, Quercus falcata, Quercus velutina*, and *Pinus echinata* in parts of the range. The shrub and small-tree layer contains *Cornus florida*. *Parthenocissus quinquefolia* is a typical vine. The low-shrub layer may be dominated by *Vaccinium pallidum*. The herbaceous layer contains *Actaea racemosa (= Cimicifuga racemosa), Desmodium glutinosum, Desmodium nudiflorum, Galium arkansanum, Galium pilosum*, and *Polystichum acrostichoides*, among others (Nelson 1985). Other herbaceous plants observed in Arkansas stands include *Symphyotrichum anomalum, Hypericum hypericoides, Cunila origanoides*, and *Lonicera dioica*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya alba*, *Quercus alba*, *Quercus rubra*
Herb (field)	Fern (Spore-bearing forb)	*Dennstaedtia punctilobula*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus alba*, *Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Quercus alba*, *Quercus rubra*
Global: *Cornus florida*, *Quercus alba*, *Quercus rubra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Castanea pumila* var. *ozarkensis* (G5T3), *Delphinium newtonianum* (G3), *Matelea baldwyniana* (G3), *Trillium pusillum* var. *ozarkanum* (G3T3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (24-Oct-2002). This community has a moderately restricted range, found primarily in the Interior Highlands of the south-central United States. Site factors are not particularly specific, but it may require a combination of thin acidic soils, occasional surface fires, and infrequent catastrophic fires to persist. Extensive clearing and use of oaks for lumber have contributed to the large decline in this forest type. Remaining parcels of this tract are subject to harvesting, but conversion is less likely. There are few areas where old forest (100- to 150-year-old stands) or old-growth forest (>150 years) conditions are present. Many stands have also been grazed in the past, resulting in ground and shrub layers that are simplified or prone to invasion by exotics. Stands may require low-intensity surface fires to maintain the quality of the ground layer, and these are often lacking.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type may be difficult to distinguish from *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070), the alkaline equivalent, but more acidic species such as *Cornus florida, Nyssa sylvatica* and *Pinus echinata* may be present. Further characterization is needed.
Global Similar Associations:

- *Quercus (alba, rubra, velutina) - Carya* spp. / *Viburnum acerifolium* Forest (CEGL006336)
- *Quercus alba - Carya alba - (Quercus velutina) / Desmodium nudiflorum - (Carex picta)* Forest (CEGL007795) of the Interior Low Plateau.
- *Quercus alba - Carya alba / Chasmanthium sessiliflorum* West Gulf Coastal Plain Forest (CEGL008413)
- *Quercus alba - Quercus rubra - Acer saccharum - Carya cordiformis / Lindera benzoin* Forest (CEGL002058)
- *Quercus alba - Quercus rubra - Carya ovalis / Acer saccharum / Polystichum acrostichoides* Forest (CEGL007233) of the Cumberlands and southern Ridge and Valley.
- *Quercus alba - Quercus rubra - Carya ovata* Glaciated Forest (CEGL002068)
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070) is more circumneutral.
- *Quercus alba - Quercus velutina - Carya alba / Desmodium nudiflorum* Ozark Forest (CEGL004270)
- *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066)
- *Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina* Forest (CEGL005018)
- *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (1) and Tennessee (8) between M425 and M430 and in the vicinity of M320, M365, M380, M420, and M440.
Global Range: This community is found in the Interior Highlands of the south-central United States, ranging from Arkansas and Missouri eastward to Tennessee, Kentucky, and southern Ohio.
Nations: US
States/Provinces: AL, AR, IL, IN, KY, MO, MS, OH, OK, TN
TNC Ecoregions: 36:C, 38:C, 39:C, 43:C, 44:C, 48:C, 49:C
USFS Ecoregions (1994/95): 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ee:CCC, 221Ef:CCC, 221Eg:CCC, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ad:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Am:CCC, 222An:CCC, 222Ao:CCC, 222Ap:CCC, 222Aq:CCP, 222Cg:CCC, 222Db:CCC, 222Dc:CCC, 222De:CCC, 222Df:CCC, 222Eg:CCC, 222Ei:CCC, 222Ek:CCC, 222Em:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 231Bd:CCC, 231Be:CCC, 251Ce:CCC, M222Aa:CCC, M222Ab:CCC, M231A:CC
Federal Lands: NPS (Buffalo River, Natchez Trace, Shiloh); USFS (Hoosier, Ozark, Wayne)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.024, NATR.032, NATR.108, NATR.123, NATR.125, NATR.127, NATR.238, NATR.394, NATR.611.

Local Description Authors: M.J. Russo

Global Description Authors: D. Faber-Langendoen, mod. M. Pyne

References: Foti 1994a, Foti 1994b, Foti et al. 1994, Homoya et al. 1988, Midwestern Ecology Working Group n.d., Nelson 1985, Nelson 2010, Nordman et al. 2011, ONHD unpubl. data, ONHI unpubl. data, Parker 1989, TDNH unpubl. data, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Lower Piedmont Chestnut Oak Forest

***Quercus prinus* - *Carya* spp. - *Quercus velutina / Vaccinium arboreum / Iris verna var. smalliana* Forest**
Chestnut Oak - Hickory species - Black Oak / Farkleberry / Upland Dwarf Iris Forest
Identifier: CEGL007261

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Southern Chestnut Oak Forest (A3289)
Association	Lower Piedmont Chestnut Oak Forest

ELEMENT CONCEPT

Global Summary: This association accommodates mesic to dry-mesic *Quercus prinus*-dominated forests of the Alabama Piedmont-Coastal Plain-Ridge and Valley transition region and is also documented from the Coastal Plain transition to the Interior Low Plateau of northwestern Alabama and southern middle Tennessee. The canopy is strongly dominated by *Quercus prinus, Carya alba* (and/or other *Carya* spp.), and *Quercus velutina*. Other tree species present include *Quercus falcata, Quercus alba, Quercus stellata, Carya glabra*, and *Pinus echinata*. Understory woody species include *Cornus florida, Nyssa sylvatica*, and *Oxydendrum arboreum*. Shrubs and woody vines include *Aesculus pavia, Asimina parviflora, Ceanothus americanus, Epigaea repens, Euonymus americanus, Gaylussacia dumosa, Hydrangea quercifolia, Parthenocissus quinquefolia, Rhododendron canescens, Smilax glauca, Smilax rotundifolia, Symplocos tinctoria, Toxicodendron pubescens, Toxicodendron radicans, Vaccinium arboreum, Vaccinium elliottii, Vaccinium pallidum, Vaccinium stamineum*, and *Vitis rotundifolia*. Herbs and herbaceous vines present include *Coreopsis major, Desmodium nudiflorum, Dioscorea villosa, Elephantopus tomentosus, Hexastylis arifolia, Iris verna var. smalliana, Maianthemum racemosum, Mimosa microphylla (= Schrankia microphylla), Mitchella repens, Silphium compositum, Tephrosia virginiana*, and *Uvularia perfoliata*. Ferns include *Polystichum acrostichoides* and *Pteridium aquilinum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This dry chestnut oak forest was sampled at 14 locations in the park. Sites range from gentle to somewhat steep upper slopes and ridges with generally eastern and western aspects. Soils are well- to moderately well-drained loam, sandy clay, and sandy loam. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes wind/ice damage, dogwood anthracnose, and the presence of exotic plants.
Global Environment: This association accommodates mesic to dry-mesic *Quercus prinus*-dominated forests of the Alabama Piedmont-Coastal Plain-Ridge and Valley transition region and is also documented from the Coastal Plain transition to the Interior Low Plateau of northwestern Alabama and southern middle Tennessee.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: These are generally mature forest with a sparse to dense (30-80% cover) canopy, 35-50 m tall, is dominated by *Quercus prinus*; additional common and/or abundant tree species may include *Carya carolinae-septentrionalis, Carya ovalis, Quercus alba* (often codominant), *Quercus coccinea, Quercus stellata*, and *Quercus velutina*. The sparse to moderate (5-50%) subcanopy (10-20 m) may include *Acer barbatum, Carya alba, Carya glabra, Cornus florida, Nyssa sylvatica* (dominant), and *Oxydendrum arboreum*. The sparse to dense (5-80%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species (mostly *Carya* spp., *Nyssa sylvatica*, and *Quercus prinus*) along with *Crataegus* spp., *Diospyros virginiana, Ilex decidua, Prunus serotina, Vaccinium arboreum*, and other *Vaccinium* spp. The herbaceous layer (10-80%) includes tree seedlings, *Danthonia spicata, Dichanthelium dichotomum, Schizachyrium scoparium, Tephrosia virginiana*, and vines (5-20%) *Dioscorea quaternata, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy of stands of this association is strongly dominated by *Quercus prinus, Carya alba*, and *Quercus velutina*. Other tree species present include *Quercus falcata, Quercus alba, Quercus stellata, Carya glabra*, and *Pinus echinata*. Understory woody species include *Cornus florida, Nyssa sylvatica*, and *Oxydendrum arboreum*. Shrubs and woody vines include *Aesculus pavia, Asimina parviflora, Ceanothus americanus, Epigaea repens, Euonymus americanus, Gaylussacia dumosa, Hydrangea quercifolia, Parthenocissus quinquefolia, Rhododendron canescens, Smilax glauca, Smilax rotundifolia, Symplocos tinctoria, Toxicodendron pubescens, Toxicodendron radicans, Vaccinium arboreum, Vaccinium elliottii, Vaccinium pallidum, Vaccinium stamineum*, and *Vitis rotundifolia* (Golden 1979). Herbs and herbaceous vines present include *Coreopsis major, Desmodium nudiflorum, Dioscorea villosa, Elephantopus tomentosus, Hexastylis arifolia, Iris verna var. smalliana, Maianthemum racemosum, Mimosa microphylla (= Schrankia microphylla), Mitchella repens, Silphium compositum, Tephrosia virginiana*, and *Uvularia perfoliata*, Ferns include *Polystichum acrostichoides* and *Pteridium aquilinum*. In addition, Beckett and Golden (1982) include *Carya pallida, Quercus coccinea, Quercus velutina, Liquidambar styraciflua, Liriodendron tulipifera, Carya ovalis, Acer rubrum, Pinus taeda*, and *Magnolia macrophylla* as components of this type (in decreasing order of frequency).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus prinus*, *Quercus velutina*
Tree subcanopy	Broad-leaved deciduous tree	*Carya alba*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya alba*, *Quercus prinus*, *Quercus velutina*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Quercus prinus*, *Quercus velutina*
Global: *Carya alba*, *Iris verna* var. *smalliana*, *Quercus prinus*, *Quercus velutina*, *Vaccinium arboreum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Aesculus parviflora* (G3), *Amorpha nitens* (G3?), *Quercus arkansana* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (30-Sep-2004). The range of this association is nearly limited to Alabama (extending north into Tennessee). While protected on Talladega National Forest and Natchez Trace Parkway, it is probably highly threatened on private land within its range as more oak-dominated forests are converted to loblolly pine plantations.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This association was defined based on Golden (1979) from the lower Piedmont of Alabama. This geographic location gives this type some Coastal Plain affinities, as evidenced by species that are present but not constant among examples (e.g., *Gaylussacia dumosa, Vaccinium elliottii, Toxicodendron pubescens*). The nominal species (*Vaccinium arboreum, Iris verna var. smalliana*) were chosen based on the constancy within the study area (Golden 1979) and not from a rangewide assessment. This association needs further clarification and expansion with subsequent range assessment and, perhaps, re-evaluation of nominal species.
Global Similar Associations:
- *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271)
- *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (4) and Tennessee (10) between M340 and M345, M360 and M365, M365 and M370, and in the vicinity of M315, M325, M360, M365, and M415.
Global Range: This association is described from the Piedmont-Coastal Plain-Ridge and Valley transition region of Alabama and is also documented from the Coastal Plain transition to the Interior Low Plateau of northwestern Alabama and southern middle Tennessee.
Nations: US
States/Provinces: AL:S2, MS, TN
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C
USFS Ecoregions (1994/95): 222Eg:CCC, 231Ab:CCC, 231Ac:CCP, 231Ah:CCP, 231Ai:CCC, 231Bc:CCC, 231Be:CCC, 231Db:CCC
Federal Lands: NPS (Horseshoe Bend, Natchez Trace, Shiloh); USFS (Talladega, Talladega (Oakmulgee), Talladega (Talladega))

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.022, NATR.048, NATR.073, NATR.074, NATR.075, NATR.133, NATR.390, NATR.395, NATR.397, NATR.398, NATR.442, NATR.444, NATR.602, NATR.624.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal and A.S. Weakley
References: Beckett and Golden 1982, Golden 1979, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Interior Low Plateau Chestnut Oak - Mixed Oak Forest

***Quercus prinus* - *Quercus* spp. / *Vaccinium arboreum* - *(Kalmia latifolia, Styrax grandifolius)* Forest**
Chestnut Oak - Oak species / Farkleberry - (Mountain Laurel, Bigleaf Snowbell) Forest
Identifier: CEGL007700

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Southern Chestnut Oak Forest (A3289)
Association	Interior Low Plateau Chestnut Oak - Mixed Oak Forest

ELEMENT CONCEPT

Global Summary: This community occurs over shallow, rocky soils on narrow ridgetops, upper slopes, and midslopes of south- to southwest-facing ridges in the Interior Low Plateau and nearby provinces such as the Southern Cumberlands and adjacent Southern Ridge and Valley. It may also occur in the Upper East Gulf Coastal Plain. This is the dominant forest type found on narrow ridges of the dissected western escarpment of the Eastern Highland Rim of Tennessee at about 350 m (1100 feet) elevation. These forests have canopies which are strongly dominated by *Quercus prinus*, with *Quercus coccinea* and/or *Quercus velutina*, and with lesser amounts of *Quercus rubra, Quercus alba, Nyssa sylvatica, Acer rubrum var. rubrum*, and *Carya alba*. The understory may contain *Oxydendrum arboreum, Fagus grandifolia, Sassafras albidum, Aralia spinosa*, and/or *Cornus florida*. The shrub stratum may be dense to sparse, partly dominated by ericaceous species. Typical shrub species can include *Viburnum acerifolium, Hypericum frondosum, Vaccinium stamineum, Vaccinium arboreum, Vaccinium pallidum, Vaccinium corymbosum*, and *Gaylussacia baccata*. Some examples will contain patches of *Kalmia latifolia*, or *Styrax grandifolius* may replace *Viburnum acerifolium* in some locales. *Smilax glauca* and *Smilax rotundifolia* are typically present. *Castanea dentata* may occur as root sprouts, and decaying stumps may still be evident. Scattered individuals of *Pinus echinata* or *Pinus virginiana* may be present in the subcanopy of some examples. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Chimaphila maculata*. Other common species may include *Tipularia discolor, Antennaria plantaginifolia, Cypripedium acaule, Danthonia spicata, Epigaea repens, Helianthus divaricatus, Helianthus hirsutus, Dichanthelium dichotomum (= Panicum dichotomum)*, and *Polystichum acrostichoides*. Mats of mosses may cover the ground surface where herbaceous cover and leaf litter are sparse.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This chestnut oak - mixed oak forest was sampled at 11 locations in the park. Sites range from gentle to somewhat steep mid and upper slopes with northeast, northwest, southeast and southwest aspects. Soils are well- to moderately well-drained loam, sandy clay, sandy loam, and silt. The unvegetated surface is dominated by litter/duff with some wood and occasional large and small rocks. Evidence of disturbance includes roads/trails, minor wind damage, and the presence of exotic plants.
Global Environment: Stands occur on dry/xeric upper slopes, midslopes and narrow ridgetops. Soils are typically shallow and occur over non-calcareous bedrock of sandstone, conglomerate, or shale, or, to the south, over thin loess and siliceous limestones and cherts.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to moderately dense (40-70% cover) canopy, 15-50+ m tall, is dominated by *Quercus prinus* along with combinations of *Quercus alba, Quercus coccinea, Quercus stellata*, and *Quercus velutina*. The sparse (5-40%) subcanopy (15-20 m) may include *Acer rubrum, Carya glabra, Cornus florida, Nyssa sylvatica, Oxydendrum arboreum, Quercus alba*, and *Quercus prinus*. The sparse (10-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are dominated by *Styrax grandifolius* and *Vaccinium* spp. The herbaceous layer (5-80%) is most often dominated by tree and/or shrub seedlings but may also include *Diarrhena americana, Dichanthelium boscii, Dichanthelium dichotomum*, and *Polystichum acrostichoides*. Vines may contribute significant cover (up to 80%) and include *Parthenocissus quinquefolia, Smilax* spp., Toxicodendron radicans, and *Vitis rotundifolia*. This community also supports Tennessee state-imperiled *Polygonatum biflorum var. commutatum*.
Global Vegetation: These forests have canopies which are strongly dominated by *Quercus prinus*, with *Quercus coccinea* and/or *Quercus velutina*, and with lesser amounts of *Quercus rubra, Quercus alba, Nyssa sylvatica, Acer rubrum var. rubrum*, and *Carya alba*. The understory may contain *Oxydendrum arboreum, Fagus grandifolia, Sassafras albidum, Aralia spinosa*, and/or *Cornus florida*. The shrub stratum may be dense to sparse, partly dominated by ericaceous species. Typical shrub species include *Viburnum acerifolium, Hypericum frondosum, Vaccinium stamineum, Vaccinium pallidum, Vaccinium corymbosum*, and *Gaylussacia baccata*. Some examples will contain patches of *Kalmia latifolia*. Some Tennessee stands (e.g., in 222Eg, the Western Highland Rim) are outside of the range of *Viburnum acerifolium*, which is typically replaced by *Styrax grandifolius* in these situations. *Smilax glauca* and *Smilax rotundifolia* are typically present. *Castanea dentata* may occur as root sprouts, and decaying stumps may still be evident. Scattered individuals of *Pinus echinata* or *Pinus virginiana* may be present in the subcanopy of some examples. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Chimaphila maculata*. Other common species may include *Tipularia discolor, Antennaria plantaginifolia, Cypripedium acaule, Danthonia spicata, Epigaea repens, Helianthus divaricatus,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Helianthus hirsutus, Dichanthelium dichotomum (= Panicum dichotomum), and *Polystichum acrostichoides*. Mats of mosses may cover the ground surface where herbaceous cover and leaf litter are sparse.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea*, *Quercus prinus*, *Quercus velutina*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Styrax grandifolius*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*
Herb (field)	Liana	*Parthenocissus quinquefolia*
Herb (field)	Graminoid	*Dichanthelium boscii*, *Dichanthelium dichotomum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea*, *Quercus prinus*, *Quercus velutina*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus prinus*, *Styrax grandifolius*
Global: *Quercus coccinea*, *Quercus prinus*, *Quercus velutina*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium)
Global: Vulnerable Plants: *Diervilla rivularis* (G3), *Scutellaria pseudoserrata* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (24-Oct-2002). This is a widespread type; *Quercus prinus* replaces itself after canopy removal, seeds germinate in the shade of parent trees, and stands can also replace themselves from stump sprouts. Stands are threatened primarily by conversion to other forest types (e.g., pine plantations) or to other land uses (e.g., pasture, housing development).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: This is at least part of the historic chestnut oak forest after loss of chestnut in the Interior Low Plateau and related ecoregions. More detailed floristic information is needed to reliably distinguish this association from other closely related forests in this alliance, such as *Quercus prinus - Carya ovata - Quercus rubra / Acer saccharum* Forest (CEGL007268) of the Ridge and Valley, *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271) of the Southern Blue Ridge, and the apparently more xeric *Quercus prinus / Smilax* spp. Forest (CEGL005022) of the lower Midwest and Kentucky.
Global Similar Associations:

- *Quercus alba - Quercus rubra - Carya ovata* Glaciated Forest (CEGL002068)
- *Quercus alba - Quercus rubra - Quercus prinus - Acer saccharum / Lindera benzoin* Forest (CEGL002059) Appalachian oak-maple.
- *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431)
- *Quercus prinus - Carya ovata - Quercus rubra / Acer saccharum* Forest (CEGL007268) of the Ridge and Valley.
- *Quercus prinus - Quercus (alba, coccinea) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023) a related type of the Western Allegheny and related northern ecoregions.
- *Quercus prinus - Quercus (rubra, velutina) / Vaccinium (angustifolium, pallidum*) Forest (CEGL006282) a more eastern equivalent?
- *Quercus prinus / Smilax* spp. Forest (CEGL005022) is perhaps a more xeric type.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The 11 sampled sites are in Tennessee between M340 and M345, M360 and M365, M365 and M370, and in the vicinity of M320, M340, M355, and M435.
Global Range: This chestnut oak - mixed oak forest community ranges in the United States from the Cumberlands / Southern Ridge and Valley, and Interior Low Plateau of Kentucky, Tennessee, Georgia and Alabama (and possibly into the Upper East Gulf Coastal Plain of Mississippi).
Nations: US
States/Provinces: AL?, GA, KY, MS?, TN
TNC Ecoregions: 43:C, 44:C, 50:C
USFS Ecoregions (1994/95): 221Hc:CCC, 221Hd:CCP, 221He:CCP, 222Cc:CPP, 222Ce:CPP, 222Cf:CPP, 222Cg:CPP, 222Dg:CCC, 222Dj:CCC, 222Eb:CCC, 222Eg:CCC, 222Eo:CCC, 222Fd:CCC, 231Be:CCC
Federal Lands: NPS (Chickamauga-Chattanooga, Mammoth Cave, Natchez Trace, Obed River); USFS (Daniel Boone, Holly Springs?, Land Between the Lakes?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.023, NATR.031, NATR.047, NATR.115, NATR.392, NATR.399, NATR.422, NATR.423, NATR.440, NATR.447, NATR.613.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne, mod. T. Govus
References: Allard 1990, Badger et al. 1997, Evans 1991, Evans et al. 2009, Nordman et al. 2011, Pyne 1994, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Interior Dry-Mesic White Oak - Hickory Forest

***Quercus alba - Carya alba - (Quercus velutina) / Desmodium nudiflorum - (Carex picta)* Forest**
White Oak - Mockernut Hickory - (Black Oak) / Naked-flower Tick-trefoil - (Painted Sedge) Forest
Identifier: CEGL007795

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Interior Low Plateau Mixed Oak Woodland (A3291)
Association	Interior Dry-Mesic White Oak - Hickory Forest

ELEMENT CONCEPT

Global Summary: This dry-mesic white oak - hickory forest is found in the Interior Low Plateau of Tennessee and adjoining states. Stands occur in dissected landscapes at low to moderate elevations (200-350 m [600-1200 feet]), on upper, middle, and lower slopes of various aspects, as well as toeslopes of gently convex form. Examples vary somewhat in expression on different aspects; however, the canopy is typically dominated by *Quercus alba* and *Carya alba*, with *Carya glabra* and *Quercus velutina*. *Quercus rubra* may be found in the subcanopy of some examples, particularly on north- and east-facing slopes. The subcanopy may also contain *Acer rubrum, Acer saccharum, Amelanchier arborea, Carpinus caroliniana, Nyssa sylvatica*, and *Oxydendrum arboreum*. *Vaccinium pallidum* may be a prominent low shrub in some examples, along with *Vaccinium stamineum* and *Viburnum acerifolium*. The herb dominance may be quite variable depending on aspect. Within its range, extensive carpets of *Carex picta* present a dramatic winter aspect dominance in south- or west-facing examples. In contrast, *Polystichum acrostichoides* may be equally dominant on north- or east-facing slopes. Some other herbs which may be found include *Cardamine angustata, Cynoglossum virginianum var. virginianum, Sanicula smallii*, and the fern *Asplenium platyneuron*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This white oak - hickory forest was sampled at 20 locations in the park. Sites range from gentle to somewhat steep mid and upper slopes and ridges of any aspect. Soils are well- to moderately well-drained loam, sandy clay, sandy loam, and silt loam. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes past logging, wind damage, dogwood anthracnose, and the presence of exotic plants.
Global Environment: Stands occur in dissected landscapes at low to moderate elevations (200-350 m [600-1200 feet]), on mid- to lower slopes of various aspects, as well as toeslopes of gently convex form. Aspect may be an important factor in species composition of different stands attributable to this type.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to dense (30-80% cover) canopy, 15-50+ m tall, is dominated by *Quercus alba* along with various combinations of *Carya alba, Carya glabra, Quercus coccinea, Quercus prinus, Quercus stellata*, and *Quercus velutina*. The sparse to moderate (20-50%) subcanopy (10-35 m) is made up of canopy species along with common species *Acer saccharum, Cornus florida, Nyssa sylvatica*, and *Oxydendrum arboreum*. The sparse to moderate (10-60%) tall-shrub (2-10 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Amelanchier arborea, Fagus grandifolia, Frangula caroliniana, Ilex decidua, Ostrya virginiana, Sassafras albidum, Styrax grandifolius*, and *Vaccinium* spp. Dominants in the herbaceous layer (5-60%) may include tree seedlings, *Athyrium filix-femina ssp. asplenioides, Desmodium nudiflorum, Desmodium rotundifolium, Diarrhena americana, Lysimachia ciliata*, and invasive exotic *Microstegium vimineum*. Abundant vines (5-10%) include *Amphicarpaea bracteata, Decumaria barbara, Parthenocissus quinquefolia, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. In addition, this community supports Tennessee state-imperiled *Polygonatum biflorum var. commutatum*.
Global Vegetation: The canopy is typically dominated by *Quercus alba* and *Carya alba*, with *Carya glabra* and *Quercus velutina*. *Quercus rubra* may be found in the subcanopy of some examples, particularly on north- and east-facing slopes. The subcanopy may also contain *Acer rubrum, Acer saccharum, Amelanchier arborea, Carpinus caroliniana, Nyssa sylvatica*, and *Oxydendrum arboreum*. *Vaccinium pallidum* may be a prominent low shrub in some examples, along with *Vaccinium stamineum* and *Viburnum acerifolium*. The herb dominance may be quite variable depending on aspect. Within its range, extensive carpets of *Carex picta* present a dramatic winter-aspect dominant in south- or west-facing examples. In contrast, *Polystichum acrostichoides* may be equally dominant on north- or east-facing slopes. Some other herbs which may be found include *Cardamine angustata, Cynoglossum virginianum var. virginianum, Sanicula smallii*, and the fern *Asplenium platyneuron*. Other species documented in plots include *Asimina triloba, Brachyelytrum erectum, Amphicarpaea bracteata, Cynoglossum virginianum*, and others (NatureServe Ecology unpubl. data).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya alba*, *Quercus alba*, *Quercus velutina*
Herb (field)	Flowering forb	*Desmodium nudiflorum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Quercus alba*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (31-Jan-2007). This is not an inherently rare forest type, and many examples are still extant. The lack of element occurrences of this type does not reflect its relative abundance. It is an extensive and widespread forest type within its range. This type is described from the Interior Low Plateau. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*). There may be some loss of herbaceous species diversity from the disturbance effects of logging.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type was originally described from the Western Highland Rim of Tennessee, and is reported from Kentucky. It covers much of the upland forests of Mammoth Cave National Park. This type could also be expected in adjacent Alabama, and possibly also from the adjacent Upper East Gulf Coastal Plain. It is also possible in Illinois and Indiana; however, in those two states the type may overlap in concept with *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066), and it may be that those stands should be removed from CEGL002066 and placed with this type. Alternatively, if this type can be white oak- and black oak-dominated, there may be some overlap with unglaciated stands placed in *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076). A similar association defined from the southern Cumberland Plateau, *Quercus alba - (Quercus prinus) / (Hydrangea quercifolia) - Viburnum acerifolium / Carex picta* Forest (CEGL008430), is dominated by *Quercus alba* and *Quercus prinus*, with character species such as *Magnolia macrophylla* and *Hydrangea quercifolia*. A related type, *Quercus alba - Quercus velutina - Carya alba / Desmodium nudiflorum* Ozark Forest (CEGL004270), has been developed to accommodate similar vegetation in the Ozarks (e.g., at Buffalo National River).

This association (CEGL007795) is related to the "White oak-black oak-tuliptree type of slopes of upland" of Braun (1950, p. 148, Table 27). In Braun's analysis, this type is one in which "the three dominants comprise 72% of the canopy." This is at some variance from our data from Mammoth Cave National Park (Kentucky), in which *Liriodendron* is not so constant or important. Her studies in the "Big Woods" area of Hart County focused on mesophytic types. Braun also makes the comment that the "where valleys cut less deeply into the upland....(t)he oak-tuliptree type...prevails."

Global Similar Associations:
- *Quercus alba - (Quercus prinus) / (Hydrangea quercifolia) - Viburnum acerifolium / Carex picta* Forest (CEGL008430)
- *Quercus alba - (Quercus velutina) - Carya ovata / Ostrya virginiana* Forest (CEGL002011) is similar but with a more northwesterly distribution.
- *Quercus alba - Quercus rubra - Carya (ovata, carolinae-septentrionalis) / Cercis canadensis* Forest (CEGL007232)
- *Quercus alba - Quercus rubra - Carya alba / Cornus florida* Acidic Forest (CEGL002067)
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070) is a type with a more strongly alkaline character.
- *Quercus alba - Quercus velutina - Carya alba / Desmodium nudiflorum* Ozark Forest (CEGL004270) of the Ozarks (e.g., at Buffalo National River).
- *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066)
- *Quercus rubra / Magnolia tripetala - Cercis canadensis / Actaea racemosa - Tiarella cordifolia* Forest (CEGL003949)
- *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (2) and Tennessee (17) between M65 and M70, M330 and M335, M340 and M345, M355 and M360, M360 and M365, M365 and M370, M385 and M390, and in the vicinity of M185, M315, M330, M340, M365, M425, and M435.
Global Range: This association is found from Kentucky and Tennessee north to Indiana and Illinois, possibly south to northern Alabama and northeastern Mississippi. It was originally described from the unglaciated Interior Low Plateau.
Nations: US
States/Provinces: AL, IL, IN, KY, MS, TN
TNC Ecoregions: 43:C, 44:C, 50:C
USFS Ecoregions (1994/95): 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Cg:CPP, 222Dg:CCC, 222Dj:CCC, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222En:CCC, 222Eo:CCC, 231Be:CCC, 231Bg:CCC, 231Bi:CCC, 231Cd:CCC, M221Cd:CCC
Federal Lands: NPS (Mammoth Cave, Natchez Trace, Shiloh); USFS (Daniel Boone, Land Between the Lakes)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.025, NATR.028, NATR.029, NATR.042, NATR.053, NATR.114, NATR.126, NATR.222, NATR.359, NATR.391, NATR.400, NATR.408, NATR.409, NATR.418, NATR.441, NATR.445, NATR.454, NATR.456, NATR.581, NATR.617.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne, mod. R.E. Evans
References: Badger et al. 1997, Braun 1950, Bryant et al. 1993, Homoya et al. 1988, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne 1997, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest

***Quercus alba - Carya ovata - Liriodendron tulipifera - (Quercus phellos) / Cornus florida* Forest**
White Oak - Shagbark Hickory - Tuliptree - (Willow Oak) / Flowering Dogwood Forest
Identifier: CEGL007709

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Interior Low Plateau Mixed Oak Woodland (A3291)
Association	Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest

ELEMENT CONCEPT

Global Summary: This community is associated with lower, more mesic slopes and higher floodplain terraces of major creeks in the Interior Low Plateau and Upper East Gulf Coastal Plain of Tennessee and the Cumberlands and Southern Ridge and Valley of Georgia. The dominant canopy species include *Quercus alba, Liriodendron tulipifera, Liquidambar styraciflua*, and/or *Quercus phellos*, as well as *Acer rubrum, Carya alba, Carya ovata, Juglans nigra, Quercus nigra*, and *Ulmus americana*. Some earlier successional examples may exhibit relative dominance by *Liriodendron* and/or *Liquidambar* rather than *Quercus* and/or *Carya*. The subcanopy is typically well-developed with canopy species, as well as *Cornus florida, Prunus serotina, Nyssa sylvatica*, and *Platanus occidentalis*. The shrub strata may include *Lindera benzoin, Symphoricarpos orbiculatus, Euonymus americanus, Asimina triloba, Carpinus caroliniana, Rhododendron canescens, Ilex opaca*, and *Toxicodendron radicans*. The herbaceous layer is often well-developed (up to 90% cover in a 20x20-m plot) but can also be rather sparse. Dominant herbs may include *Thelypteris noveboracensis, Osmunda cinnamomea, Osmunda regalis, Polystichum acrostichoides, Athyrium filix-femina ssp. asplenioides, Boehmeria cylindrica, Chasmanthium laxum, Poa sylvestris*, and *Carex intumescens*. The exotic grass *Microstegium vimineum* may also be dominant in some occurrences.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This white oak - tuliptree forest was sampled at 11 locations in the park. Sites range from gentle to moderate to steep slopes of mostly southern, eastern, and northern aspects. Soils are well- to moderately well-drained loam, sandy loam, and clay loam. The unvegetated surface is dominated by litter/duff with some wood and occasional large and small rocks and bare soil. Evidence of disturbance includes roads/trails, wind damage, and the presence of exotic plants.
Global Environment: This community is associated with lower, more mesic slopes and higher floodplain terraces of major creeks in the Interior Low Plateau and Upper East Gulf Coastal Plain of Tennessee and possibly adjacent states. It occurs on a variety of soil types. On Arnold Air Force Base (Coffee and Franklin counties, Tennessee) this community is found on lower, more mesic slopes and higher floodplain terraces of major creeks such as Crumpton, Brumalow, Hunt, and Rowland creeks.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (40-80% cover) canopy, 20-50 m tall, is dominated by *Liriodendron tulipifera* and *Quercus alba*; additional common and/or abundant tree species include *Acer rubrum, Acer saccharum, Carya alba, Carya glabra, Carya ovata, Liquidambar styraciflua, Platanus occidentalis*, and *Ulmus americana*. The sparse (20-40%) subcanopy (15-20 m) is made up of canopy species along with *Carpinus caroliniana, Cornus florida, Nyssa sylvatica, Ostrya virginiana, Sassafras albidum*, and *Ulmus alata*. The sparse (5-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers includes canopy/subcanopy species along with *Corylus americana, Fagus grandifolia, Fraxinus americana, Styrax grandifolius*, and *Symphoricarpos orbiculatus*. The herbaceous layer (30-70%) may be dominated by *Ageratina altissima, Dennstaedtia punctilobula, Diarrhena americana, Microstegium vimineum* (invasive exotic), *Osmunda cinnamomea, Podophyllum peltatum, Polystichum acrostichoides*, and/or tree or shrub seedlings. Dominant vines (up to 80%) include *Amphicarpaea bracteata, Decumaria barbara*, and *Toxicodendron radicans*.
Global Vegetation: The dominant canopy species in stands of this association include *Quercus alba, Liriodendron tulipifera, Liquidambar styraciflua*, and/or *Quercus phellos*, as well as *Acer rubrum, Carya alba, Carya ovata, Juglans nigra, Quercus nigra*, and *Ulmus americana*. Some earlier-successional examples may exhibit relative dominance by *Liriodendron* and/or *Liquidambar* rather than *Quercus* spp. and/or *Carya* spp. The subcanopy is typically well-developed with canopy species, as well as *Cornus florida, Prunus serotina, Nyssa sylvatica*, and *Platanus occidentalis*. The shrub strata may include *Lindera benzoin, Symphoricarpos orbiculatus, Euonymus americanus, Asimina triloba, Carpinus caroliniana, Rhododendron canescens, Ilex opaca*, and *Toxicodendron radicans*. Stands from Shiloh National Military Park were described as having a "very sparse" shrub stratum which included *Alnus serrulata, Lindera benzoin, Fraxinus pennsylvanica, Viburnum* sp., *Vaccinium fuscatum*, and *Rhododendron canescens*. The herbaceous layer is often well-developed (up to 90% cover in a 20x20-m plot) but can also be rather sparse. Dominant herbs may include *Thelypteris noveboracensis, Osmunda cinnamomea, Osmunda regalis, Polystichum acrostichoides, Athyrium filix-femina ssp. asplenioides, Boehmeria cylindrica, Chasmanthium laxum, Poa sylvestris*, and *Carex intumescens*. Other herbs include *Brachyelytrum erectum, Amphicarpaea bracteata, Mitchella repens, Dioscorea villosa, Arisaema triphyllum, Stellaria pubera, Trillium cuneatum, Podophyllum peltatum, Elephantopus carolinianus, Sanicula canadensis, Galium* spp., *Houstonia* spp., *Scutellaria integrifolia,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Lysimachia quadrifolia, Tipularia discolor, Symphyotrichum sp., *Eupatorium* sp., *Asplenium platyneuron*, and *Geum canadense*. The exotic grass *Microstegium vimineum* may also be dominant in some occurrences.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya alba*, *Carya ovata*, *Liriodendron tulipifera*, *Quercus alba*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*
Herb (field)	Flowering forb	*Ageratina altissima*
Herb (field)	Fern (Spore-bearing forb)	*Dennstaedtia punctilobula*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya alba*, *Carya ovata*, *Liriodendron tulipifera*, *Quercus alba*, *Quercus phellos*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya ovata*, *Liriodendron tulipifera*, *Quercus alba*
Global: *Carya alba*, *Carya ovata*, *Cornus florida*, *Liriodendron tulipifera*, *Quercus alba*, *Quercus phellos*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Morus alba* (High/Medium), *Poncirus trifoliata* ()
Global: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (18-Jan-2000). This is not an inherently rare forest type. It is presumed to be relatively common throughout its known range. It occurs on a variety of soil types and is somewhat generally distributed in upper floodplain terraces and lower slopes in parts of the Interior Low Plateau and Upper East Gulf Coastal Plain as well as in the Cumberlands and Southern Ridge and Valley. There are still some questions about the full extent of its global distribution and its relationship to related types. It is poorly documented through EOs, and not much data are available on the specific condition of examples of this type. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*) and loss of herbaceous species diversity from the disturbance effects of logging. The Grank was formerly G3G5. Changing this to G4 helps to clarify its status.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: On Arnold Air Force Base (Coffee and Franklin counties, Tennessee) this community is found on lower, more mesic slopes and higher floodplain terraces of major creeks such as Crumpton, Brumalow, Hunt, and Rowland creeks.
Global Similar Associations:
- *Liquidambar styraciflua - (Liriodendron tulipifera)* Ruderal Wet Forest (CEGL007330)
- *Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum)* Floodplain Forest (CEGL004771)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (1) and Tennessee (9) between M360 and M365, M365 and M370, and in the vicinity of M365, M440, and the Mississippi-Alabama stateline.
Global Range: At least a moderately widespread type, it is present in parts of the Interior Low Plateau and Upper East Gulf Coastal Plain as well as in the Cumberlands and Southern Ridge and Valley. A comprehensive review of its relationship to related types is not complete.
Nations: US
States/Provinces: AL, GA, MS, TN
TNC Ecoregions: 43:C, 44:C, 50:C, 53:?
USFS Ecoregions (1994/95): 222Cg:CCC, 222Eb:CCC, 222Ec:CC?, 222Eg:CCC, 231Bc:CC?, 231Bd:CCP, 231Be:CCC, 232:?
Federal Lands: DOD (Arnold); NPS (Chickamauga-Chattanooga, Natchez Trace)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.026, NATR.035, NATR.041, NATR.059, NATR.068, NATR.093, NATR.110, NATR.393, NATR.396, NATR.404, NATR.629.

Local Description Authors: M.J. Russo

Global Description Authors: M. Pyne and M. Russo

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Interior Southern Red Oak - White Oak Forest

***Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum* Forest**
Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest
Identifier: CEGL007244

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Interior Low Plateau Mixed Oak Woodland (A3291)
Association	Interior Southern Red Oak - White Oak Forest

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This southern red oak - white oak - hickory dry forest was sampled at 43 locations in the park. Sites range from flat ridgetops to gentle to somewhat steep mid and upper slopes. Soils are well- to moderately well-drained loam, sandy clay, sandy loam, silt, and silt loam. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes erosion, past logging/clearing, wind damage, and the presence of exotic plants.
Global Environment: Stands are typically found on low fertility Ultisols in the Piedmont, the interior uplands, and the Cumberland Plateau. This community occurs on soils of relatively low fertility; suborders on which this community occurs include Hapludults and Paleudults. Stands are uneven-aged and tree replacement occurs in gaps; severe fires most likely destroy community occurrences although light fires probably are tolerated. In western Tennessee (Shiloh National Military Park) it occurs on silt loam and loam soils on moderate to gentle slopes and ridgetops.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to dense (20-80% cover) canopy, 15-50 m tall, is codominated by *Quercus alba* and *Quercus falcata* along with lesser amounts of *Carya alba, Carya glabra, Liquidambar styraciflua*, and *Quercus stellata*, among others. Dominants in the sparse to moderate (20-60%) subcanopy (10-20 m) include *Cornus florida, Liquidambar styraciflua, Nyssa sylvatica, Oxydendrum arboreum, Ulmus alata*, and canopy oaks. The sparse to dense (10-70%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy species; additional common shrubs include *Diospyros virginiana, Liriodendron tulipifera, Prunus serotina, Sassafras albidum, Styrax grandifolius*, and *Vaccinium arboreum*. The herbaceous layer (5-40%) is dominated by tree/shrub seedlings but may also include *Arundinaria gigantea, Dichanthelium dichotomum, Phaseolus polystachios, Podophyllum peltatum, Polystichum acrostichoides*, and *Tipularia discolor*. Vines (5-20%) include *Amphicarpaea bracteata, Smilax bona-nox, Smilax rotundifolia, Toxicodendron radicans, Vitis rotundifolia*, and invasive exotic *Lonicera japonica*.
Global Vegetation: The vegetation is dominated by *Quercus* spp. and lesser amounts of *Carya* spp. The canopy is continuous and may include *Quercus falcata, Quercus alba, Quercus velutina, Quercus coccinea*, and *Quercus stellata*. The subcanopy closure is variable, ranging from less than 25% to more than 40% cover, and the shrub and herb layers generally are sparse. Subcanopy species include canopy species and *Acer rubrum, Liriodendron tulipifera, Oxydendrum arboreum, Liquidambar styraciflua, Ulmus alata, Cornus florida, Nyssa sylvatica, Juniperus virginiana var. virginiana*, and *Vaccinium arboreum*. The tall-shrub stratum may contain *Rhododendron canescens* and *Vaccinium arboreum*. The low-shrub stratum is dominated by various ericaceous shrubs such as *Vaccinium pallidum, Vaccinium stamineum, Vaccinium fuscatum*, and *Gaylussacia baccata*. *Smilax glauca* and *Vitis rotundifolia* are common vines. Herbaceous species that may be present include *Aristolochia serpentaria, Symphyotrichum dumosum (= Aster dumosus), Clitoria mariana, Desmodium nudiflorum, Euphorbia corollata, Galium circaezans, Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Solidago odora, Tephrosia virginiana, Potentilla*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

simplex, Porteranthus stipulatus, Pteridium aquilinum, Lespedeza spp., *Dichanthelium* spp., and *Hieracium venosum*. *Lonicera japonica* is also known.

At Shiloh (western Tennessee) this association is documented from 3 plots; the canopy is dominated by *Quercus alba, Quercus falcata, Quercus stellata, Ulmus alata*, and *Carya alba*. *Quercus muehlenbergii* is also present as a canopy species in one of the plots. Subcanopy dominants are *Liquidambar styraciflua, Ulmus alata, Nyssa sylvatica, Fraxinus americana*, and *Carya glabra*. Other subcanopy trees are *Quercus rubra, Quercus alba, Carya alba, Juniperus virginiana var. virginiana, Carya ovalis, Diospyros virginiana*, and *Fagus grandifolia*. The most abundant tall shrubs are *Carya alba, Quercus falcata, Ulmus alata*, and *Liquidambar styraciflua*. Other tall shrubs are *Carya ovalis, Sassafras albidum, Quercus alba, Nyssa sylvatica, Vaccinium arboreum, Vaccinium stamineum*, and less abundant *Quercus velutina, Quercus rubra, Fagus grandifolia, Fraxinus americana, Acer rubrum, Smilax rotundifolia*, and *Ilex opaca*. Short shrubs are diverse; *Quercus falcata, Vitis rotundifolia, Vaccinium stamineum*, and *Carya alba* are the most abundant. Other short shrubs are *Quercus velutina, Ulmus alata, Quercus alba, Nyssa sylvatica, Parthenocissus quinquefolia, Prunus serotina*, and *Sassafras albidum*. Short shrubs which are sparse include *Amelanchier arborea, Vaccinium arboreum, Juniperus virginiana var. virginiana, Diospyros virginiana, Hypericum hypericoides, Fraxinus americana, Smilax rotundifolia, Ilex opaca, Acer rubrum, Quercus phellos, Celtis occidentalis, Rubus argutus, Morus rubra, Smilax bona-nox, Ilex decidua, Toxicodendron radicans*, and *Carya ovalis*. In one of the plots *Chasmanthium sessiliflorum* is the dominant herb, in the other plots there is no single dominant and herbs are all sparse. Other herbs include *Dichanthelium boscii, Carex complanata, Dichanthelium laxiflorum, Danthonia spicata, Lespedeza repens, Lespedeza procumbens, Carex leavenworthii, Schizachyrium scoparium* and present a in trace amounts *Carex swanii, Dichanthelium dichotomum var. dichotomum, Sericocarpus linifolius, Galium circaezans, Panicum anceps, Tridens flavus, Aristolochia serpentaria, Dichanthelium acuminatum var. acuminatum, Galium pilosum, Solidago rugosa, Erechtites hieraciifolia, Sanicula canadensis, Asplenium platyneuron, Acalypha rhomboidea, Mimosa microphylla, Conyza canadensis*, and *Penstemon calycosus*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya alba*, *Carya glabra*, *Quercus alba*, *Quercus falcata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*
Herb (field)	Flowering forb	*Podophyllum peltatum*
Herb (field)	Graminoid	*Dichanthelium dichotomum*
Herb (field)	Fern (Spore-bearing forb)	*Polystichum acrostichoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya alba*, *Quercus alba*, *Quercus coccinea*, *Quercus falcata*, *Quercus velutina*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*, *Oxydendrum arboreum*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*, *Vaccinium stamineum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya alba*, *Quercus alba*, *Quercus falcata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Amorpha schwerinii* (G3G4), *Brickellia cordifolia* (G3), *Hexastylis lewisii* (G3), *Hexastylis naniflora* (G3), *Monotropsis odorata* (G3), *Rhus michauxii* (G2G3), *Thermopsis mollis* (G3G4); **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium); **Other Plants**: *Corallorhiza wisteriana* (G5), *Nestronia umbellula* (G4), *Onosmodium virginianum* (G4), *Porteranthus stipulatus* (G5), *Prunus umbellata* (G4G5), *Yucca filamentosa* (G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (13-Feb-2009). This is not a rare forest type, although most examples have been impacted by removal of the more valuable timber species (e.g., *Quercus alba*), and remaining ones on private land are highly vulnerable to canopy removal and conversion to other forest types or other land uses. This is one of the most common dry to dry-mesic oak forest communities found at Chattahoochee River National Recreation Area (L. Echols pers. comm. 2009).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: The limits of the range of this type needs to be clarified in Kentucky.
Global Similar Associations:

- *Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata* Forest (CEGL008427) a related mixed type.
- *Quercus alba - Carya alba / Euonymus americanus / Hexastylis arifolia* Forest (CEGL006227) a more mesic type with range overlap in the southern Piedmont.
- *Quercus alba - Quercus falcata / Vaccinium (arboreum, hirsutum, pallidum)* Forest (CEGL008567) more eastern and montane in distribution.
- *Quercus alba - Quercus rubra - Carya alba / Vaccinium stamineum / Desmodium nudiflorum* Piedmont Forest (CEGL008475) has a higher proportion of *Quercus alba* to other oak species.
- *Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina* Forest (CEGL005018)
- *Quercus stellata - Quercus marilandica - Carya (glabra, texana) / Vaccinium arboreum* Forest (CEGL002075)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (6), Mississippi (20) and Tennessee (17) between M50 and M55, M350 and M355, M355 and M360, M380 and M385, M385 and M390, and in the vicinity of M65, M170, M180, M210, M230, M330, M335, M350, M355, M360, M380, M400, M430, and M435.
Global Range: This southern red oak - white oak dry forest is found in the Piedmont of Georgia, South Carolina, North Carolina, and Virginia, and in the interior uplands and Cumberland Plateau of Kentucky and Tennessee. It has also been reported from the Upper East Gulf Coastal Plain of Mississippi, Tennessee and Georgia.
Nations: US
States/Provinces: AL, GA, KY, MS, NC, SC, TN
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C, 53:?
USFS Ecoregions (1994/95): 221Hc:CCC, 222Cg:CCC, 222Eb:CCC, 222Ef:CCC, 222Eg:CCC, 231Aa:CCC, 231Ab:CCC, 231Ae:CCC, 231Bb:CCC, 231Bd:CCC, 231Bg:CCC, 231Bh:CCC, 231Bi:CCC, 231Bj:CCC, 231Bk:CCC, 231Cc:CCC
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon?); DOE (Oak Ridge); NPS (Chattahoochee River, Cowpens, Guilford Courthouse, Horseshoe Bend, Kennesaw Mountain, Kings Mountain, Little River Canyon, Natchez Trace, Ninety Six, Shiloh); USFS (Daniel Boone, Holly Springs?, Oconee, Sumter, Sumter (Piedmont), Talladega, Talladega (Oakmulgee), Talladega (Talladega), Tombigbee?, Tuskegee?, Uwharrie); USFWS (Eufaula)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.001, NATR.003, NATR.005, NATR.009, NATR.015, NATR.016, NATR.019, NATR.020, NATR.040, NATR.043, NATR.064, NATR.065, NATR.076, NATR.079, NATR.080, NATR.082, NATR.086, NATR.088, NATR.092, NATR.117, NATR.118, NATR.119, NATR.189, NATR.218, NATR.232, NATR.235, NATR.271, NATR.317, NATR.335, NATR.350, NATR.357, NATR.376, NATR.411, NATR.412, NATR.413, NATR.415, NATR.420, NATR.421, NATR.424, NATR.426, NATR.427, NATR.452, NATR.457.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal, mod. R.E. Evans
References: ALNHP 2002, Allard 1990, Ambrose 1990a, Echols pers. comm., Evans 1991, Evans et al. 2009, Eyre 1980, Golden 1979, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Oberholster 1993, Oosting 1942, Peet and Christensen 1980, Peet et al. unpubl. data, Pyne 1994, Rawinski 1992, Schafale 2012, Schafale and Weakley 1990, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White 2004, White and Govus 2003, White and Govus 2005, White and Pyne 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Western Highland Rim Post Oak Barrens

***Quercus stellata / Viburnum rufidulum / Schizachyrium scoparium - (Sorghastrum nutans, Helianthus eggertii)* Woodland**
Post Oak / Rusty Blackhaw / Little Bluestem - (Indiangrass, Eggert's Sunflower) Woodland
Identifier: CEGL004686

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Forest & Woodland (G159)
Alliance	Interior Low Plateau Mixed Oak Woodland (A3291)
Association	Western Highland Rim Post Oak Barrens

ELEMENT CONCEPT

Global Summary: These woodlands are dominated by *Quercus stellata*; a scattered to dense subcanopy of *Juniperus virginiana var. virginiana* may be present. This community occurs as open patches (10x30 m or larger) on droughty mid to upper slopes in the unglaciated Interior Low Plateau, including on shaly siltstones of the Fort Payne Formation in the dissected escarpment of the Western Highland Rim of Tennessee, and related sites at Mammoth Cave National Park (Kentucky). The soils in Tennessee examples are mapped as Bodine; this is a droughty, excessively well-drained soil from which calcium ions have been removed by leaching, making it more acidic. The vegetation most frequently occurs on south- to southwest-facing slopes at an elevation of 150-260 m (500-850 feet) msl but may occur on other aspects as well. This community provides habitat for *Helianthus eggertii*. While fire undoubtedly played a role in its maintenance, local edaphic conditions function to maintain this distinctive vegetation. The presence of a subcanopy of *Juniperus virginiana var. virginiana* is probably a symptom of fire suppression. Other woody plants observed include *Quercus marilandica* in the canopy, *Cercis canadensis* in the subcanopy, and *Viburnum rufidulum* in the shrub stratum. *Schizachyrium scoparium* dominates the herbaceous stratum, with *Sorghastrum nutans* present in some examples. Distinctive herbaceous species present include *Eryngium yuccifolium, Ionactis linariifolius, Liatris squarrosa, Polytaenia nuttallii*, and *Parthenium integrifolium var. integrifolium*. The herb layer also contains *Dodecatheon meadia, Manfreda virginica, Monarda fistulosa, Symphyotrichum shortii (= Aster shortii), Ruellia humilis, Helianthus divaricatus*, and *Isanthus brachiatus*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This post oak woodland was sampled at three locations in the park. Sites are flat to gently sloping ridgetops with well-drained clay loam soil. The unvegetated surface is dominated by litter/duff with some wood, small rocks, standing water, and bare soil. Evidence of disturbance includes roads/trails, wind damage, and fire suppression.
Global Environment: This community occurs as open patches (10x30 m or larger) on mid to upper slopes of shaly siltstones of the Fort Payne Formation in the dissected escarpment of the Western Highland Rim of Tennessee. The soils are mapped as Bodine; this is a droughty, excessively well-drained soil from which calcium ions have been removed by leaching, making it more acidic. The vegetation most frequently occurs on south- to southwest-facing slopes at an elevation of 500-850 feet msl but may occur on other aspects as well. While fire undoubtedly played a role in its maintenance, local edaphic conditions function to maintain this distinctive vegetation. The presence of a subcanopy of *Juniperus virginiana var. virginiana* is probably a symptom of fire suppression.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of stands of this community is highly variable, ranging from mature to stunted woodlands. The sparse (10-40% cover) canopy, 10-50 m tall, and very sparse (5-20%) subcanopy (2-20 m) are dominated by *Quercus stellata* and may include *Acer rubrum, Carya glabra, Gleditsia triacanthos*, and others. The very sparse (5-10%) tall-shrub (1-5 m) and short-shrub (0.5-1 m) layers include *Diospyros virginiana, Nyssa sylvatica, Oxydendrum arboreum, Prunus serotina, Quercus* spp., and *Vaccinium arboreum*. Due to the open canopy, the herbaceous layer is relatively dense (60-70%); common taxa include *Coreopsis major, Dichanthelium dichotomum, Schizachyrium scoparium* (dominant), and *Tephrosia virginiana*.
Global Vegetation: These woodlands are dominated by *Quercus stellata*; a scattered to dense subcanopy of *Juniperus virginiana var. virginiana* may be present. The presence of a subcanopy of *Juniperus virginiana var. virginiana* is probably a symptom of fire suppression. Other woody plants observed include *Quercus marilandica* in the canopy, *Cercis canadensis* in the subcanopy, and *Viburnum rufidulum* in the shrub stratum. *Schizachyrium scoparium* dominates the herbaceous stratum, with *Sorghastrum nutans* present in some examples. Distinctive herbaceous species present include *Eryngium yuccifolium, Ionactis linariifolius, Liatris squarrosa, Polytaenia nuttallii*, and *Parthenium integrifolium var. integrifolium*. The herb layer also contains *Dodecatheon meadia, Manfreda virginica, Monarda fistulosa, Symphyotrichum shortii (= Aster shortii), Ruellia humilis, Helianthus divaricatus*, and *Isanthus brachiatus*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus stellata*
Herb (field)	Flowering forb	*Coreopsis major*, *Tephrosia virginiana*
Herb (field)	Graminoid	*Dichanthelium dichotomum*, *Schizachyrium scoparium*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus stellata*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Viburnum rufidulum*
Herb (field)	Graminoid	*Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Coreopsis major*, *Quercus stellata*, *Schizachyrium scoparium*
Global: *Helianthus eggertii*, *Quercus stellata*, *Schizachyrium scoparium*, *Sorghastrum nutans*, *Viburnum rufidulum*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Helianthus eggertii* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (5-Sep-2008). This woodland association is found in a restricted range and specific set of habitat conditions. It is known from areas of exposed, droughty soils in the unglaciated Interior Low Plateau of the central United States. Fire may have been an important factor in maintaining this vegetation type; in the absence of fire, all but the most droughty sites will probably convert to forest. These remnant woodlands are likely representative of the more typical vegetation structure of the region during periods before extensive fire suppression.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Examples are known from Beaman Park and Ridgetop Barrens, Davidson County, Tennessee. Stands have also been found in Kentucky at Mammoth Cave National Park. The same or closely related vegetation could occur in Alabama.
Global Similar Associations:
- *Quercus marilandica - (Juniperus virginiana) / Schizachyrium scoparium - Danthonia spicata* Wooded Grassland (CEGL002428)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Tennessee between M355 and M360 and in the vicinity of M315 and M435.
Global Range: This association is known from areas of exposed, droughty soils in the unglaciated Interior Low Plateau of the central United States. It has been documented from Kentucky and Tennessee and could also occur on related strata and landforms in Alabama.
Nations: US
States/Provinces: AL?, KY, TN
TNC Ecoregions: 44:C
USFS Ecoregions (1994/95): 222Dg:CCC, 222Dj:CCC, 222Ec:CCP, 222Eg:CCC, 222Eh:CCC
Federal Lands: NPS (Mammoth Cave, Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.116, NATR.414, NATR.621.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Allard 1990, Braun 1950, Frick 1939, Nordman et al. 2011, Pyne 1994, Pyne 1997, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G651. South-Central Interior Oak Savanna & Barrens

Western Highland Rim Blackjack Oak Barrens

***Quercus marilandica / Schizachyrium scoparium - (Helianthus mollis, Silphium asteriscus, Liatris aspera)* Woodland**
Blackjack Oak / Little Bluestem - (Ashy Sunflower, Starry Rosinweed, Tall Blazingstar) Woodland
Identifier: CEGL004756

USNVC CLASSIFICATION

Division	Eastern North American Forest & Woodland (1.B.2.Na)
Macrogroup	Southern & South-Central Oak - Pine Forest & Woodland (M016)
Group	South-Central Interior Oak Savanna & Barrens (G651)
Alliance	Clay/Loess Oak Woodland (A3315)
Association	Western Highland Rim Blackjack Oak Barrens

ELEMENT CONCEPT

Global Summary: These barrens are found on flat exposed ridgetops of the Western Highland Rim (Lewis County, Tennessee), and are dominated by a great variety of grasses and forbs. Scattered *Quercus marilandica* are characteristic. Among the dominant grasses, *Schizachyrium scoparium* is most abundant, with *Andropogon gerardii* and *Sorghastrum nutans*; *Carex complanata* and *Dichanthelium* spp. are also present. Forbs present include *Liatris aspera, Liatris spicata, Silphium asteriscus, Monarda fistulosa, Mimosa microphylla, Tephrosia virginiana, Lobelia puberula, Eryngium yuccifolium, Euphorbia corollata, Porteranthus stipulatus, Symphyotrichum patens (= Aster patens), Sericocarpus linifolius (= Aster solidagineus), Eupatorium hyssopifolium, Eupatorium rotundifolium, Eupatorium serotinum, Eupatorium sessilifolium, Parthenium integrifolium, Solidago odora, Helianthus hirsutus, Hypericum virgatum (= Hypericum denticulatum var. acutifolium)*, and *Lysimachia tonsa*. In addition, this community provides habitat for *Helianthus eggertii*, a globally rare plant. At the one site known, this vegetation consists of scattered *Quercus marilandica* with a dense cover of grasses and forbs. Due to fire suppression, *Rhus copallinum* is invading; adjoining areas have been converted to *Festuca* pasture or are in *Quercus stellata - Quercus falcata* forest. These barrens occur on winter-wet, summer-dry loessal soils on the surface of the Western Highland Rim of middle Tennessee. Soils are generally deep, with chert fragments; rock outcrops are absent. The presence of this or similar vegetation may be related to remnant deposits of Cretaceous gravels which remain on some of the high flat ridges in this landscape.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This barrens community was sampled twice in the park. The sites are gentle to flat ridges with well-drained sandy loam soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes the minor presence of exotic plants.
Global Environment: These barrens occur on winter-wet, summer-dry loessal soils on the surface of the Western Highland Rim of middle Tennessee. Soils are generally deep, with chert fragments; rock outcrops are absent.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate (40-50% cover) canopy, 10-15 m tall, may contain *Acer rubrum, Cornus florida, Juniperus virginiana, Oxydendrum arboreum, Quercus marilandica*, and/or *Robinia pseudoacacia*. The sparse (20-30%) tall-shrub (1-2 m) and short-shrub (0.5-1 m) layers include similar species along with *Rhus copallinum, Vaccinium arboreum* and/or *Vaccinium pallidum*. The herbaceous layer (30-40%) is dominated by *Schizachyrium scoparium*; additional herbs are diverse and variable.
Global Vegetation: These barrens are dominated by a great variety of grasses and forbs. Scattered *Quercus marilandica* are characteristic. Among the dominant grasses, *Schizachyrium scoparium* is most abundant, with *Andropogon gerardii* and *Sorghastrum nutans*; *Carex complanata* and *Dichanthelium* spp. are also present. Forbs present include *Liatris aspera, Liatris spicata, Silphium asteriscus, Monarda fistulosa, Mimosa microphylla, Tephrosia virginiana, Lobelia puberula, Eryngium yuccifolium, Euphorbia corollata, Porteranthus stipulatus, Symphyotrichum patens (= Aster patens), Sericocarpus linifolius (= Aster solidagineus), Eupatorium hyssopifolium, Eupatorium rotundifolium, Eupatorium serotinum, Eupatorium sessilifolium, Parthenium integrifolium, Solidago odora, Helianthus hirsutus, Hypericum virgatum (= Hypericum denticulatum var. acutifolium), Lysimachia tonsa*, and *Helianthus eggertii*, a globally rare plant. At the one site known, this vegetation consists of scattered *Quercus marilandica* with a dense cover of grasses and forbs.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Juniperus virginiana*
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum*, *Cornus florida*, *Oxydendrum arboreum*, *Quercus marilandica*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Rhus copallinum*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Vaccinium arboreum*
Herb (field)	Graminoid	*Schizachyrium scoparium*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus marilandica*
Herb (field)	Graminoid	*Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus marilandica*, *Schizachyrium scoparium*
Global: *Liatris aspera*, *Quercus marilandica*, *Schizachyrium scoparium*, *Silphium asteriscus*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Daucus carota* (Low), *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Global: Vulnerable Plants: *Helianthus eggertii* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2 (23-Oct-2002). This woodland (formerly wooded herbaceous) association is found in a restricted range and specific set of habitat conditions. It only occurs in barrens on flat exposed ridgetops of the Western Highland Rim of Tennessee (Hickman, Lawrence, and Lewis counties), where winter-wet, summer-dry loessal soils are present. At the one site currently known, scattered blackjack oak is present over a dense cover of a great variety of grasses and forbs. Adjoining areas have been converted to fescue pasture or are in post oak - southern red oak forest. Few examples remain of this community; the soils typically support forests and succession has extirpated many examples. Fire may have been an important factor in maintaining this community; in the absence of fire most sites appear to have converted to forest. Marginal examples remain along roadsides or field margins. Increasingly extensive agricultural development or new housing construction may have eliminated many occurrences.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type needs to be compared with related types from adjoining states and from the Midwest. Few examples remain of this community; succession has extirpated many examples. Fire may have been an important factor in maintaining this community; in its absence, most sites appear to have developed greater canopy closure, with shrubs dominating at the expense of herbs. Most examples are marginal, being found along roadsides or field margins. Increasingly extensive agricultural development may have eliminated many occurrences. This association was originally described as a wooded herbaceous type, but is now considered a woodland.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Tennessee in the vicinity of M315.
Global Range: This woodland occurs on flat exposed ridgetops of the Western Highland Rim (for example Hickman, Lawrence, and Lewis counties, Tennessee) and likely equivalent landforms in adjacent Alabama and Kentucky. These areas are scattered across Subsection 222Eg (Keys et al. 1995) and EPA Level IV Ecoregion 71f.
Nations: US
States/Provinces: AL?, KY?, TN
TNC Ecoregions: 44:C
USFS Ecoregions (1994/95): 222Eg:CCC
Federal Lands: NPS (Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.410, NATR.625.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Allard 1990, DeSelm 1988, Nordman et al. 2011, Southeastern Ecology Working Group n.d., TDNH unpubl. Data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

1.B.3. Temperate Flooded & Swamp Forest

1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

M029. Central Hardwood Floodplain Forest

G652. Silver Maple - Green Ash - Sycamore Floodplain Forest

Sycamore - Silver Maple Calcareous Floodplain Forest

***Platanus occidentalis - Acer saccharinum - Juglans nigra - Ulmus rubra* Floodplain Forest**
American Sycamore - Silver Maple - Black Walnut - Slippery Elm Floodplain Forest
Identifier: CEGL007334

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Floodplain Forest (M029)
Group	Silver Maple - Green Ash - Sycamore Floodplain Forest (G652)
Alliance	American Sycamore - River Birch Floodplain Forest (A3712)
Association	Sycamore - Silver Maple Calcareous Floodplain Forest

ELEMENT CONCEPT

Global Summary: This sycamore - silver maple floodplain forest occurs along riverfronts in calcareous areas of the east-central United States, including forests along small streams. Stands are dominated by *Platanus occidentalis*, with a mixture of other species, including *Acer negundo, Acer saccharinum, Fraxinus americana, Fraxinus pennsylvanica, Juglans nigra, Ulmus americana*, and *Ulmus rubra*. Shrubs include *Asimina triloba* and *Lindera benzoin*. Vines may be abundant, including *Parthenocissus quinquefolia* and *Toxicodendron radicans*. Herbaceous species include *Arisaema triphyllum, Asarum canadense, Boehmeria cylindrica, Elymus virginicus, Pilea pumila, Polygonum virginianum*, and others.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sycamore - silver maple floodplain forest was sampled twice in the park. Sites are temporarily flooded riverbanks with well-drained silt loam soil. The unvegetated surface is dominated by bare soil with some litter/duff. Evidence of disturbance includes roads/trails, flooding, and the presence of exotic plants.
Global Environment: This association occurs along riverfronts in calcareous areas, including forests along small streams (Weakley et al. 1998). The creation in 2000 of *Platanus occidentalis - Celtis laevigata - Liriodendron tulipifera / Lindera benzoin - Arundinaria gigantea / Amphicarpaea bracteata* Floodplain Forest (CEGL008429) may dictate that the use of this type (CEGL007334), at least in their range of overlap, would be more appropriate for large rivers rather than "small streams."

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (70% cover) canopy, 20-35 m tall, and sparse (40%) subcanopy (15-20 m) are dominated by *Acer negundo, Acer saccharinum*, and *Platanus occidentalis*. The sparse (10%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers includes *Arundinaria gigantea* and *Celtis laevigata*. The herbaceous layer (70%) is dominated by *Chasmanthium latifolium, Iresine rhizomatosa, Leersia virginica, Microstegium vimineum* (exotic), *Polygonum virginianum, Solidago* sp., and *Symphyotrichum dumosum*.
Global Vegetation: Stands are dominated by *Platanus occidentalis*, with a mixture of other species, including *Acer negundo, Acer saccharinum, Fraxinus americana, Fraxinus pennsylvanica, Juglans nigra, Ulmus americana*, and *Ulmus rubra*. Shrubs include *Asimina triloba* and *Lindera benzoin*. Vines may be abundant, including *Parthenocissus quinquefolia* and *Toxicodendron radicans*. Herbaceous species include *Arisaema triphyllum, Asarum canadense, Boehmeria cylindrica, Elymus virginicus, Pilea pumila, Polygonum virginianum*, and others (Van Kley et al. 1995, Weakley et al. 1998). *Acer saccharinum* may be a differential species in relation to some of the other associations in this alliance, as it is apparently absent from the southeastern Atlantic Coastal Plain and at the edge of its range in the southern Piedmont.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer negundo*, *Acer saccharinum*, *Platanus occidentalis*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Celtis laevigata*
Shrub/sapling (tall & short)	Graminoid	*Arundinaria gigantea*
Herb (field)	Flowering forb	*Iresine rhizomatosa*, *Polygonum virginianum*, *Symphyotrichum dumosum*
Herb (field)	Graminoid	*Chasmanthium latifolium*, *Leersia virginica*, *Microstegium vimineum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharinum*, *Fraxinus pennsylvanica*, *Platanus occidentalis*
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Asimina triloba*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer saccharinum*, *Platanus occidentalis*, *Polygonum virginianum*
Global: *Acer negundo*, *Acer saccharinum*, *Alliaria petiolata*, *Asimina triloba*, *Chaerophyllum procumbens*, *Fraxinus pennsylvanica*, *Mertensia virginica*, *Platanus occidentalis*, *Verbesina alternifolia*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Global: Vulnerable Plants: *Erythronium albidum* (G5, VA state-rare), *Maianthemum stellatum* (G5, VA state-rare), *Trillium lancifolium* (G3); **Invasive/Exotic Plants**: *Alliaria petiolata* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (4-Jan-2001). This type is apparently somewhat restricted in habitat, but with a wide range, and not highly threatened. Timber removal will cause disruption, but permanent conversion to other forest types is less likely. This community and other types of floodplain forests are threatened by alteration of the hydroperiod by artificial impoundments or river diversion projects, or the disruption of the floodplain communities by forestry or agriculture.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type could be in Illinois and Missouri. It is not well characterized yet and may be difficult to distinguish from other floodplain forests where *Platanus* is conspicuous without being dominant. For example, see *Acer saccharinum - Fraxinus pennsylvanica - Ulmus americana* Floodplain Forest (CEGL002586), *Fraxinus pennsylvanica - Celtis* spp. - *Quercus* spp. - *Platanus occidentalis* Floodplain Forest (CEGL002410), *Fraxinus pennsylvanica - Ulmus americana - Celtis laevigata / Ilex decidua* Floodplain Forest (CEGL002427), and *Fraxinus pennsylvanica - Ulmus* spp. - *Celtis occidentalis* Floodplain Forest (CEGL002014). It is possible that CEGL002410 could be merged with this type, depending on level of dominance required for *Platanus*. Related vegetation in Virginia is treated as *Platanus occidentalis - Acer negundo - Juglans nigra / Asimina triloba / Mertensia virginica* Floodplain Forest (CEGL004073).
Global Similar Associations:

- *Acer negundo* Ruderal Floodplain Forest (CEGL005033) is dominated by *Acer negundo*; there may be small patches of *Acer negundo* imbedded in examples of CEGL007334.
- *Acer saccharinum - Acer negundo / Ageratina altissima - Laportea canadensis - (Elymus virginicus)* Floodplain Forest (CEGL006217)
- *Acer saccharinum - Fraxinus pennsylvanica - Ulmus americana* Floodplain Forest (CEGL002586)
- *Fraxinus pennsylvanica - Celtis* spp. - *Quercus* spp. - *Platanus occidentalis* Floodplain Forest (CEGL002410)
- *Fraxinus pennsylvanica - Platanus occidentalis - Celtis laevigata / Chasmanthium latifolium* Piedmont Floodplain Forest (CEGL007013)
- *Fraxinus pennsylvanica - Ulmus americana - Celtis laevigata / Ilex decidua* Floodplain Forest (CEGL002427)
- *Fraxinus pennsylvanica - Ulmus* spp. - *Celtis occidentalis* Floodplain Forest (CEGL002014)
- *Platanus occidentalis - Acer negundo - Juglans nigra / Asimina triloba / Mertensia virginica* Floodplain Forest (CEGL004073) is found in Maryland, Virginia, West Virginia, and possibly Pennsylvania.
- *Platanus occidentalis - Celtis laevigata - Liriodendron tulipifera / Lindera benzoin - Arundinaria gigantea / Amphicarpaea bracteata* Floodplain Forest (CEGL008429) on small to medium-sized terraces of small streams.
- *Platanus occidentalis - Fraxinus pennsylvanica / Carpinus caroliniana / Verbesina alternifolia* Floodplain Forest (CEGL006458)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Tennessee in the vicinity of M425.
Global Range: This association occurs on river and large stream floodplains in calcareous areas of the east-central United States from Indiana and Kentucky and possibly Ohio, south to Tennessee. Range extent may be approximately 300,000 square km.
Nations: US
States/Provinces: AL, GA, IN, KY, MO, MS, OH, PA, TN, WV:S2?
TNC Ecoregions: 43:C, 44:C, 45:C, 49:C, 50:C, 51:C
USFS Ecoregions (1994/95): 221Ec:CCC, 221Ed:CCP, 221Ef:CCP, 221Eg:CCC, 221Fa:CCC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Cg:CCC, 222De:CCP, 222Dg:CCC, 222Dj:CCC, 222Eb:CCC, 222Ec:CCC, 222Eg:CCC, 222Em:CCP, 222En:CCC, 222Eo:CCC, 222Fa:CCC, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Hb:CCC, 222Hf:CCC, 231Aa:PPP
Federal Lands: NPS (Chickamauga-Chattanooga, Fort Donelson, Mammoth Cave, Natchez Trace, Ozark Riverways, Shiloh); USFS (Daniel Boone, Hoosier, Wayne?); USFWS (Erie)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.051, NATR.129.
Local Description Authors: M.J. Russo
Global Description Authors: D. Faber-Langendoen, mod. K.D. Patterson
References: Allard 1990, CAP pers. comm. 1998, Chastain et al. 2006, Homoya et al. 1988, MNHP 2000, Nigh et al. 2000, Nordman et al. 2011, ONHD unpubl. data, Palmer-Ball et al. 1988, Pyne et al. 2010, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Van Kley et al. 1995, WVNHP unpubl. data b, Weakley et al. 1998, White 2005, Zimmerman 2011m, Zimmerman et al. 2012

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G673. Silver Maple - Sugarberry - Sweetgum Floodplain Forest

River Birch Levee Forest

***Betula nigra - Platanus occidentalis / Alnus serrulata / Boehmeria cylindrica* Floodplain Forest**
River Birch - American Sycamore / Hazel Alder / Small-spike False Nettle Floodplain Forest
Identifier: CEGL007312

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Floodplain Forest (M029)
Group	Silver Maple - Sugarberry - Sweetgum Floodplain Forest (G673)
Alliance	Atlantic & East Gulf River Birch - Sycamore Levee Forest (A3699)
Association	River Birch Levee Forest

ELEMENT CONCEPT

Global Summary: This riverfront forest, dominated by *Betula nigra* and *Platanus occidentalis*, occurs primarily on levees along small rivers and streams. It also is found along flowages of larger rivers ("artificial oxbows"). It ranges from North Carolina to southern Georgia in the Piedmont and Coastal Plain (and into the southern and lower-elevation parts of the Southern Blue Ridge, excluding the highest elevations of the Mountains) and west to eastern Texas, and the Cumberland Plateau of Tennessee and possibly northern Alabama. No effort has been made to subdivide this type into northern and southern, or Coastal Plain and Interior variants, although there are undoubtedly some floristic differences between these extremes, at least in the lower strata. *Betula nigra* contributes at least 50%, and often more, of the tree density of stands of this community. *Platanus occidentalis* may be codominant, or at least prominent, with large individuals overtopping the *Betula*, which tends to have a greater number of stems, but *Platanus occidentalis* may be more conspicuous because of its larger size. Other canopy associates include *Liriodendron tulipifera, Liquidambar styraciflua, Acer rubrum, Acer negundo, Ulmus americana, Ulmus rubra, Celtis* spp., and *Quercus* spp.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This river birch forest was sampled at seven locations in the park. Sites are temporarily to intermittently flooded alluvial flats and floodplains. Soils include poorly drained clay and silty clay and well-drained sandy loam. The unvegetated surface is dominated by litter/duff with some wood and occasional large and small rocks, sand, bare soil, and standing water. Evidence of disturbance includes roads/trails, past logging and grazing, and the presence of exotic plants.
Global Environment: *Betula nigra* requires soils with moisture near field capacity throughout the year but is relatively intolerant of flooding; *Platanus occidentalis* also is intolerant of flooding during the growing season and will die if the entire tree is inundated for more than two weeks. The absence of this community in the lower Mississippi River Alluvial Plain is attributed to this intolerance, as is its most common location on levees of smaller rivers. The community usually is found on the natural levee of the watercourse and, therefore, is slightly elevated from the flats behind the levee. The community is more common along small streams and blackwater streams than along alluvial floodplains, mostly because of the higher sustained flow rates of these larger rivers. It also is found along flowages of larger rivers ("artificial oxbows") in southeast Kentucky. In the Upper East Gulf Coastal Plain (Shiloh National Military Park, Hardin County, Tennessee), this association occurs along small stream floodplains.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (60-80% cover) canopy, 20-50 m tall, is dominated by *Betula nigra* along with *Platanus occidentalis* and *Quercus nigra*. The sparse to moderate (30-50%) subcanopy (5-20 m) may include canopy species, *Acer negundo, Acer saccharum, Carpinus caroliniana, Liquidambar styraciflua*, and *Ulmus americana*. The invasive exotic *Ligustrum sinense* dominates the sparse to moderate (10-70%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers which also includes canopy/subcanopy species. Dominants in the herbaceous layer (10-40%) may include tree seedlings, *Chasmanthium latifolium, Commelina virginica, Justicia americana*, and *Microstegium vimineum* (exotic). Vines (5-10%) include *Aristolochia tomentosa, Campsis radicans, Smilax* spp., and *Toxicodendron radicans*.
Global Vegetation: *Betula nigra* contributes at least 50%, and often more, of the tree density of stands of this community. *Platanus occidentalis* may be codominant, or at least prominent, with large individuals overtopping the *Betula*, which tends to have a greater number of stems, but *Platanus occidentalis* may be more conspicuous because of its larger size. Other canopy associates include *Liriodendron tulipifera, Liquidambar styraciflua, Acer rubrum, Acer negundo, Ulmus americana, Ulmus rubra, Celtis* spp., and *Quercus* spp. *Pinus echinata, Pinus strobus*, or *Pinus virginiana* may be found in some montane or submontane examples. The subcanopy or tall-shrub strata may include *Cornus florida* and *Carpinus caroliniana*, along with *Acer rubrum, Ilex opaca, Ulmus alata, Prunus serotina*, and *Carya* spp. Shrubs and woody vines may include *Alnus serrulata, Euonymus americanus, Parthenocissus quinquefolia, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. Herbs may include *Boehmeria cylindrica, Polygonum virginianum, Rudbeckia laciniata, Sanicula* sp., *Symphyotrichum lateriflorum (= Aster lateriflorus), Thalictrum dioicum, Viola sororia, Polystichum acrostichoides, Woodwardia areolata, Botrychium dissectum, Botrychium virginianum*, and *Impatiens capensis*. The exotics *Ligustrum sinense, Lonicera japonica, Microstegium vimineum*, and *Rosa multiflora* may spread into disturbed examples of this community. No effort has been made to subdivide this type into northern and southern, or Coastal Plain and Interior variants, although there are undoubtedly some floristic differences between these extremes, at least in the lower strata.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Betula nigra*, *Platanus occidentalis*, *Quercus nigra*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*
Herb (field)	Flowering forb	*Commelina virginica*, *Justicia americana*
Herb (field)	Graminoid	*Chasmanthium latifolium*, *Microstegium vimineum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Betula nigra*, *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Platanus occidentalis*
Tree subcanopy	Broad-leaved deciduous tree	*Alnus serrulata*, *Carpinus caroliniana*, *Salix nigra*
Shrub/sapling (tall & short)	Liana	*Berchemia scandens*, *Campsis radicans*, *Toxicodendron radicans*, *Vitis riparia*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Asimina parviflora*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Geranium maculatum*, *Impatiens capensis*, *Laportea canadensis*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Betula nigra*, *Chasmanthium latifolium*
Global: *Alnus serrulata*, *Betula nigra*, *Boehmeria cylindrica*, *Platanus occidentalis*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: **Vulnerable Plants**: *Spiraea virginiana* (G2); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (13-Feb-2009). This is a widespread, variable, and dynamic association. The principal threats to it come from hydrologic alterations. In addition, stands do not typically contain valuable timber species and are not particularly vulnerable to logging. Stands receive some protection from "streamside management zones" in relation to forestry operations where "best management practices" are employed.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Under the new classification hierarchy, this association may require subdivision into three components: one for the coastal plains and adjacent Piedmont from Virginia to Mississippi; one for the Mississippi River Alluvial Plain and West Gulf coastal plains from Arkansas and Louisiana west to Texas; and one from the Appalachian and interior regions. To do this well, some more detailed information may be needed about the floristic differences among these types. No effort has been made to subdivide this type into northern and southern, or Coastal Plain and Interior variants, although there are undoubtedly some floristic differences between these extremes, at least in the lower strata. This includes the 'Sycamore - River Birch - Silver Maple' forests of the Pearl River in Louisiana mentioned by K. Ribbeck. Additional species from the shrub and herb strata need to be added to make more apparent the differences between this association and *Betula nigra - Platanus occidentalis* Floodplain Forest (CEGL002086), which is a more northern forest. In Kentucky, this association (CEGL007312) would be found on the southern part of the Daniel Boone National Forest, in contrast to CEGL002086, which is more northern. In Virginia, related vegetation is treated as *Betula nigra - Platanus occidentalis* Floodplain Forest (CEGL002086).
Global Similar Associations:
- *Betula nigra - Acer rubrum - (Liquidambar styraciflua) / Microstegium vimineum* Ruderal Floodplain Forest (CEGL006976)
- *Betula nigra - Platanus occidentalis* Floodplain Forest (CEGL002086)
- *Betula nigra - Quercus laurifolia - Taxodium (distichum, ascendens) / Crataegus aestivalis* Riparian Forest (CEGL004282)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (3) and Tennessee (3) between M300 and M305, M370 and M375, M425 and M430, and in the vicinity of M310.

Global Range: This riverfront association ranges from North Carolina to southern Georgia in the Piedmont and Coastal Plain (and into the southern and lower elevations of the Southern Blue Ridge, excluding the highest elevations of the mountains), west to eastern Texas and the Cumberland Plateau of Tennessee and possibly northern Alabama.

Nations: US

States/Provinces: AL, AR, GA, KY, LA, MS, NC, SC, TN, TX

TNC Ecoregions: 32:P, 40:P, 41:C, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 56:C, 57:C, 58:?

USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 222Cf:CCC, 222Cg:CCC, 222Eg:CCC, 231Ab:CCC, 231Ba:CCC, 231Bd:CCC, 231Cd:CCC, 231E:CC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232B:CC, 232C:CC, 232D:CC, 232F:CC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 255:C, M221Cd:CCC, M221Dc:CCC, M221Dd:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Federal Lands: BIA (Eastern Band of Cherokee); DOD (Fort Benning); NPS (Big South Fork, Blue Ridge Parkway, Chattahoochee River, Horseshoe Bend, Natchez Trace, Obed River, Prince William, Shiloh); USFS (Bankhead?, Bienville?, Chattahoochee, Chattahoochee (Piedmont), Chattahoochee (Southern Blue Ridge), Daniel Boone, De Soto?, Delta, Francis Marion?, Holly Springs?, Kisatchie, Oconee?, Pisgah, St. Francis?, Sumter, Sumter (Mountains), Sumter (Piedmont), Talladega (Oakmulgee)?, Tombigbee?, Tuskegee?); USFWS (Hatchie?, Little River)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.002, NATR.037, NATR.038, NATR.122, NATR.256, NATR.630, NATR.654.

Local Description Authors: M.J. Russo

Global Description Authors: S. Landaal, mod. C.W. Nordman

References: Allard 1990, Ambrose 1990a, Burns and Honkala 1990b, Campbell 1988, Campbell 1989a, Clark and Benforado 1981, Dickson and Segelquist 1978, Duever and Brinson 1984b, Evans 1991, Evans et al. 2009, Eyre 1980, FNAI 1992b, Faulkner and Patrick n.d., Flinchum 1977, Gettman 1974, Hoagland 1997, Kartesz 1999, Klimas et al. 1981, LNHP 2009, McWilliams and Rosson 1990, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Nordman et al. 2011, Oberholster 1993, Palmer-Ball et al. 1988, Peet et al. unpubl. data, Putnam 1951, Putnam et al. 1960, Pyne 1994, Rawinski 1992, Schafale 2000, Schafale 2012, Schafale and Weakley 1990, Schmalzer and DeSelm 1982, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, USFS 1988, Wharton 1978, Wharton et al. 1982, Wieland 1994b, Wieland 2000b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Interior Box-elder Riparian Forest

***Acer negundo - (Platanus occidentalis, Populus deltoides)* Floodplain Forest**
Box-elder - (American Sycamore, Eastern Cottonwood) Floodplain Forest
Identifier: CEGL004690

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Floodplain Forest (M029)
Group	Silver Maple - Sugarberry - Sweetgum Floodplain Forest (G673)
Alliance	Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest (A3700)
Association	Southern Interior Box-elder Riparian Forest

ELEMENT CONCEPT

Global Summary: This association represents forests on narrow floodplains, along streams and medium-sized rivers and Tennessee Valley Authority impoundments in Kentucky, Tennessee, Alabama, and Arkansas, where *Acer negundo* dominates, possibly with emergent *Platanus occidentalis* and/or *Populus deltoides*. It explicitly covers *Acer negundo*-dominated vegetation of streams, as opposed to *Acer negundo* Ruderal Floodplain Forest (CEGL005033), a type of larger rivers which has a greater documented distribution. This association (CEGL004690) covers smaller areas and may have a greater transition zone to other communities and consequently higher diversity. More information is needed on species composition and dynamics of this association in order to better distinguish it from CEGL005033. Composition is variable. In central Kentucky, a simple strip of *Acer negundo* and *Platanus occidentalis*, plus *Ulmus americana*, etc., is common along all medium-sized streams, with almost no *Acer saccharinum* or *Populus deltoides*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This box-elder - sycamore - cottonwood forest was sampled at two locations in the park. The sites are temporarily flooded alluvial terraces with moderately well- to well-drained sandy clay and loamy sand soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes periodic flooding and scouring, erosion, and the presence of exotic plants.
Global Environment: Stands occur on floodplains of streams and medium-sized rivers. They are typically temporarily flooded in the spring.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (60-70% cover) canopy (20-35 m tall) is dominated by *Platanus occidentalis* and *Populus deltoides*, while the sparse to moderate (20-70%) subcanopy (10-20 m) is dominated by *Acer negundo*. The sparse (30%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) may include *Acer negundo, Carpinus caroliniana, Carya* spp., *Celtis laevigata, Juniperus virginiana, Ligustrum sinense* (exotic), and *Ulmus americana*. Common and/or abundant species in the sparse (20-40%) herbaceous layer include *Chasmanthium latifolium, Chasmanthium sessiliflorum, Equisetum hyemale, Lonicera japonica* (exotic), *Toxicodendron radicans*, and *Verbesina virginica*.
Global Vegetation: Stands are dominated by *Acer negundo*, possibly with emergent *Platanus occidentalis* and/or *Populus deltoides*. In addition, *Ulmus americana* may also be a canopy component in Kentucky, and *Acer saccharinum* and *Populus deltoides* will typically be lacking (J. Campbell pers. comm.). More information is needed on species composition, variation, and dynamics of this association in order to better distinguish it from *Acer negundo* Ruderal Floodplain Forest (CEGL005033), a type of larger rivers which has a greater documented distribution.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Platanus occidentalis*, *Populus deltoides*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer negundo*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer negundo*, *Equisetum hyemale*, *Platanus occidentalis*, *Populus deltoides*
Global: *Acer negundo*, *Platanus occidentalis*, *Populus deltoides*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Pueraria montana* var. *lobata* (), *Rosa multiflora* (Medium/Low)
Global: Vulnerable Plants: *Delphinium newtonianum* (G3), *Matelea baldwyniana* (G3), *Trillium viridescens* (G2G4Q)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (17-Dec-1999). This is an early-successional type, which has numerous but poorly documented occurrences. The rangewide occurrence of this type is complicated by the "weedy" nature of *Acer negundo*. Decline has been moderate, primarily caused by disruption of the flooding regime by impoundments or by water withdrawals and interbasin transfers. The actual range of the type is probably greater than the data indicate. Many states do not track this vegetation as it is early-successional. It may not be adequately distinguished in the data or the literature from the related *Acer negundo* Ruderal Floodplain Forest (CEGL005033), a type of larger rivers. Admittedly, it is unclear what the EO rank criteria are for an early-successional type. The Grank was changed from the ambiguous G3G5 to G4 based on information from state ecologists which clarified the concept and allowed it to be conceptually differentiated from CEGL005033.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: More information is needed on species composition and environmental variables to better distinguish this type (CEGL004690) and *Acer negundo* Ruderal Floodplain Forest (CEGL005033). Tom Foti (pers. comm.) states that the small stream *Acer negundo* type (CEGL004690) covers small areas and may have a greater transition zone to other communities and consequently higher diversity. In contrast, the big river *Acer negundo* type (CEGL005033) can cover hundreds of acres with relatively little ecotone and may consist of pure *Acer negundo*. In central Kentucky, a simple strip of *Acer negundo* and *Platanus occidentalis*, plus *Ulmus americana*, etc., is common along all medium-sized streams, with almost no *Acer saccharinum* or *Populus deltoides* (J. Campbell pers. comm.). Most Natural Heritage programs do not track this successional type, and relatively little information is available on its detailed composition and dynamics. Its apparently limited range may simply be due to its failure to be distinguished from the big river type or from other small stream floodplain associations. In Virginia, related vegetation is treated as *Acer negundo* Ruderal Floodplain Forest (CEGL005033).
Global Similar Associations:
- *Acer negundo* Ruderal Floodplain Forest (CEGL005033)
- *Platanus occidentalis - (Populus deltoides) - Acer negundo* Floodplain Forest (CEGL002092)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi in the vicinity of M5 and M310.
Global Range: This *Acer negundo* small stream floodplain forest is best documented in central Kentucky; its full distribution is not known. It presumably occurs in Tennessee and is reported from Alabama and Arkansas. It could be found sporadically on small stream floodplains in the southern, eastern, and midwestern United States throughout the range of *Acer negundo*. The actual range of the type is probably greater than the data indicate. Many states do not track this vegetation as it is early-successional. It may not be adequately distinguished in the data or the literature from the related CEGL005033, a type of larger rivers.
Nations: US
States/Provinces: AL, AR, KY, MS, TN
TNC Ecoregions: 38:C, 39:C, 40:C, 42:C, 43:C, 44:C, 50:C
USFS Ecoregions (1994/95): 221Ha:CCC, 221Hc:CCC, 221Hd:CC?, 221He:CCC, 221Ja:CP?, 221Jb:CP?, 221Jc:CP?, 222Ag:CCC, 222An:CCC, 222Ca:CC?, 222Cb:CC?, 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CCC, 222Ch:CC?, 222Ea:CC?, 222Eb:CCC, 222Ec:CC?, 222Ed:CCC, 222Ee:CC?, 222Ef:CC?, 222Eg:CCC, 222Eh:CC?, 222Ei:CC?, 222Ej:CCC, 222Ek:CC?, 222En:CCC, 222Eo:CCC, 222Fa:CP?, 222Fb:CP?, 222Fc:CP?, 222Fd:CP?, 222Ff:CP?, 231Ba:CCC, 231Bd:CCC, 232Bb:CCC, M221Cd:CCC
Federal Lands: NPS (Buffalo River, Natchez Trace, Stones River); USFS (Daniel Boone, Tuskegee)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.574, NATR.636.
Local Description Authors: M.J. Russo
Global Description Authors: Southeast Ecology Group
References: Campbell pers. comm., Evans 1991, Evans et al. 2009, Foti pers. comm., Nordman 2004a, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Silver Maple - Sugarberry - Pecan Floodplain Forest

***Acer saccharinum - Celtis laevigata - Carya illinoinensis* Floodplain Forest**
Silver Maple - Sugarberry - Pecan Floodplain Forest
Identifier: CEGL002431

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Floodplain Forest (M029)
Group	Silver Maple - Sugarberry - Sweetgum Floodplain Forest (G673)
Alliance	Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest (A3700)
Association	Silver Maple - Sugarberry - Pecan Floodplain Forest

ELEMENT CONCEPT

Global Summary: This silver maple floodplain forest type is found in the central United States. Stands occur in deep (greater than 1 m) moist alluvial soils of river bottoms and occasionally at the base of protected slopes. The soils are poorly drained and often have an impervious clay layer which encourages the ponding of water. Groundwater is at or near the surface, except on ridges and terraces where the levees of old streams and meanders were deposited. Canopy cover is more-or-less complete and dominated by *Acer saccharinum, Celtis laevigata*, and *Carya illinoinensis*. Less dominant species encountered are *Acer negundo, Populus deltoides, Salix nigra, Liquidambar styraciflua, Quercus palustris*, and *Betula nigra*. Trees are tall (24-30 m [80-100 feet]) and straight with rounded, spreading, open crowns and massive branches. The understory is sparse and dominated by *Celtis laevigata, Acer saccharinum*, and *Ulmus americana*. *Forestiera acuminata* and *Ilex decidua* dominate the shrub layer. Herbaceous species most commonly encountered are *Boehmeria cylindrica, Laportea canadensis*, and *Urtica dioica*. Although the understory may be sparsely populated, a diverse variety of species can be encountered. Vines may form dense thickets and include *Vitis* spp., *Smilax* spp., *Toxicodendron radicans*, and *Campsis radicans*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This silver maple floodplain forest was sampled at two locations in the park. Sites are flat, temporarily flooded bottomlands with poorly to moderately well-drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.
Global Environment: Stands occur in deep (greater than 1 m), moist alluvial soils of second bottoms and terraces within the Mississippi River floodplain and occasionally at the base of protected slopes. These soils are deep, medium-textured, and have adequate or excessive moisture available for vegetation during the growing season. Often the deposition of impermeable clay layers causes ponding of water in low areas. Many of these soils have a high shrink-swell capacity. Ridge-and-swale topography is common as a result of depositional and scouring processes which occur when rivers flood over their banks and meander through the floodplain. Soil properties also vary with distance from the river. Heavier particles settle out first to form ridges and terraces, while finer particles settle further out and form expansive, level floodplain terraces. This community is subject to periodic flooding, although it is seldom deeply inundated (>1.5 m) for more than several days at a time.

Soils include dominantly level or nearly level to gently sloping soils that formed in alluvium on floodplains. These soils are deep, medium-textured, and have adequate or excessive moisture available for vegetation during the growing season. They have a udic or aquic moisture regime, a thermic temperature regime, and montmorillonitic or mixed mineralogy. Soils are Aquepts, Aqualfs, Aquents, Udolls, and Udalfs. Haplaquepts, Ochraqualfs, Fluvaquents, Natraqualfs, Ochraqualfs, and Hapludalfs are found in backswamp areas and older natural levees. Dystrochrepts, Udifluvents, and Fluvaquents occur in smaller areas. Soils Associations which would support this community in southern Illinois include Belknap-Wakeland, Darwin-Medway-Cairo, Jacob-Booker, Ginat-Weinbach-Sciotoville, Armiesburg-Emma, and Belknap-Bonnie-Cape. Bedrock is deeply buried Paleozoic material. The unconsolidated sediments that overlay the bedrock need to be further characterized.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate (50-60% cover) canopy, 20-35 m tall, is dominated by *Acer saccharinum*; additional species may include *Carya illinoinensis, Liquidambar styraciflua, Platanus occidentalis, Populus deltoides, Quercus nigra*, and *Ulmus americana*. The moderate to dense (40-90%) subcanopy (10-20 m) may include canopy species, *Acer negundo*, and *Celtis laevigata*. The very sparse (10-20%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Cornus foemina* and invasive exotic *Ligustrum sinense*. The herbaceous layer (60-70%) is dominated by *Chasmanthium latifolium*; additional common herbs include *Cryptotaenia canadensis, Elephantopus carolinianus, Leersia virginica, Polygonum virginianum, Solidago rugosa*, and *Symphyotrichum lateriflorum*. Vines (5-10%) include *Bignonia capreolata, Cocculus carolinus, Smilax* spp., and *Toxicodendron radicans*.
Global Vegetation: Canopy cover is more or less complete (80-100%), and dominated by *Acer saccharinum, Celtis laevigata*, and *Carya illinoinensis*. *Carya illinoinensis* seldom occurs in high densities but grows to be one of the largest trees on the floodplain. Less dominant species encountered are *Acer negundo, Populus deltoides, Salix nigra, Liquidambar styraciflua, Quercus palustris*, and *Betula nigra*. Trees are tall (25-35 m) and straight with rounded, spreading, open crowns and massive branches. The understory is sparse, dominated by *Celtis laevigata, Acer saccharinum*, and *Ulmus americana*. *Forestiera acuminata* and *Ilex decidua* dominate the shrub layer. Herbaceous species most commonly encountered are *Boehmeria cylindrica, Laportea canadensis*, and *Urtica dioica*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Although the understory may be sparsely populated, a diverse variety of species can be encountered. Vines may form dense thickets and include *Vitis* spp., *Smilax* spp., *Toxicodendron radicans*, and *Campsis radicans* (TNC 1995a). Species composition within and among this natural community is largely determined by the flooding regime of adjacent rivers and lakes. Soil physical properties also affect plant associations. Herbaceous density is influenced by the depth and duration of flooding.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum*, *Carya illinoinensis*, *Liquidambar styraciflua*, *Populus deltoides*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus foemina*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*
Herb (field)	Graminoid	*Chasmanthium latifolium*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum*, *Celtis laevigata*, *Ulmus americana*
Tree canopy	Broad-leaved deciduous tree	*Carya illinoinensis*, *Fraxinus pennsylvanica*
Shrub/sapling (tall & short)	Liana	*Campsis radicans*, *Cocculus carolinus*, *Parthenocissus quinquefolia*, *Smilax rotundifolia*, *Toxicodendron radicans*, *Vitis palmata*, *Vitis vulpina*
Tall shrub/sapling	Broad-leaved deciduous tree	*Ilex decidua*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Crataegus viridis*, *Forestiera acuminata*
Herb (field)	Flowering forb	*Arisaema dracontium*, *Commelina virginica*, *Laportea canadensis*, *Pilea pumila*, *Symphyotrichum ontarionis*
Herb (field)	Graminoid	*Chasmanthium latifolium*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer saccharinum*, *Carya illinoinensis*, *Celtis laevigata*, *Commelina virginica*, *Pilea pumila*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (31-Mar-2000). Many sites have been drained and cleared for agriculture.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This is a relatively southern type, separable from *Acer saccharinum - Fraxinus pennsylvanica - Ulmus americana* Floodplain Forest (CEGL002586), but the distinction needs more clarity. Missouri isn't sure they can distinguish these two types in the state. Stands are found on Kentucky's Mississippi River Alluvial Plain, *Carya illinoinensis* can codominate (M. Evans pers. comm. 1999). This forest occurs on the Arkansas River (T. Foti pers. comm. 1999).
Global Similar Associations:

- *Acer saccharinum - Betula nigra / Cephalanthus occidentalis* Floodplain Forest (CEGL007810)
- *Acer saccharinum - Fraxinus pennsylvanica - Ulmus americana* Floodplain Forest (CEGL002586)
- *Fraxinus pennsylvanica - Ulmus americana - Celtis laevigata / Ilex decidua* Floodplain Forest (CEGL002427) has similar habitat requirements but lacks pecan as a significant contributor to canopy dominance.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi in the vicinity of M40.
Global Range: This silver maple forest type is found in the central United States, ranging from southern Indiana west to Missouri, south to Arkansas, Oklahoma and possibly Mississippi, and east to Kentucky.
Nations: US
States/Provinces: AR, IL, IN, KY, MO?, MS, OK?, TN
TNC Ecoregions: 36:C, 39:C, 40:C, 42:C, 43:C, 44:C, 53:C
USFS Ecoregions (1994/95): 222A:CP, 222C:CP, 231E:CC, 231Ga:CCC, 232Bb:CCC, 234A:PP, 251Cf:CCC
Federal Lands: NPS (Natchez Trace); USFWS (Holla Bend)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.174, NATR.561.
Local Description Authors: M.J. Russo
Global Description Authors: M. Guetersloh, mod. D. Faber-Langendoen 06-00
References: Blair 1938, Cowardin et al. 1979, Evans 1991, Evans et al. 2009, Evans, M. pers. comm., Eyre 1980, Foti pers. comm., Hoagland 2000, Homoya et al. 1988, Küchler 1964, Midwestern Ecology Working Group n.d., Nelson 1985, Nelson 2010, Nordman et al. 2011, TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Green Ash - Elm - Sugarberry Floodplain Forest

***Fraxinus pennsylvanica - Ulmus americana - Celtis laevigata / Ilex decidua* Floodplain Forest**
Green Ash - American Elm - Sugarberry / Possum-haw Floodplain Forest
Identifier: CEGL002427

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Floodplain Forest (M029)
Group	Silver Maple - Sugarberry - Sweetgum Floodplain Forest (G673)
Alliance	Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest (A3700)
Association	Southern Green Ash - Elm - Sugarberry Forest

ELEMENT CONCEPT

Global Summary: This green ash - American elm - sugarberry community is found throughout the central and southern United States. Stands occur in floodplains of major rivers where water is absent for most of the growing season. Soils are moist alluvial clay or silt loams. *Ulmus americana* was once the most prominent member of this forest, but Dutch elm disease (*Ceratostomella ulmi*) and logging have eliminated many of the largest mature *Ulmus* spp. from most of the species natural range. *Fraxinus pennsylvanica* dominates on moist flats and shallow sloughs, while *Celtis laevigata* is most prevalent on new land or front sites. Other species commonly encountered include *Carya aquatica, Quercus lyrata, Liquidambar styraciflua*, and *Acer negundo*. The subcanopy is often dense and dominated by *Fraxinus pennsylvanica* which sprouts prolifically. Shrubs typical of this forest include *Cornus drummondii, Ilex decidua*, and *Crataegus* spp. The herbaceous layer is dense and diverse, dominated by *Galium* spp., *Viola* spp., *Carex* spp., *Leersia* spp., *Boehmeria cylindrica, Laportea canadensis, Pilea pumila, Impatiens capensis (= Impatiens biflora)*, and *Impatiens pallida*. Vines most often encountered include *Toxicodendron radicans, Campsis radicans*, and *Parthenocissus quinquefolia*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This green ash - American elm forest was sampled at four locations in the park. Sites are intermittently flooded bottomlands with poorly to somewhat poorly drained silty clay soils. The unvegetated surface is dominated by litter/duff with some wood and occasional substantial bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.

Global Environment: This community occurs in floodplains of major rivers, generally alluvial or brownwater rivers, on low ridges, flats, and sloughs; terrace flats and sloughs in first bottoms; and occasionally on new lands or fronts (Eyre 1980). In terms of hydrology, this is a Zone IV community (Wharton et al. 1982). Short-term, shallow flooding occurs seasonally/periodically within this community. Soils are clay or silt loams that are seasonally inundated or saturated for 1 or 2 months during the growing season, with a 50-100% annual frequency (Eyre 1980, Smith and Craig 1990). Alluvial deposition and nutrient input occurs, but less than in more frequently flooded forest types (Schafale and Weakley 1990).

Soils include dominantly level or nearly level soils that formed in water-laid clayey or loamy sediments on floodplains of the Mississippi and other rivers and large perennial streams in the Coastal Plain. They are Aquepts, Aqualfs, and Aquents. Haplaquepts, Ochraqualfs, Fluvaquents, Natraqualfs, and Hapludalfs are found in backswamp areas and older natural levees. Dystrochrepts, Udifluvents, and Fluvaquents occur in smaller areas. Hydraquents are in southern Louisiana. These soils have a udic or aquic moisture regime, thermic temperature regime, and montmorillonitic or mixed mineralogy. These soils formed in alluvium and are deep, medium-textured, and have adequate or excessive moisture available for vegetation during the growing season (McNab and Avers 1994). Bedrock is deeply buried Paleozoic sandstone or stratified Cenozoic marine deposits.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to very dense (60-90% cover) canopy, 15-35 m tall, and moderate (30-50%) subcanopy (10-20 m) are dominated by *Fraxinus pennsylvanica*; additional trees are variable but may include *Acer negundo, Acer saccharum, Carya illinoinensis, Celtis laevigata, Liquidambar styraciflua, Liriodendron tulipifera, Populus deltoides*, and *Ulmus americana*. The sparse to moderate (10-50%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy species; dominant shrubs may include *Hydrangea arborescens, Lindera benzoin*, or *Sambucus canadensis*. The herbaceous layer (20-50%) includes *Carex* spp., *Impatiens* sp., *Symphyotrichum lateriflorum*, and invasive exotic *Microstegium vimineum*. Vines (10-30%) include *Amphicarpaea bracteata, Campsis radicans, Smilax* spp., and *Toxicodendron radicans*.

Global Vegetation: This community is a broadleaf deciduous floodplain forest which exhibits high canopy diversity and good herbaceous diversity (although lower herbaceous diversity than mesic floodplain forest). *Ulmus americana* was once the most prominent member of this forest, but Dutch elm disease (*Ceratostomella ulmi*) and logging have eliminated many of the largest mature *Ulmus* spp. from most of the species natural range (Collingwood and Brush 1984). *Fraxinus pennsylvanica* dominates on moist flats and shallow sloughs, while *Celtis laevigata* is most prevalent on new land or front sites. Other species commonly encountered include *Carya aquatica, Quercus lyrata, Liquidambar styraciflua*, and *Acer negundo*. The subcanopy is often dense and dominated by *Fraxinus pennsylvanica* which sprouts prolifically. *Fraxinus pennsylvanica*, however, is considered a pioneer species and does not maintain its canopy position under intense shading found in later successional stages (Voigt and Mohlenbrock 1964). Shrubs typical of this forest include *Cornus drummondii, Ilex decidua*, and *Crataegus* spp. The herbaceous layer is dense and diverse, dominated by *Galium* spp., *Viola* spp., *Carex* spp., *Leersia* spp., *Boehmeria cylindrica, Laportea canadensis, Pilea pumila, Impatiens capensis (=*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Impatiens biflora), and *Impatiens pallida*. Vines most often encountered include *Toxicodendron radicans, Campsis radicans*, and *Parthenocissus quinquefolia* (TNC 1995a).

Species variability within and among occurrences of this community is great and directly related to the level of saturation of the substrate. Alluvial deposition varies and slight ridges may favor sugarberry, while depressions will favor green ash. Species variability and composition within this community are considerable as a result of a mosaic of moisture conditions controlled by seasonal flooding and local topography. In the northern part of the range (north-central Oklahoma, northern Arkansas, Missouri, Tennessee, Kentucky, southern Illinois, southeastern Indiana), this community coincides with the distribution of *Celtis occidentalis*. In this section *Celtis occidentalis* is often a dominant in the canopy-subcanopy. In Louisiana, Mississippi, Alabama, Arkansas, and southwestern Missouri, *Quercus texana* is a major associate in this type. *Celtis laevigata* is especially abundant on river front and disturbed sites. *Fraxinus pennsylvanica* is relatively more abundant on saturated flats or shallow sloughs. *Berchemia scandens* is common in this community northward through southeastern Virginia and Tennessee. Areas that have been cleared or logged in the past may have locally abundant disturbance species such as *Acer rubrum, Pinus taeda, Liquidambar styraciflua*, or *Platanus occidentalis*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fraxinus pennsylvanica*
Tree subcanopy	Broad-leaved deciduous tree	*Celtis laevigata*, *Ulmus americana*
Herb (field)	Liana	*Amphicarpaea bracteata*, *Campsis radicans*
Herb (field)	Flowering forb	*Symphyotrichum lateriflorum*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Celtis laevigata*, *Fraxinus pennsylvanica*, *Ulmus americana*
Tree canopy	Broad-leaved deciduous tree	*Carya aquatica*, *Quercus lyrata*, *Quercus nigra*, *Quercus phellos*
Shrub/sapling (tall & short)	Liana	*Campsis radicans*, *Parthenocissus quinquefolia*, *Toxicodendron radicans*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cornus drummondii*, *Ilex decidua*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Celtis laevigata*, *Fraxinus pennsylvanica*, *Symphyotrichum lateriflorum*, *Ulmus americana*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Other Plants: *Quercus texana* (G4G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

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

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:

- *Acer (rubrum, saccharinum) - Fraxinus* spp. - *Ulmus americana* Swamp Forest (CEGL005038) is often non-floodplain.
- *Acer saccharinum - Celtis laevigata - Carya illinoinensis* Floodplain Forest (CEGL002431)
- *Fraxinus pennsylvanica - Ulmus* spp. - *Celtis occidentalis* Floodplain Forest (CEGL002014)
- *Platanus occidentalis - Acer saccharinum - Juglans nigra - Ulmus rubra* Floodplain Forest (CEGL007334)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1), Mississippi (2) and Tennessee (1) between M45 and M50 and in the vicinity of M85 and M410.

Global Range: This green ash - American elm - sugarberry community is found throughout the central and southern United States on floodplains of major rivers from Texas, Oklahoma, Arkansas, north to southern Illinois and adjacent Indiana, east to Tennessee, and south to Louisiana. The range formerly included states of the Atlantic Coastal Plain, but now see *Fraxinus pennsylvanica - Ulmus americana / Carpinus caroliniana / Boehmeria cylindrica* Floodplain Forest (CEGL007806).

Nations: US

States/Provinces: AL:S2, AR, IL, IN, KY, LA, MO, MS, OK, TN, TX?

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

USFS Ecoregions (1994/95): 221D:CC, 222Cg:CCC, 222D:CP, 222E:CP, 231Ba:CCP, 231Be:CCC, 231Bi:CCC, 231C:CP, 231D:CP, 231E:CC, 231G:C?, 232Bb:CCC, 232D:CP, 232F:CC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCP, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, M231A:CP

Federal Lands: DOE (Oak Ridge); NPS (Buffalo River, Natchez Trace, Shiloh, Stones River); USFS (Angelina?, Bienville, Davy Crockett?, Delta, Kisatchie, Sabine?, Sam Houston?, Shawnee, St. Francis); USFWS (Hatchie, Lower Hatchie?, Reelfoot?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.061, NATR.139, NATR.178, NATR.333.

Local Description Authors: M.J. Russo

Global Description Authors: M. Guetersloh, mod. M. Pyne and D. Faber-Langendoen

References: ALNHP unpubl. data, Allard 1990, Collingwood and Brush 1984, Cowardin et al. 1979, Diamond 1993, Eyre 1980, Foti 1994a, Foti 1994b, Foti et al. 1994, Hoagland 1997, Hoagland 2000, Homoya et al. 1988, Küchler 1964, LNHP 2009, Nelson 1985, Nelson 2010, Nordman 2004a, Nordman et al. 2011, Penfound 1948, Penfound 1953, Rice and Penfound 1956, Rosson 1995, Smith 1996a, Smith and Craig 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, Wharton et al. 1982, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M503. Central Hardwood Swamp Forest

G044. Central Interior-Appalachian Seepage Swamp

Interior Forested Acidic Seep

***Acer rubrum var. trilobum - Nyssa sylvatica / Rhododendron canescens - Viburnum nudum var. nudum / Woodwardia areolata* Seep Forest**

Carolina Red Maple - Blackgum / Mountain Azalea - Possumhaw / Netted Chainfern Seep Forest

Identifier: CEGL004425

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Swamp Forest (M503)
Group	Central Interior-Appalachian Seepage Swamp (G044)
Alliance	Ozark-Interior Red Maple - Blackgum Seepage Forest (A3359)
Association	Interior Forested Acidic Seep

ELEMENT CONCEPT

Global Summary: This forested acidic seep occurs at the base of steep to moderate slopes where water percolates out through Cretaceous or Pennsylvanian sands and gravels. Stands are known primarily from Crowley's Ridge of Arkansas and Missouri, the northern part of the Upper Coastal Plain of Kentucky and Tennessee, but it is also reported from Kentucky's Shawnee Hills and along the Natchez Trace Parkway in Alabama. Soils are deep, and often gravelly or sandy. Common or characteristic trees include *Acer rubrum, Betula nigra, Liquidambar styraciflua, Fagus grandifolia, Nyssa sylvatica*, and *Quercus pagoda*. Small trees and shrubs characteristic of the seeps include *Styrax americanus, Rhododendron canescens, Ilex opaca, Carpinus caroliniana, Photinia* spp. (= *Aronia* spp.), *Cornus foemina, Itea virginica, Viburnum nudum var. nudum*, and *Vaccinium* spp. (including *Vaccinium fuscatum*). The ground cover consists of herbaceous species such as *Osmunda cinnamomea, Osmunda regalis var. spectabilis, Woodwardia areolata, Thelypteris palustris var. pubescens, Carex* spp., *Juncus* spp., *Rhynchospora capitellata, Rhynchospora globularis, Saururus cernuus, Bartonia virginica*, and many others. Some Tennessee examples contain *Magnolia virginiana*, which is rare in that state. This vegetation occurs at the heads of small streams or on the margins of their floodplains at the upland / wetland interface. Examples from the Shawnee Hills of Kentucky (subsections 222Dc, 222Dg) are reported to be somewhat depauperate, lacking *Rhododendron canescens* and *Viburnum nudum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This red maple - blackgum forest was sampled at four locations in the park. Sites are flat to gently sloping alluvial terraces and seeps that may be intermittently to semipermanently flooded or saturate. Soils include well-drained loam and poorly to very poorly drained muck. The unvegetated surface is dominated by litter/duff with occasional wood, small rocks, bare soil, and standing water. Evidence of disturbance includes flooding and the presence of exotic plants.

Global Environment: This forested acidic seep occurs at the base of steep to moderate slopes where water percolates out through Cretaceous or Pennsylvanian sands and gravels. Stands are known primarily from Crowley's Ridge of Arkansas and Missouri, the northern part of the Upper Coastal Plain of Kentucky and Tennessee, but it is also reported from Kentucky's Shawnee Hills. Soils are deep, and often gravelly or sandy. This vegetation occurs at the heads of small streams or on the margins of their floodplains at the upland / wetland interface. Examples from the Shawnee Hills of Kentucky (subsections 222Dc, 222Dg) are reported to be somewhat depauperate. At Shiloh National Military Park (western Tennessee) this association occurs in a wet floodplain adjacent to a creek. Seepage from adjacent hillside maintains a moderately saturated condition, which is reflected in the flora.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this community is quite variable, ranging from relatively dense (70% cover) mature forests 35-50 m tall to sparse to moderate (30-60%) trees 15-35 m tall. *Acer rubrum* and *Nyssa sylvatica* dominate; additional species may include *Liquidambar styraciflua, Liriodendron tulipifera, Platanus occidentalis, Quercus* spp., and *Ulmus americana*. The sparse (20-30%) subcanopy (5-15 m) includes *Acer rubrum, Carpinus caroliniana, Fagus grandifolia*, and *Oxydendrum arboreum*. The very sparse (5-10%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers include *Carpinus caroliniana, Cornus foemina, Euonymus americanus, Fraxinus pennsylvanica, Ilex verticillata, Itea virginica*, and *Lindera benzoin*. The herbaceous layer (5-50%) may include *Boehmeria cylindrica, Carex* spp., *Chelone glabra, Lobelia cardinalis, Mitchella repens, Onoclea sensibilis, Osmunda cinnamomea, Polygonum* spp., and *Solidago* spp. Vines (5-10%) include *Decumaria barbara* and *Smilax rotundifolia*.

Global Vegetation: Common or characteristic trees in stands of this type include *Acer rubrum, Betula nigra, Liquidambar styraciflua, Fagus grandifolia, Nyssa sylvatica*, and *Quercus pagoda*. Small trees and shrubs characteristic of the seeps include *Styrax americanus, Rhododendron canescens, Ilex opaca, Carpinus caroliniana, Photinia* spp. (= *Aronia* spp.), *Cornus foemina, Itea virginica, Viburnum nudum var. nudum*, and *Vaccinium* spp. (including *Vaccinium fuscatum*). The ground cover consists of herbaceous species such as *Osmunda cinnamomea, Osmunda regalis var. spectabilis, Woodwardia areolata, Thelypteris palustris var. pubescens, Carex* spp., *Juncus* spp., *Rhynchospora capitellata, Rhynchospora globularis, Saururus cernuus, Bartonia virginica*, and many others. Some Tennessee examples contain *Magnolia virginiana*, which is rare in that state. Examples on Crowley's Ridge in

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Arkansas are dominated by *Acer rubrum, Liquidambar styraciflua*, and *Liriodendron tulipifera*. Common understory woody plants include *Alnus serrulata, Cornus foemina, Corylus americana*, and *Lindera benzoin*. The substrate is densely to sporadically covered with sphagnum mosses (e.g., *Sphagnum palustre, Sphagnum magellanicus*), ferns, sedges, and rushes (Vanderpool and Richards 1998). In Arkansas, *Liriodendron tulipifera, Spiraea tomentosa*, and *Chelone glabra* are only found on Crowley's Ridge. Examples from the Shawnee Hills of Kentucky (subsections 222Dc, 222Dg) are reported to be somewhat depauperate, lacking *Rhododendron canescens* and *Viburnum nudum*.

At Shiloh National Military Park (western Tennessee) the canopy was dominated by *Nyssa sylvatica* with *Liquidambar styraciflua, Liriodendron tulipifera*, and *Quercus pagoda* also important. *Quercus alba* also occurs in the canopy. The subcanopy is dominated by *Fagus grandifolia, Oxydendrum arboreum*, and *Carpinus caroliniana* with *Acer rubrum* and *Carya alba*. The tall shrubs had 20% total cover. In order of abundance, they were *Rhododendron canescens, Oxydendrum arboreum, Fagus grandifolia*, and *Vaccinium fuscatum*. Short shrubs were sparse. In order of abundance, they were *Quercus alba, Smilax rotundifolia, Decumaria barbara, Smilax glauca, Vitis rotundifolia, Sassafras albidum, Diospyros virginiana, Prunus serotina, Carya alba*, and the invasive exotic plants *Ligustrum sinense* and *Lonicera japonica*. The herbaceous layer was completely dominated by *Thelypteris noveboracensis*. Other common herbaceous plants were *Uvularia sessilifolia, Chasmanthium sessiliflorum, Athyrium filix-femina ssp. asplenioides, Polygonum virginianum, Woodwardia areolata, Osmunda regalis, Leersia virginica, Carex debilis, Osmunda cinnamomea*, and *Maianthemum racemosum*. Present only at trace amounts were *Arisaema triphyllum, Bartonia paniculata, Carex tribuloides, Carex lurida, Dichanthelium dichotomum var. dichotomum, Solidago rugosa, Boehmeria cylindrica, Platanthera clavellata, Lycopus rubellus*, and the invasive exotic grass *Microstegium vimineum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum*
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*, *Nyssa sylvatica*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Chelone glabra*
Herb (field)	Fern (Spore-bearing forb)	*Onoclea sensibilis*, *Osmunda cinnamomea*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* var. *trilobum*, *Nyssa sylvatica*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Rhododendron canescens*, *Viburnum nudum* var. *nudum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer rubrum*, *Boehmeria cylindrica*, *Lobelia cardinalis*, *Nyssa sylvatica*, *Onoclea sensibilis*, *Osmunda cinnamomea*
Global: *Acer rubrum* var. *trilobum*, *Nyssa sylvatica*, *Rhododendron canescens*, *Viburnum nudum* var. *nudum*, *Woodwardia areolata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Polygonum hydropiper* ()
Global: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (16-Dec-1999). This community is restricted in its geographic distribution and occurs in a very specific land type and environment. This vegetation occurs at the heads of small streams or on the margins of their floodplains at the interface between upland and wetland. As far as is known, it is limited to Crowley's Ridge of Arkansas and Missouri, the northern part of the Upper East Gulf Coastal Plain of Kentucky and Tennessee and the adjacent Shawnee Hills of Kentucky. These communities are very limited in extent and are threatened by siltation resulting from upslope timber removal. Adjacent upland development would alter the supply of groundwater and would impact the distinctive hydrology of this community.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This seep vegetation is distinct from the more Appalachian type, *Acer rubrum var. trilobum - Nyssa sylvatica / Osmunda cinnamomea - Carex intumescens / Sphagnum lescurii* Seep Forest (CEGL007443), which occurs on streamhead swales on broad ridges where a perched water table is present. These communities are very limited in extent and are threatened by siltation resulting from upslope timber removal.
Global Similar Associations:

- *Acer rubrum var. trilobum - Nyssa sylvatica / Osmunda cinnamomea - Carex intumescens / Sphagnum lescurii* Seep Forest (CEGL007443) a more Appalachian type.
- *Nyssa biflora - Liquidambar styraciflua / Magnolia virginiana / Hamamelis virginiana - Viburnum nudum* Swamp Forest (CEGL008477) from the southern part of the Upper East Gulf Coastal Plain, with more evergreen shrub dominance.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1) and Tennessee (3) in the vicinity of M305, M315, and M390.
Global Range: This forested acidic seep occurs in the southeastern United States. It is apparently restricted to Crowley's Ridge of Arkansas and Missouri, the Upper East Gulf Coastal Plain of Kentucky and Tennessee and the adjacent Shawnee Hills of Kentucky. It is also reported from along the Natchez Trace Parkway in Alabama.
Nations: US
States/Provinces: AL, AR, IL?, KY:S1, MO, TN
TNC Ecoregions: 42:C, 43:C, 44:C
USFS Ecoregions (1994/95): 222Ca:CC?, 222Cb:CCC, 222Ce:CCC, 222Cg:CCC, 222Dc:CCP, 222Dg:CCP, 222Eg:CCC, 222G:CC, 231Be:CCC, 234Ab:CCC
Federal Lands: NPS (Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.056, NATR.213, NATR.618, NATR.650.
Local Description Authors: M.J. Russo
Global Description Authors: mod. C.W. Nordman
References: Evans 1991, Evans et al. 2009, Funk 1975, Funk and Fuller 1978, Nelson 2005, Nordman et al. 2011, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderpool and Richards 1998, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G654. South-Central Flatwoods & Pond Forest

Willow Oak Bottomland Flatwoods Forest

***Quercus phellos* - *(Quercus lyrata) / Carex* spp. - *Leersia* spp. Pond Forest**
Willow Oak - (Overcup Oak) / Sedge species - Cutgrass species Pond Forest
Identifier: CEGL002102

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Central Hardwood Swamp Forest (M503)
Group	South-Central Flatwoods & Pond Forest (G654)
Alliance	Interior Oak Pond & Flatwoods (A3429)
Association	Willow Oak Bottomland Flatwoods Forest

ELEMENT CONCEPT

Global Summary: This willow oak flatwoods forest occurs in bottomland flatwoods environments of major rivers in the south-central United States. This type most often occurs on first bottoms and terrace flats with poorly drained, heavy silty clay soils that are flooded with shallow water each winter and spring. The relatively high clay content in these soils produces a perched water table that contributes to prolonged wet conditions and equally severe summer dry periods when soils become hard and develop excessive cracks. This restricted soil permeability is characteristic of flatwoods, which contain species typical of drier upland sites on slight rises and shallow ephemeral seasonal ponds in depressions. The perched water table situation can also occur in distinctly upland situations as well as in floodplains. Dominant trees in this community include *Quercus phellos, Celtis laevigata, Fraxinus pennsylvanica*, and *Ulmus americana*. *Quercus lyrata* and *Quercus texana* are also frequently encountered. Unfavorable soil conditions often cause the trees to be stunted. The understory and shrub layers are poorly developed (less than 50% cover) consisting primarily of *Acer rubrum, Ilex decidua*, and *Forestiera acuminata*. The herbaceous stratum is dominated by *Carex* spp., *Leersia* spp., and *Cinna arundinacea*. Herbaceous density is generally low but fluctuates with canopy openness. Elevated rises exhibit plants common of dry and dry-mesic soils such as *Porteranthus stipulatus* and *Pycnanthemum tenuifolium*, while wet and wet-mesic soils found in shallow ephemeral or seasonal ponds in depressions are dominated by *Carex* spp. *Symphyotrichum lanceolatum var. lanceolatum (= Aster simplex)* is often encountered in flatwoods, as are *Toxicodendron radicans* and *Campsis radicans*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This willow oak flatwoods forest was sampled at four locations in the park. Sites are temporarily to intermittently flooded bottomlands. Soils include well-drained silt, somewhat poorly drained sandy loam, and poorly drained silty clay. The unvegetated surface is dominated by litter/duff with some wood. No evidence of disturbance was reported.
Global Environment: This willow oak forest occurs in bottomland flatwoods environments of major rivers in the south-central United States. This type most often occurs on first bottoms and terrace flats with poorly drained, heavy silty clay soils that are flooded with shallow water each winter and spring. The relatively high clay content (sometimes forming a fragipan) in these soils produces a perched water table that contributes to prolonged wet conditions and equally severe summer dry periods when soils become hard and develop excessive cracks. This restricted soil permeability is characteristic of flatwoods, which contain species typical of drier upland sites on slight rises and shallow ephemeral seasonal ponds in depressions. Some examples (e.g., in Kentucky) are not in bottomlands but are in distinctly upland positions, but otherwise fit the description (M. Evans pers. comm.).

Soils include dominantly level or nearly level soils that formed in water-laid clayey or loamy sediments on the floodplains of the Mississippi and Ohio rivers. Although flatwoods are best developed on soils with massive, brittle fragipans, they are also well represented on relatively impermeable clay soils. In the Midwest, fragipans (hardpan) are usually developed from glacial till of Illinoisan age (White and Madany 1978). This glacial material forms a loamy, brittle subsurface horizon that is low in porosity and organic matter, low or moderate in clay, but high in silt or very fine sand. A fragipan appears cemented and restricts root growth and water flow. Soils high in clay also exhibit low porosity and are slowly to very slowly permeable. Clays also display an affinity for water, which makes it unavailable to plants when soils begin to dry. Clay soils have a high shrink-swell capacity and crack excessively as they dry. During the rainy season, water slowly permeates these soils and ponds in depressions. The soil dries rapidly in the summer or during drought, and herbaceous vegetation wilts in response to this stress. The penetration of tree roots in the subsoil and burrowing by animals is limited by the hardpan (Nelson 1985, White and Madany 1978). Order: Entisol, Mollisol; Subgroup: Typic Fluvaquents, Vertic Haplaquent, Fluvaquentic Halplaquolls; Family: fine-silty, montmorillonitic-mixed, non-acidic, mesic, udic; Series (IL): Belknap, Bonnie, Cape. Bedrock is deeply buried Paleozoic sandstone or stratified Cenozoic marine deposits.

Ponding in shallow depressions encourages the growth of hydrophytic vegetation, while droughty conditions encourage the growth of vegetation typical of drier uplands on slight ridges. Shallow flooding is common, occurring seasonally (winter and spring) for short durations. Tree species in this type may not tolerate deep flooding (Robertson et al. 1984).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-90% cover) canopy, 20-35 m tall, is dominated by *Quercus phellos*; *Quercus lyrata, Quercus nigra*, or *Quercus texana* may codominate. Dominants in the sparse to moderate (30-70%) subcanopy (10-20 m) include *Acer rubrum, Fraxinus pennsylvanica, Platanus occidentalis, Quercus lyrata, Quercus michauxii, Quercus texana*, and *Ulmus americana*. The sparse (5-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species. The herbaceous layer (10-30%) is dominated by *Arundinaria gigantea* or *Saururus cernuus*. Vines (10-30%) include *Brunnichia ovata, Campsis radicans, Smilax rotundifolia*, and *Toxicodendron radicans*.

Global Vegetation: This community is dominated by broad-leaved deciduous trees and has sparse to well-developed understory, shrub, and herbaceous strata. Dominant trees include *Quercus phellos, Celtis laevigata, Fraxinus pennsylvanica*, and *Ulmus americana*. In addition, *Quercus lyrata* and *Quercus texana* also frequently occur. Trees in this forest are usually of medium height (20-30 m) (Nelson 1985), and unfavorable soil conditions often cause them to be stunted. The understory and shrub layers are poorly developed (less than 50% cover) consisting primarily of *Acer rubrum, Ilex decidua*, and *Forestiera acuminata*. The herbaceous stratum is dominated by *Carex* spp., *Leersia oryzoides*, and *Cinna arundinacea*. Herbaceous density is generally low but fluctuates with canopy openness. Elevated rises exhibit plants common of dry and dry-mesic soils such as *Porteranthus stipulatus* and *Pycnanthemum tenuifolium*, while wet and wet-mesic soils found in shallow ephemeral or seasonal ponds in depressions are dominated by sedges. *Symphyotrichum lanceolatum (= Aster lanceolatus)* is a ubiquitous species often encountered in flatwoods, as are the vines *Toxicodendron radicans* and *Campsis radicans* (Voigt and Mohlenbrock 1964, TNC 1995a).

Considerable variability in species composition and physiognomy is encountered within and among occurrences of this natural community throughout its range. This variability is a result of hydrologic influences (duration, depth, and timing of flooding), soil physical properties (the presence of clay or a fragipan), and the amount of light penetrating the tree canopy. Willow oak is diagnostic and the dominant canopy species in all occurrences of this community.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus lyrata*, *Quercus nigra*, *Quercus phellos*, *Quercus texana*
Herb (field)	Flowering forb	*Saururus cernuus*
Herb (field)	Graminoid	*Arundinaria gigantea*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus phellos*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*, *Ulmus americana*
Shrub/sapling (tall & short)	Liana	*Campsis radicans*, *Toxicodendron radicans*
Tall shrub/sapling	Broad-leaved deciduous tree	*Ilex decidua*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Crataegus viridis*, *Forestiera acuminata*
Herb (field)	Graminoid	*Carex hyalinolepis*, *Carex muskingumensis*, *Carex typhina*, *Cinna arundinacea*, *Leersia oryzoides*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus lyrata*, *Quercus phellos*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4Q (29-Mar-1999). Rank cannot be assigned until SCS completes review of type.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: Large, mature examples of this are reported from Kentucky (M. Evans pers. comm. 2003). This community is most prevalent in the poorly drained bottomlands of the Mississippi River and its major tributaries. It can be found in extreme southern Illinois and southeastern Missouri, from where it was initially described; however, in Illinois, *Quercus phellos* is reported only from Massac County (Mohlenbrock and Voigt 1959), and in Missouri this type could be lumped with *Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes* spp. Wet Forest (CEGL002101) (M. Leahy pers. comm. 1999). Further field research is needed to document this community outside the Mississippi River Alluvial Plain. This type or related vegetation has been reported from and attributed to the Interior Low Plateau of Kentucky (J. Campbell pers. comm. 1999), as well as Louisiana (L. Smith pers. comm. 1999), and southern Arkansas (D. Zollner pers. comm. 1999). More information is needed on these occurrences. Its proposed occurrence in Mississippi and Tennessee is speculative.

This type may need to be split as more information becomes available. Similar *Quercus phellos* flatwoods occur in southern Kentucky's karst region (Pennyroyal Plateau) and are wetter than other Kentucky flatwoods types (J. Campbell pers. comm. 1999). Given that the alliance concept includes communities primarily found in upland depressions, the placement of this association here is

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

problematic and needs to be assessed. *Quercus phellos* is the indicator species and should be the dominant contributor to the forest canopy. Another unique diagnostic attribute of this community is the presence of dry and dry-mesic herbaceous species on slight rises and wet or wet-mesic herbaceous plants in shallow ephemeral pools.

Global Similar Associations:

- *Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes* spp. Wet Forest (CEGL002101) is perhaps similar.
- *Quercus palustris - Quercus bicolor - (Liquidambar styraciflua)* Swamp Forest (CEGL002432)
- *Quercus palustris - Quercus bicolor - Acer rubrum* Flatwoods Forest (CEGL005037)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi between M200 and M205, M380 and M385, and in the vicinity of M165 and M395.

Global Range: This willow oak flatwoods forest occurs in the south-central United States, ranging from extreme southern Illinois and southeast Missouri south to Arkansas, Louisiana, and perhaps elsewhere.

Nations: US

States/Provinces: AL?, AR, IL, KY, MO?, MS, TN

TNC Ecoregions: 39:P, 42:C, 43:C, 44:C

USFS Ecoregions (1994/95): 221:C, 222C:CP, 231A:CP, 231Bd:CCC, 231Bg:CCC, 231Ej:CCC, 231Ga:CCC, 231Gb:CC?, 232B:PP, 234Ac:CCC, 234Ad:CCC

Federal Lands: NPS (Natchez Trace); USFS (Delta?, Holly Springs?, St. Francis?, Tombigbee?); USFWS (Little River)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.203, NATR.227, NATR.260, NATR.267.

Local Description Authors: M.J. Russo

Global Description Authors: M. Guetersloh, mod. D. Faber-Langendoen

References: Campbell pers. comm., Cowardin et al. 1979, Evans 1991, Evans et al. 2009, Evans, M. pers. comm., Eyre 1980, Foti et al. 1994, Küchler 1964, Mohlenbrock 1959, Mohlenbrock and Voigt 1959, Nelson 1985, Nelson 2010, Nordman et al. 2011, Robertson et al. 1984, Smith 1996a, Smith, L. pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, White and Madany 1978, Yeager 1949, Zollner pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M302. Eastern North American Ruderal Flooded & Swamp Forest

G552. Eastern North American Ruderal Flooded & Swamp Forest

Ruderal Box-elder Floodplain Forest

***Acer negundo* Ruderal Floodplain Forest**
Box-elder Ruderal Floodplain Forest
Identifier: CEGL005033

USNVC CLASSIFICATION

Division	Eastern North American-Great Plains Flooded & Swamp Forest (1.B.3.Na)
Macrogroup	Eastern North American Ruderal Flooded & Swamp Forest (M302)
Group	Eastern North American Ruderal Flooded & Swamp Forest (G552)
Alliance	Box-elder - Mixed Hardwoods / Garlic Mustard Ruderal Floodplain Forest (A4099)
Association	Ruderal Box-elder Floodplain Forest

ELEMENT CONCEPT

Global Summary: This semi-open to closed-canopy ruderal forest is found on disturbed sites in floodplains in the southern, eastern, and midwestern United States. Stands occur on large rivers in the active floodplain and on sandbars, and may form farther from the riverfront following disturbance. Occurrences are mostly on higher floodplain terraces with less rocky soils which were used for agriculture or habitation. They are typically temporarily flooded in the spring. These ruderal forests are dominated by *Acer negundo*. Other characteristic species include *Platanus occidentalis, Celtis laevigata, Acer rubrum, Liriodendron tulipifera, Robinia pseudoacacia, Liquidambar styraciflua, Acer saccharinum, Ulmus alata, Ulmus rubra, Carya cordiformis, Fraxinus pennsylvanica, Juglans nigra, Carpinus caroliniana, Morus rubra*, and *Populus deltoides*. The shrub and herb layers range from sparse to relatively lush, and the vine component often is heavy. The herb layer consists of a mixture of weedy exotics and native floodplain species, including *Rhamnus cathartica* and various invasive *Lonicera* species.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This box-elder floodplain forest was sampled at six locations in the park. Sites are flat to gently sloping, temporarily to intermittently flooded alluvial terraces and floodplains. Soils are somewhat poorly drained sandy clay and silty clay. The unvegetated surface is dominated by litter/duff with occasional wood and bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.
Global Environment: Stands occur on disturbed sites in large rivers in the active floodplain and on sandbars, and may form farther from the riverfront following disturbance. Occurrences are mostly on higher floodplain terraces with less rocky soils which were used for agriculture or habitation. They are typically temporarily flooded in the spring and have sandy soils. In Kentucky, these forests may also occur in old fields within floodplains.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this community is quite variable, ranging from relatively sparse (40% cover) mature forests 35-50 m tall to dense (70%) stunted forests 5-10 m tall. Midstories are also variable but typically 10-15m tall with moderate cover (50-60%), when present. *Acer negundo* is the clear dominant; additional tree species at much lower occurrence may include *Acer saccharum, Celtis laevigata, Celtis occidentalis, Diospyros virginiana, Juglans nigra, Liquidambar styraciflua, Platanus occidentalis*, and/or *Ulmus americana*. The same is true for the sparse to moderate (10-60%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers, when present. Shrubs may include *Acer negundo, Arundinaria gigantea, Celtis laevigata, Ligustrum sinense* (invasive exotic), *Sambucus canadensis*, and *Symphoricarpos orbiculatus*. Depending on the density of the canopy layers, the herbaceous layer may be relatively sparse to nearly entire (30-100%). Dominants vary from site to site but include from these examples *Acer negundo* seedlings, *Impatiens* sp., *Microstegium vimineum* (invasive exotic), *Rudbeckia laciniata, Saururus cernuus*, or *Verbesina alternifolia*. Vines (5-10%) include *Bignonia capreolata, Parthenocissus quinquefolia, Smilax* spp., and *Vitis rotundifolia*. In addition, this community supports Tennessee state-rare *Hasteola suaveolens*.
Global Vegetation: These ruderal forests (sometimes woodlands) are dominated by *Acer negundo*. Other characteristic species include *Platanus occidentalis, Celtis laevigata, Acer rubrum, Liriodendron tulipifera, Robinia pseudoacacia, Liquidambar styraciflua, Acer saccharinum, Ulmus alata, Ulmus rubra, Carya cordiformis, Fraxinus pennsylvanica, Juglans nigra, Carpinus caroliniana, Morus rubra*, and *Populus deltoides*. The shrub and herb layers range from sparse to relatively lush, and the vine component often is heavy. *Lindera benzoin* may be dominant in the shrub layer. The herb layer consists of a mixture of weedy exotics and native floodplain species, including *Ageratina altissima, Alliaria petiolata, Boehmeria cylindrica, Carex grayi, Cryptotaenia canadensis, Glechoma hederacea, Lysimachia nummularia, Mertensia virginica, Polygonum virginianum, Prunella vulgaris, Urtica dioica ssp. dioica*, and *Verbesina alternifolia*. The range, dynamics, and variability of this type are complicated by the "weedy" nature of *Acer negundo*, e.g., in Kentucky, *Acer negundo* may be dominant in old fields, with *Dichanthelium clandestinum* and *Carex* spp. in the ground layer. Elsewhere in the Midwest, logged and grazed stands of *Fraxinus pennsylvanica* and *Ulmus americana* may be dominated by *Acer negundo*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer negundo*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer negundo*, *Celtis laevigata*, *Symphoricarpos orbiculatus*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*
Shrub/sapling (tall & short)	Graminoid	*Arundinaria gigantea*
Herb (field)	Broad-leaved deciduous tree	*Acer negundo*
Herb (field)	Flowering forb	*Saururus cernuus*, *Verbesina alternifolia*
Herb (field)	Graminoid	*Microstegium vimineum*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer negundo*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer negundo*
Global: *Acer negundo*, *Acer saccharinum*, *Ageratina altissima*, *Boehmeria cylindrica*, *Carex grayi*, *Lindera benzoin*, *Liquidambar styraciflua*, *Mertensia virginica*, *Platanus occidentalis*, *Prunella vulgaris*, *Robinia pseudoacacia*, *Ulmus americana*, *Verbesina alternifolia*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Hasteola suaveolens* (G4, TN state-rare); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Polygonum caespitosum* ()
Global: Invasive/Exotic Plants: *Alliaria petiolata* (High/Medium), *Glechoma hederacea* (Low), *Lysimachia nummularia* (Medium/Low), *Urtica dioica* ssp. *dioica* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (28-Mar-2014). As currently defined, this is a broad-ranging ruderal community type.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: The range, dynamics, and variability of this type is complicated by the "weedy" nature of *Acer negundo*. For example, disturbed stands in former *Fraxinus pennsylvanica - Ulmus americana - Celtis (occidentalis, laevigata)* Temporarily Flooded Forest Alliance (A.286) often become dominated by *Acer negundo*. And in the upper Midwest *Acer negundo*-dominated stands are treated as part of *Fraxinus pennsylvanica - (Ulmus americana) / Symphoricarpos occidentalis* Floodplain Forest (CEGL002088). Thus, some consistency is needed in the application of this type across its range. In Arkansas, these forests can be pure *Acer negundo* or have *Acer rubrum* and *Platanus occidentalis* as associates (T. Foti pers. comm. 1999). Composition is variable. Where *Acer negundo* occurs in natural habitats in the Southeast, it should be placed in *Acer negundo - (Platanus occidentalis, Populus deltoides)* Floodplain Forest (CEGL004690), e.g., along the Arkansas River in Arkansas (D. Zollner pers. comm. 1999). In Missouri, natural stands would probably be combined with *Betula nigra - Platanus occidentalis* Floodplain Forest (CEGL002086) (M. Leahy pers. comm. 1999). In Kentucky, this may be found at the Licking River impoundment (Cave Run Lake).
Global Similar Associations:
- *Acer negundo - (Platanus occidentalis, Populus deltoides)* Floodplain Forest (CEGL004690)
- *Betula nigra - Platanus occidentalis* Floodplain Forest (CEGL002086)
- *Fraxinus nigra - Acer saccharinum* Upper Great Lakes Floodplain Forest (CEGL005488)
- *Fraxinus pennsylvanica - (Ulmus americana) / Symphoricarpos occidentalis* Floodplain Forest (CEGL002088)
- *Fraxinus pennsylvanica - Ulmus americana - (Acer negundo, Tilia americana)* Great Plains Floodplain Forest (CEGL005400)
- *Fraxinus pennsylvanica - Ulmus* spp. - *Celtis occidentalis* Floodplain Forest (CEGL002014)
- *Platanus occidentalis - Acer saccharinum - Juglans nigra - Ulmus rubra* Floodplain Forest (CEGL007334)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Colbert County, Alabama (1), Claiborne, Hinds, and Lee Counties, Mississippi (3) and Lewis County, Tennessee (1).

Global Range: This *Acer negundo* ruderal floodplain forest is found sporadically on floodplains in the southern, eastern, and midwestern United States, ranging from New York and New Jersey west to Iowa (and possibly southeastern South Dakota), south to Louisiana and possibly Texas, and east to Georgia. It occurs in the Piedmont region in Pennsylvania and in the Coastal Plain and Piedmont regions in New Jersey and Delaware.

Nations: CA?, US

States/Provinces: AL, AR, DC, DE:S3, GA, IA, KY, LA, MD, MN, MO, MS, NJ, NY, OK, PA, QC?, SC, SD?, TN, TX?, VA, WV

TNC Ecoregions: 31:?, 32:P, 36:P, 38:C, 39:C, 40:C, 41:P, 42:C, 43:C, 44:C, 50:C, 53:C, 56:?, 57:?, 58:?, 59:C, 61:C, 62:C

USFS Ecoregions (1994/95): 221Bc:CCC, 221Ha:CC?, 221Hc:CC?, 221Hd:CC?, 221He:CC?, 221Ja:CP?, 221Jb:CP?, 221Jc:CP?, 222An:CCC, 222Ca:CC?, 222Cb:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CCC, 222Ch:CC?, 222Ea:CCP, 222Eb:CCP, 222Ec:CCP, 222Ed:CCP, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222En:CCP, 222Eo:CCC, 222Fa:CP?, 222Fb:CP?, 222Fc:CP?, 222Fd:CP?, 222Ff:CP?, 231Ba:CCC, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCC, 231Bi:CCC, 231Bj:CCP, 231Bk:CCP, 231Bl:CCP, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Db:CCP, 231Dc:CCP, 231Dd:CCP, 231De:CCP, 231Ea:CC?, 231Eb:CCP, 231Ec:CC?, 231Ed:CCP, 231Ee:CCP, 231Ef:CCP, 231Eg:CCP, 231Eh:CCP, 231Ei:CCP, 231Ej:CCP, 231Ek:CCP, 231El:CCP, 231Em:CCP, 231En:CCP, 231Fa:C??, 231Fb:C??, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Ac:CCC, 232Ad:CC?, 232Bb:CCC, 232Bd:CCC, 234Aa:CCC, 234Ab:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, M221Be:CCC, M221Cb:CCC

Federal Lands: NPS (Antietam, Bluestone, Buffalo River, C&O Canal, Chickamauga-Chattanooga, George Washington Parkway, Harpers Ferry, Manassas, Mississippi, Monocacy, Natchez Trace, National Capital-East, New River Gorge, Ozark Riverways, Saratoga, Shiloh, Vicksburg); USFS (Daniel Boone, St. Francis); USFWS (Little River, National Conservation Training Center)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.033, NATR.045, NATR.343, NATR.451, NATR.585, NATR.655.

Local Description Authors: M.J. Russo

Global Description Authors: E. Largay and S.C. Gawler, mod. D. Faber-Langendoen

References: Blair 1938, CDPNQ unpubl. data, Campbell pers. comm., Chastain et al. 2006, Coxe 2009, Edinger et al. 2002, Edinger et al. 2007, Evans 1991, Evans et al. 2009, Fleming et al. 2001, Foti pers. comm., Harrison 2004, Harrison 2011, INAI n.d., LNHP 2009, Lea 2004, Lea et al. 2013, Leahy pers. comm., NRCS 2004a, Nigh et al. 2000, Nordman et al. 2011, Patterson and DeSelm 1989, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007, Vanderhorst et al. 2008, WVNHP unpubl. data b, Zollner pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

1.B.3.Nb. Southeastern North American Flooded & Swamp Forest

M161. Pond-cypress Basin Swamp

G036. Pond-cypress Basin Swamp

East Gulf Coastal Plain Bald-cypress Pondshore

***Taxodium distichum* East Gulf Coastal Plain Pondshore Swamp Woodland**
Bald-cypress East Gulf Coastal Plain Pondshore Swamp Woodland
Identifier: CEGL004046

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Pond-cypress Basin Swamp (M161)
Group	Pond-cypress Basin Swamp (G036)
Alliance	Lakeshore Cypress Woodland (A0652)
Association	East Gulf Coastal Plain Bald-cypress Pondshore

ELEMENT CONCEPT

Global Summary: This association represents *Taxodium distichum*-dominated pondshores of the Gulf Coastal Plain east of the Mississippi River. These ponds and lakes may be of a variety of natural origins or of "unnatural" origin (e.g., millponds). Stands on the Conecuh National Forest contain *Taxodium distichum* and few other taxa.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This bald-cypress woodland was sampled twice in the park. Sites are semipermanently flooded impounded ponds with very poorly drained muck or silty clay soil. The unvegetated surface is dominated by standing water (up to 100%) with very little litter/duff and wood. These are man-made ponds; other evidence of disturbance includes the presence of exotic plants.
Global Environment: Examples on the Conecuh National Forest are isolated ponds found in a predominantly mesic to dry-mesic *Pinus palustris*-dominated upland landscape. Some examples could be "millponds" created during the first half of the nineteenth century. The ponds themselves retain water throughout the year.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse (30-40% cover) canopy, 15-20 m tall, is dominated exclusively by *Taxodium distichum*, while the moderate (40-60%) subcanopy (10-15 m) may also include *Liquidambar styraciflua, Pinus taeda*, and *Quercus nigra*. Shrubs and herbs are sparse; shrubs include *Ilex decidua* and *Quercus nigra*. *Boehmeria cylindrica* and *Juncus effusus* are common herbs.
Global Vegetation: Stands on the Conecuh National Forest contain *Taxodium distichum* and few other taxa.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Taxodium distichum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ilex decidua*, *Quercus nigra*
Herb (field)	Flowering forb	*Boehmeria cylindrica*
Herb (field)	Graminoid	*Juncus effusus*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Taxodium distichum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Taxodium distichum*
Global: *Taxodium distichum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (3-Apr-2003). This pondshore association is restricted to isolated seasonal depression ponds found in the East Gulf Coastal Plain. This vegetation occurs as scattered wetland inclusions in predominantly mesic to dry-mesic uplands, which are typically subjected to intensive forest management practices. Because occurrences are usually small in area (<0.5 ha), they are often overlooked as a distinct community. Except those found on U.S. Forest Service lands, many high-quality examples of this community have been drained or impacted through forest type conversion and/or alteration of the hydrological regimes. This can occur from road construction, seismic surveying, well-drilling, increased windthrow and microclimate modification caused by intensive silvicultural practices on adjacent uplands, herbicide use, and vegetation damage by feral hogs.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: Noted on the Conecuh National Forest in a series of upland ponds (M. Pyne pers. obs. 1998).
Global Similar Associations:

- *Taxodium distichum / Lemna minor* Floodplain Forest (CEGL002420) a semipermanently flooded forest.
- *Taxodium distichum* West Gulf Coastal Plain Lakeshore Swamp Woodland (CEGL008497) of the East Gulf Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi in the vicinity of M65.
Global Range: This association occurs in the East Gulf Coastal Plain of southern Alabama and may be found in southern Mississippi and/or southwestern Georgia.
Nations: US
States/Provinces: AL, FL?, GA?, MS
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Bi:CCC, 232Be:CC?, 232Bg:CCP, 232Bh:CC?, 232Bi:CCP, 232Bj:CCC, 232Cc:CP?
Federal Lands: NPS (Natchez Trace); USFS (Apalachicola?, Conecuh, Holly Springs)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.176, NATR.544.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne pers. comm., Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M310. Southeastern North American Ruderal Flooded & Swamp Forest

G762. Southeastern Exotic Ruderal Flooded & Swamp Forest

Ruderal Chinese Tallow Wet Forest

***Triadica sebifera* Ruderal Wet Forest**
Chinese Tallow Ruderal Wet Forest
Identifier: CEGL007412

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southeastern North American Ruderal Flooded & Swamp Forest (M310)
Group	Southeastern Exotic Ruderal Flooded & Swamp Forest (G762)
Alliance	Southern Woody Exotic Flooded & Swamp Forest (A3339)
Association	Ruderal Chinese Tallow Wet Forest

ELEMENT CONCEPT

Global Summary: This wetland forest type is broadly defined to cover a variety of sites strongly dominated by the exotic tree *Triadica sebifera (= Sapium sebiferum)* (Euphorbiaceae). Other wetland trees may be present, including *Acer rubrum var. drummondii, Salix nigra*, and *Salix caroliniana*. Various wetland grasses, sedges, and forbs are present.

VEGETATION DESCRIPTION

Global Vegetation: Stands are strongly dominated by the exotic tree *Triadica sebifera (= Sapium sebiferum)* (Euphorbiaceae). Other wetland trees may be present including *Acer rubrum var. drummondii, Salix nigra*, and *Salix caroliniana*. Various wetland grasses, sedges, and forbs are present.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Triadica sebifera*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Triadica sebifera*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Triadica sebifera*
Global: *Triadica sebifera*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Triadica sebifera* (High)
Global: Invasive/Exotic Plants: *Triadica sebifera* (High)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (22-Nov-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong

ELEMENT DISTRIBUTION

Global Range: This association is found in the southeastern coastal plains of the United States, from South Carolina to Texas. It has been documented from the states of Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.
Nations: US
States/Provinces: AL, FL, GA, LA, MS, SC, TX
TNC Ecoregions: 31:C, 40:C, 41:P, 53:C, 56:C
USFS Ecoregions (1994/95): 231E:CC, 231Fa:CCC, 231Fb:CCC, 232Ce:CCC, 232Dc:CCC, 232Ea:CCC, 232Eb:CCC, 255Da:CCC, 255Db:CCP, 255Dc:CCC
Federal Lands: NPS (Big Thicket, Jean Lafitte, Natchez Trace, Timucuan?); USFWS (Anahuac, Bon Secour, Brazoria)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: A.S. Weakley
References: Nijjer et al. 2007, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G553. Southeastern Native Ruderal Flooded & Swamp Forest

Ruderal Sweetgum Wet Forest

***Liquidambar styraciflua - (Liriodendron tulipifera)* Ruderal Wet Forest**
Sweetgum - (Tuliptree) Ruderal Wet Forest
Identifier: CEGL007330

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southeastern North American Ruderal Flooded & Swamp Forest (M310)
Group	Southeastern Native Ruderal Flooded & Swamp Forest (G553)
Alliance	Southern Deciduous Ruderal Wetland Forest (A3343)
Association	Ruderal Sweetgum Wet Forest

ELEMENT CONCEPT

Global Summary: This widespread association of the southeastern United States is dominated by *Liquidambar styraciflua*, but can be dominated by *Liriodendron tulipifera* in some cases, and occurs on heavily disturbed sites such as wetland old fields that have been recovering for the past 10-60 years. This is a successional community that develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas. As this community ages, it often begins to approach the composition of more natural *Liquidambar styraciflua - Liriodendron tulipifera / Lindera benzoin / Arisaema triphyllum* Floodplain Forest (CEGL004418). This association is known from the Piedmont, Interior Low Plateau, Inner South Atlantic Coastal Plain, Upper East Gulf Coastal Plain, and possibly other provinces. *Acer rubrum* may be a major component of the canopy and subcanopy and may even partially dominate in some instances. In more mature examples, other canopy/subcanopy species which may occur to a lesser extent and often as scattered emergents are *Quercus alba, Quercus phellos, Quercus nigra, Nyssa sylvatica*, and *Cornus florida*. Stands in the Inner Coastal Plain of South Carolina typically contain *Persea palustris* and *Magnolia virginiana*. Some stands, as on the Chattahoochee River in Georgia, may contain *Acer negundo* as a codominant canopy/subcanopy component. The shrub layer can contain *Carpinus caroliniana, Itea virginica, Vitis rotundifolia, Parthenocissus quinquefolia, Smilax rotundifolia*, and/or *Rubus* sp., in addition to canopy/subcanopy species. *Lonicera japonica* is often abundant in the understory. On disturbed sites, the shrub layer is often dominated by *Ligustrum sinense*, and the ground layer is typically solid *Microstegium vimineum* or a tangle of *Smilax rotundifolia* and *Rubus* sp. The herbaceous layer may include *Chasmanthium laxum, Carex* spp., *Boehmeria cylindrica*, and *Botrychium biternatum*, sometimes growing on hummocks in standing water.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional sweetgum - tuliptree floodplain forest was sampled at 26 locations in the park. Sites are flat bottomlands that may be saturated, intermittently or temporarily flooded. Soils range from well-drained to poorly drained, and everything in between, and include muck, sandy clay, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff (up to 100%) with some wood and bare soil. Evidence of disturbance includes the presence (often heavy) of exotic plants.

Global Environment: This association occurs on disturbed sites such as wetland old fields. This is a successional community that develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas. These are productive stream terraces subject to occasional flooding (Jones et al. 1981b).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: Structure varies depending on the age of the stand. The sparse to very dense (40-90% cover) canopy, 5-35 m tall, is dominated by *Liquidambar styraciflua*, often with *Liriodendron tulipifera* as codominant. Additional trees may include *Fraxinus pennsylvanica* and *Quercus nigra*. The very sparse to very dense (5-90%) subcanopy (5-20 m) is made up of canopy dominants along with *Acer rubrum, Carpinus caroliniana*, and *Ulmus americana*. The very sparse to dense (5-70%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Alnus serrulata, Cornus* spp., *Fraxinus pennsylvanica, Ligustrum sinense* (exotic), and *Lindera benzoin*. Dominants in the herbaceous layer (5-70%) can include *Amphicarpaea bracteata, Arundinaria gigantea, Athyrium filix-femina ssp. asplenioides, Dennstaedtia punctilobula, Equisetum hyemale var. affine, Helianthus decapetalus, Juncus effusus, Onoclea sensibilis, Solidago rugosa ssp. aspera, Symphyotrichum lateriflorum*, and exotics *Glechoma hederacea* and *Microstegium vimineum*. Vines (up to 30%) include *Berchemia scandens, Campsis radicans, Decumaria barbara, Lonicera japonica* (exotic), *Parthenocissus quinquefolia, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. This community also supports Mississippi state-rare *Spiranthes ovalis*.

Global Vegetation: The canopy of this association is dominated by *Liquidambar styraciflua* but can be dominated by *Liriodendron tulipifera* in some cases. *Acer rubrum* may be a major component of the canopy and subcanopy and may even partially dominate in some instances (TNC 1998a). In more mature examples, other canopy/subcanopy species which may occur to a lesser extent and often as scattered emergents are *Quercus alba, Quercus phellos, Quercus nigra, Fraxinus americana, Carya* spp., *Nyssa sylvatica*, and *Cornus florida*. Stands in the Inner Coastal Plain of South Carolina typically contain *Persea palustris* and *Magnolia virginiana* (Jones et al. 1981b). The shrub layer contains *Carpinus caroliniana, Itea virginica, Vitis rotundifolia, Parthenocissus quinquefolia, Smilax rotundifolia*, and *Rubus* sp., in addition to canopy/subcanopy species. *Lonicera japonica* is often abundant in the understory. On

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

disturbed sites, the shrub layer is often dominated by *Ligustrum sinense*, and the ground layer is typically solid *Microstegium vimineum* or a tangle of *Smilax rotundifolia* and *Rubus* sp. The herbaceous layer may include *Chasmanthium laxum, Carex* spp., *Boehmeria cylindrica*, and *Botrychium biternatum*, sometimes growing on hummocks in standing water. Various *Carex* species may be present.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

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

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Boehmeria cylindrica*, *Liquidambar styraciflua*, *Liriodendron tulipifera*
Global: *Boehmeria cylindrica*, *Smilax rotundifolia*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Spiranthes ovalis* (G5?, MS state-rare); **Invasive/Exotic Plants**: *Dioscorea oppositifolia* (High/Medium), *Glechoma hederacea* (Low), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Other Plants: *Liriodendron tulipifera* (G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (8-Aug-2000). This is a successional community which develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: At Arnold Air Force Base (Tennessee), this community is found primarily in the vicinity of Hunt Creek, Heron Pond, and Sinking Pond in areas that have experienced logging. Prior to logging, these areas would probably have had canopies dominated by *Quercus phellos* or *Quercus alba*, with the overall community structure being that of *Quercus alba - Carya ovata - Liriodendron tulipifera - (Quercus phellos) / Cornus florida* Forest (CEGL007709) or possibly *Quercus phellos - Quercus alba / Vaccinium fuscatum - (Viburnum nudum) / Carex barrattii* Wet Forest (CEGL007364). The sweet gum-red maple-red bay community of Jones et al. (1981b) (2 stands sampled) is included here.
Global Similar Associations:

- *Liquidambar styraciflua - Liriodendron tulipifera / Lindera benzoin / Arisaema triphyllum* Floodplain Forest (CEGL004418) may be difficult to distinguish from older versions of this community; trees are older, uneven-aged, and the herbaceous layer more diverse in this association (CEGL004418).
- *Liriodendron tulipifera - Quercus alba - (Liquidambar styraciflua) / Ilex opaca / Polystichum acrostichoides* Piedmont Floodplain Forest (CEGL004900)
- *Quercus alba - Carya ovata - Liriodendron tulipifera - (Quercus phellos) / Cornus florida* Forest (CEGL007709)
- *Quercus phellos - Quercus alba / Vaccinium fuscatum - (Viburnum nudum) / Carex barrattii* Wet Forest (CEGL007364)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2), Mississippi (17) and Tennessee (7) between M10 and M15, M90 and M95, M100 and M105, M145 and M150, M185 and M190, M235 and M240, M360 and M365, M375 and M380, M380 and M385, M390 and M395, and in the vicinity of M145, M160, M175, M370, M375, M380, M390, and M400.
Global Range: This widespread association is known from the Piedmont, Southern Ridge and Valley, Interior Low Plateau, South Atlantic and Mid-Atlantic coastal plains, Upper East Gulf Coastal Plain, Chesapeake Bay, and possibly other provinces.
Nations: US
States/Provinces: AL, DC, GA, KY, MD, MS, NC, NJ?, SC, TN, VA
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C, 56:C, 57:C, 58:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Cg:CCC, 222Dg:CCC, 222Eb:CCC, 222Eg:CCC, 231Aa:CCC, 231Ab:CCC, 231Ae:CCC, 231Ak:CCC, 231An:CCC, 231Ba:CCC, 231Bd:CCC, 231Be:CCC, 231Bg:CCC, 231Bi:CCC, 231Bk:CCC, 231Cc:CCC, 231Cd:CCC, 231D:CC, 232Ad:CCC, 232Bd:CCC, 232Br:CCC, 232Cg:CCC

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Federal Lands: DOD (Arnold, Fort Benning?); DOE (Savannah River Site); NPS (Big South Fork, Chattahoochee River, Chickamauga-Chattanooga?, Cowpens, Fort Donelson, Fredericksburg-Spotsylvania, George Washington Parkway, Horseshoe Bend, Kings Mountain, Little River Canyon, Mammoth Cave, Natchez Trace, National Capital-East, Shiloh); USFS (Bankhead?, Bienville?, Daniel Boone, De Soto?, Delta?, Francis Marion?, Holly Springs?, Homochitto?, Oconee?, St. Francis, Sumter (Piedmont)?, Talladega (Oakmulgee)?, Talladega?, Tombigbee?, Tuskegee?); USFWS (Patuxent)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.013, NATR.058, NATR.066, NATR.067, NATR.151, NATR.167, NATR.210, NATR.211, NATR.212, NATR.214, NATR.230, NATR.236, NATR.246, NATR.252, NATR.263, NATR.287, NATR.288, NATR.321, NATR.325, NATR.360, NATR.363, NATR.365, NATR.384, NATR.388, NATR.402, NATR.407, NATR.610.

Local Description Authors: M.J. Russo

Global Description Authors: mod. R. White

References: Jones et al. 1981b, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Patterson 2008e, Pyne et al. 2010, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a, Taverna and Patterson 2008, White 2004, White 2005, White and Govus 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Loblolly Pine - Tuliptree Wet Forest

***Pinus taeda - Liriodendron tulipifera / Lindera benzoin / Carex crinita* Ruderal Wet Forest**
Loblolly Pine - Tuliptree / Northern Spicebush / Fringed Sedge Ruderal Wet Forest
Identifier: CEGL007546

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southeastern North American Ruderal Flooded & Swamp Forest (M310)
Group	Southeastern Native Ruderal Flooded & Swamp Forest (G553)
Alliance	Southern Pine - Sweetgum Ruderal Wetland Forest (A3345)
Association	Ruderal Loblolly Pine - Tuliptree Wet Forest

ELEMENT CONCEPT

Global Summary: This broadly defined, successional wetland forest is dominated by *Pinus taeda* and *Liriodendron tulipifera*, but many other canopy species are usually present. *Lindera benzoin* is a typical shrub, and *Carex crinita* is a typical herb. More information is needed on the detailed floristics of this association. It develops in river floodplain alluvial terraces along streams following major disturbances such as blowdowns, logging, and agriculture.

ENVIRONMENTAL DESCRIPTION

Global Environment: This broadly defined, successional wetland forest develops in river floodplain alluvial terraces along streams following major disturbances such as blowdowns, logging, and agriculture. This is primarily a Zone IV community with a likelihood of 51-100% of flooding with intermittent periodicity for 1-2 months (12.5-25% of total) of the growing season. Flooding usually occurs in the spring. Just as important as flooding regime in determining the species composition of this community is land-use history since this community most often develops on floodplains subjected to timbering practices.

VEGETATION DESCRIPTION

Global Vegetation: This successional vegetation is dominated by *Pinus taeda* and *Liriodendron tulipifera*, but many other canopy species are usually present. *Lindera benzoin* is a typical shrub, and *Carex crinita* is a typical herb. More information is needed on the detailed floristics of this association. Other woody species that may be present include *Liquidambar styraciflua, Platanus occidentalis, Cornus florida, Acer rubrum, Nyssa biflora, Quercus alba, Fagus grandifolia, Morus rubra, Betula nigra, Fraxinus americana, Ilex opaca, Lindera benzoin*, and *Asimina parviflora*. Woody species common in the Piedmont portion of the range include *Aesculus sylvatica* and *Acer negundo*. Herbaceous and woody vine species that may occur include *Carex crinita, Botrychium virginianum, Eupatorium purpureum, Polystichum acrostichoides, Arundinaria gigantea, Toxicodendron radicans ssp. radicans, Asplenium platyneuron, Woodwardia areolata, Osmunda cinnamomea, Ophioglossum vulgatum, Actaea racemosa (= Cimicifuga racemosa), Dulichium arundinaceum, Carex albolutescens, Hypericum nudiflorum, Corydalis flavula*, and others. The exotics *Ligustrum sinense* and *Lonicera japonica* commonly occur in this community. The preceding information is from the related alliance description (Weakley et al. 1998), and these floristics were included in a 1995 CCA for the "*Pinus taeda - Liriodendron tulipifera / Lindera benzoin / Carex crinita* Successional Forest" (1C03B020.01F), on which this association is apparently based. It is not clear where these data originated. Some of the taxa mentioned (e.g., *Eupatorium purpureum*) seem "suspicious" and out of place.

Apparently related vegetation from the Savannah River Site cited in Jones et al. (1981b) indicates dominance of some stands by *Pinus taeda, Nyssa biflora*, and *Liriodendron tulipifera* in the canopy, with *Persea palustris, Magnolia virginiana, Acer rubrum*, and *Nyssa biflora* in the subcanopy. Other species present include *Vaccinium formosum, Viburnum nudum, Arundinaria gigantea, Toxicodendron radicans ssp. radicans, Mitchella repens, Osmunda cinnamomea*, and *Onoclea sensibilis*.

MOST ABUNDANT SPECIES

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Liriodendron tulipifera*, *Platanus occidentalis*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida*
Tree subcanopy	Broad-leaved evergreen tree	*Ilex opaca*
Shrub/sapling (tall & short)	Liana	*Lonicera japonica*, *Toxicodendron radicans* ssp. *radicans*
Tall shrub/sapling	Broad-leaved deciduous tree	*Lindera benzoin*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Asimina parviflora*
Herb (field)	Flowering forb	*Eupatorium purpureum*
Herb (field)	Graminoid	*Arundinaria gigantea*, *Carex crinita*
Herb (field)	Fern (Spore-bearing forb)	*Botrychium virginianum*, *Polystichum acrostichoides*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Coreopsis pulchra* (G2, Cumberland Plateau endemic), *Diervilla rivularis* (G3), *Marshallia trinervia* (G3), *Rudbeckia heliopsidis* (G2); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (19-Aug-2002). This is a successional forest composed of species native to the southeastern United States; it is not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: On the Bankhead National Forest, this community was observed on previously farmed alluvial terraces along medium-sized streams. The canopy of this forest is dominated by *Pinus taeda* with *Liriodendron tulipifera, Liquidambar styraciflua*, and *Nyssa sylvatica* also present in the canopy. Midstory components include *Nyssa sylvatica, Magnolia macrophylla, Carpinus caroliniana*, and *Ostrya virginiana*. Shrubs include *Hamamelis virginiana, Lindera benzoin*, and *Asimina parviflora*. Jones et al. (1981a) describe an old-growth stand at the Boiling Springs Natural Area at the DOE Savannah River Plant (upper coastal plain, Barnwell County, South Carolina) as a "loblolly pine-bottomland hardwood stand" which has a "senescent upperstory" composed of *Pinus taeda* and *Liriodendron tulipifera*. In contrast, the analysis of common forest types at the Savannah River Plant by Jones et al. (1981b) and Jones and Churchill (1987) includes floodplain vegetation dominated by *Pinus taeda* and *Liquidambar styraciflua*.
Global Similar Associations:
- *Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis* Floodplain Forest (CEGL007329) a related deciduous type.

ELEMENT DISTRIBUTION

Global Range: This association is known from the Cumberland Plateau, Piedmont, South Atlantic Coastal Plain, and Chesapeake Bay Lowlands. It is also probably found in the East Gulf Coastal Plain and Upper East Gulf Coastal Plain.
Nations: US
States/Provinces: AL, GA, MS, NC, SC, VA?
TNC Ecoregions: 43:P, 50:C, 52:C, 53:P, 56:C, 57:P, 58:?
USFS Ecoregions (1994/95): 231Aa:CCC, 231Ae:CCC, 231Af:CCC, 231An:CCC, 231Ao:CCP, 231Cc:CCC, 231Cd:CCC, 232Br:CCC
Federal Lands: DOE (Savannah River Site); NPS (Chattahoochee River, Kings Mountain, Little River Canyon, Natchez Trace); USFS (Bankhead, Oconee?, Sumter, Sumter (Piedmont), Uwharrie)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: S. Landaal
References: Allard 1990, Eyre 1980, Gallyoun et al. 1996, Jones and Churchill 1987, Jones et al. 1981a, Jones et al. 1981b, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Peet et al. unpubl. data, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., USFS 1988, Weakley et al. 1998, White and Govus 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Loblolly Pine - Sweetgum Wet Forest

***Pinus taeda - Nyssa biflora - Liquidambar styraciflua / Lyonia lucida* Ruderal Wet Forest**
Loblolly Pine - Swamp Tupelo - Sweetgum / Shining Fetterbush Ruderal Wet Forest
Identifier: CEGL007560

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southeastern North American Ruderal Flooded & Swamp Forest (M310)
Group	Southeastern Native Ruderal Flooded & Swamp Forest (G553)
Alliance	Southern Pine - Sweetgum Ruderal Wetland Forest (A3345)
Association	Ruderal Loblolly Pine - Sweetgum Wet Forest

ELEMENT CONCEPT

Global Summary: At Fort Benning, Georgia, vegetation attributed to this concept contains *Pinus taeda, Nyssa biflora, Liquidambar styraciflua*, with evergreen shrubs (e.g., *Lyonia lucida*) along with ferns and *Sphagnum* mosses. *Acer rubrum* may increase with disturbance. This vegetation may represent successional phases of saturated swamps or seepage forests. Some sites show evidence of past disturbance or hydrologic manipulation.

ENVIRONMENTAL DESCRIPTION

Global Environment: This vegetation may represent post-disturbance, successional phases of saturated swamps or seepage forests. Some sites show evidence of past disturbance or hydrologic manipulation.

VEGETATION DESCRIPTION

Global Vegetation: Vegetation attributed to this concept at Fort Benning, Georgia, apparently contains *Pinus taeda, Magnolia virginiana, Nyssa biflora, Liquidambar styraciflua*, with evergreen shrubs (e.g., *Lyonia lucida, Ilex coriacea*) along with ferns and *Sphagnum* mosses. At Fort Benning, plots assigned to this type contain *Pinus taeda, Magnolia virginiana, Acer rubrum var. trilobum, Nyssa biflora*, and *Liquidambar styraciflua* in the canopy; *Magnolia virginiana, Ilex coriacea, Nyssa biflora*, and *Persea palustris* in the subcanopy; *Ilex coriacea, Ilex glabra, Ilex opaca, Itea virginica, Lyonia lucida, Clethra alnifolia, Morella caroliniensis, Viburnum nudum*, and smaller individuals of canopy/subcanopy species in the shrub layers; and the ferns and herbs *Osmunda cinnamomea, Woodwardia areolata, Woodwardia virginica, Chasmanthium laxum, Rhexia mariana, Carex glaucescens, Platanthera ciliaris, Carex atlantica ssp. capillacea, Rhynchospora chalarocephala, Fuirena squarrosa*, and *Eleocharis tuberculosa*. Woody vines may include *Vitis rotundifolia, Smilax walteri*, and *Smilax laurifolia*. *Quercus nigra* is an important canopy component of this vegetation in Mississippi (R. Wieland pers. comm.). The exotic *Ligustrum sinense* may invade some stands of this type.

MOST ABUNDANT SPECIES

Global Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus taeda*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Nyssa biflora*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Lyonia lucida*

CHARACTERISTIC SPECIES

Global: *Liquidambar styraciflua*, *Lyonia lucida*, *Nyssa biflora*, *Pinus taeda*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (1-Aug-2005). The type is a post-disturbance, successional type which has probably replaced hardwood saturated swamps, seepage forests, or nearly treeless canebrakes following extensive cutting, fire suppression, and hydrologic alteration. Some examples of this type may, in fact, represent altered examples of other associations (e.g., CEGL004772, CEGL004227, or the rare *Arundinaria gigantea ssp. tecta* Wet Shrubland (CEGL003843)).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Element CEGL007560 moved from Seasonally Flooded (Weakley et al. 1996) to saturated ca. 1997.
Global Similar Associations:
- *Nyssa biflora - Acer rubrum var. trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida* Swamp Forest (CEGL004645)
- *Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis* Swamp Forest (CEGL006137) of Delaware, etc.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Global Range: This presumably successional vegetation is documented from Georgia and could occur in the Atlantic and East Gulf coastal plains from South Carolina to Mississippi.
Nations: US
States/Provinces: AL, GA, LA?, MS, SC
TNC Ecoregions: 43:C, 52:P, 53:C, 56:P, 57:P
USFS Ecoregions (1994/95): 232:C
Federal Lands: DOD (Fort Benning); NPS (Natchez Trace); USFS (Bienville?, De Soto?, Francis Marion?, Holly Springs?, Homochitto?, Kisatchie?, Tombigbee?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: M. Pyne
References: Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M033. Southern Coastal Plain Basin Swamp & Flatwoods

G130. Hardwood - Loblolly Pine Nonriverine Wet Flatwoods

Southern Red Oak Flatwoods Forest

***Quercus falcata* Wet Flatwoods Forest**
Southern Red Oak Wet Flatwoods Forest
Identifier: CEGL004412

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Basin Swamp & Flatwoods (M033)
Group	Hardwood - Loblolly Pine Nonriverine Wet Flatwoods (G130)
Alliance	Interior & West Gulf Coastal Plain Oak Flatwoods (A3445)
Association	Southern Red Oak Flatwoods Forest

ELEMENT CONCEPT

Global Summary: This southern red oak flatwoods forest is found in parts of the Interior Low Plateau and adjacent areas of the Upper East Gulf Coastal Plain of the southern United States. Stands occur on somewhat poorly drained sites. The vegetation is dominated by *Quercus falcata*. It is perhaps marginally a wetland and is better drained than *Quercus phellos* flatwoods. The canopy may also contain some *Quercus alba* and *Quercus stellata*, and possibly *Carya alba*. The ground cover is predominantly leaf litter and most occurrences are thought to be fire-suppressed. At Shiloh National Military Park (Tennessee) *Chasmanthium laxum, Krigia dandelion*, and *Carex complanata* were the most abundant herbaceous plants. It is known historically from the Upper East Gulf Coastal Plain of western Kentucky (eastern Gulf Coastal Plain on tertiary terraces), western Tennessee, and northwestern Mississippi (the "flatwoods belt"), as well as the Shawnee Hills and the Knobs region of Kentucky.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This southern red oak flatwoods forest was sampled at five locations in the park. Sites are flat uplands or temporarily/seasonally flooded bottomlands. Soils range from well-drained silt loam to moderately well-drained sandy clay, silt, and silt loam to poorly drained clay loam. The unvegetated surface is dominated by litter/duff with some wood. No evidence of disturbance was reported.

Global Environment: In Kentucky, stands occur on broad flats underlain by fragipans that impede drainage. Although these sites are wet, they are perhaps only considered as marginal wetlands by many definitions. They occur in limited areas of the Jackson Purchase region of western Kentucky where loess deposits thin out near the eastern edge of the region, as well as in related areas of the coastal plains and Interior Low Plateau. At Shiloh National Military Park (Tennessee), this association occurs in an area which is very flat, called flatwoods. It has standing water after heavy rain (>5 inches during the prior 2 days). The site may have a fragipan or other impermeable soil horizon which allows water to stay for short periods at the surface of the soil and stand. Despite this, the site is described as mesic and not called a wetland. The surface soil is silt loam.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (40-90% cover) canopy, 20-50 m tall, is dominated by *Quercus falcata* and may include *Liquidambar styraciflua, Quercus phellos, Quercus stellata*, and/or *Quercus velutina*. The sparse (30-40%) subcanopy (10-20 m) contains *Acer rubrum, Carya alba, Carya ovata, Liquidambar styraciflua, Nyssa sylvatica*, and *Quercus* spp. The sparse (5-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Ilex decidua, Rhododendron canescens, Vaccinium arboreum*, and *Vaccinium corymbosum*. The herbaceous layer (5-40%) is dominated by *Chasmanthium laxum*. Vines (10%) include *Smilax rotundifolia* and *Vitis rotundifolia*.

Global Vegetation: Stands of this vegetation type are dominated by *Quercus falcata*. The canopy may also contain some *Quercus alba* and *Quercus stellata*, and possibly *Carya alba*. The ground cover is predominantly leaf litter, and most occurrences are thought to be fire-suppressed. This association as documented at Shiloh National Military Park is a forest with the canopy completely dominated by *Quercus falcata*. Many of these trees are quite large. There are no other canopy trees in the plot (SHIL.22). The subcanopy has a variety of trees, the most common being *Nyssa sylvatica, Liquidambar styraciflua*, and *Acer rubrum*. Also in the subcanopy (in order of abundance) are *Quercus stellata, Carya alba, Ulmus alata, Liriodendron tulipifera, Fraxinus pennsylvanica*, and *Prunus serotina*. The most abundant tall shrubs (including tree species) are *Acer rubrum, Liquidambar styraciflua*, then *Carya alba, Nyssa sylvatica*, and *Cornus florida*. Less common as tall shrubs are *Quercus falcata, Vaccinium arboreum, Ulmus alata, Carya glabra, Juniperus virginiana var. virginiana, Amelanchier arborea*, and *Quercus phellos*. The most abundant plant in the short-shrub layer is *Vitis rotundifolia*. Other plants are rather sparse as short shrubs; in order of abundance they are *Quercus falcata, Nyssa sylvatica, Vaccinium arboreum, Rubus argutus, Lonicera japonica, Vaccinium stamineum, Ulmus alata, Hypericum hypericoides, Amelanchier arborea, Rosa carolina, Parthenocissus quinquefolia, Quercus phellos, Toxicodendron radicans, Fraxinus pennsylvanica, Smilax rotundifolia, Rhus copallinum, Liriodendron tulipifera*, and *Carya glabra*. The open areas have the most herbaceous plant cover. The most abundant herbaceous plants are *Chasmanthium laxum* and (less abundant) *Krigia dandelion*, then *Carex complanata, Scutellaria integrifolia, Oxalis stricta, Potentilla simplex (= var. simplex), Danthonia spicata, Dichanthelium*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

laxiflorum, Elephantopus carolinianus, and *Dichanthelium dichotomum*. Herbaceous plants present at trace amounts are *Lactuca canadensis, Viola x palmata, Vernonia missurica, Eupatorium rotundifolium var. ovatum, Hypoxis hirsuta, Stachys latidens, Galium triflorum*, and *Schizachyrium scoparium*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus falcata*, *Quercus phellos*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ilex decidua*, *Rhododendron canescens*, *Vaccinium corymbosum*
Herb (field)	Graminoid	*Chasmanthium laxum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Quercus falcata*, *Quercus phellos*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2? (31-Jan-2007). This is an unusual upland wetland community, never abundant in the landscape and severely impacted by agriculture and other intensive land uses. Even historically, it was known only from the Upper East Gulf Coastal Plain of western Kentucky, western Tennessee, and northwestern Mississippi (the "flatwoods belt"), and the Shawnee Hills and Knobs region of Kentucky. Most occurrences are small in size and lack any jurisdictional wetland protection. Most historic occurrences have been cleared, drained and tiled, and the few remaining sites are small and degraded. Fire suppression has also caused degradation of remaining examples.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: In Kentucky, historic occurrences have been cleared, drained and tiled, and remaining sites are small and degraded. Similar flatwoods vegetation occurs elsewhere in Kentucky but have temporarily flooded hydrology and different canopy dominants. This type is also better drained than *Quercus phellos* flatwoods. It is known historically from the Upper East Gulf Coastal Plain of western Kentucky (eastern Gulf Coastal Plain on tertiary terraces), western Tennessee, and northwestern Mississippi (the "flatwoods belt"), as well as the Shawnee Hills and the Knobs region of Kentucky. See the dissertation of Wharton (1945) for information on this association in the Knobs region.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (3) and Tennessee (2) between M240 and M245, M425 and M430, and in the vicinity of M305 and M370.
Global Range: This southern red oak flatwoods forest is found in parts of the Interior Low Plateau and Upper East Gulf Coastal Plain of the United States, ranging from Kentucky and Tennessee into parts of Indiana and Mississippi.
Nations: US
States/Provinces: AL, IN?, KY, MS, TN
TNC Ecoregions: 43:C, 44:C
USFS Ecoregions (1994/95): 222Cb:CCC, 222Cc:CCP, 222Ce:CCP, 222Cg:CCC, 222Da:CCC, 222Dg:CCC, 222Eg:CCC, 231Ba:CCC, 231Bd:CCC, 231Bk:CCC
Federal Lands: NPS (Mammoth Cave, Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.124, NATR.373, NATR.386, NATR.389, NATR.645.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne, J. Campbell and M. Evans, mod. C.W. Nordman
References: Homoya et al. 1988, Nordman et al. 2011, Pyne et al. 2010, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Wharton 1945

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M032. Southern Coastal Plain Evergreen Hardwood - Conifer Swamp

G037. Coastal Plain Mixed Evergreen Swamp

Southern Upper East Gulf Coastal Plain Seepage Forest

***Nyssa biflora - Liquidambar styraciflua / Magnolia virginiana / Hamamelis virginiana - Viburnum nudum* Swamp Forest**
Swamp Tupelo - Sweetgum / Sweetbay / American Witch-hazel - Possumhaw Swamp Forest
Identifier: CEGL008477

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Evergreen Hardwood - Conifer Swamp (M032)
Group	Coastal Plain Mixed Evergreen Swamp (G037)
Alliance	Sweetbay - Swamp Tupelo - Laurel Oak Wetland Forest (A0378)
Association	Southern Upper East Gulf Coastal Plain Seepage Forest

ELEMENT CONCEPT

Global Summary: These saturated forests occur in seepage-influenced areas adjacent to small streams in southern portions of the Upper East Gulf Coastal Plain of Alabama and possibly Mississippi. The open tree canopy is typically dominated by *Nyssa biflora*, with some combination of *Liquidambar styraciflua* and *Acer rubrum*. In addition, *Pinus taeda* may be present in some stands. The subcanopy (and possibly the canopy in some examples) contains substantial *Magnolia virginiana*; this stratum may also contain *Ilex opaca var. opaca* and *Cornus foemina*. Canopy cover in these seeps is not complete, and the shrub and herbaceous layers may be well-developed. The shrub stratum contains *Ilex opaca var. opaca, Viburnum nudum var. nudum, Hamamelis virginiana*, and *Itea virginica*, which may be dominant. Other shrubs present include *Viburnum dentatum, Ilex decidua, Cornus foemina, Arundinaria gigantea ssp. tecta*, and others. The herbaceous layer includes *Osmunda regalis var. spectabilis, Osmunda cinnamomea, Woodwardia areolata, Solidago patula var. strictula, Sagittaria latifolia, Penthorum sedoides, Mikania scandens, Juncus effusus, Chelone glabra, Dichanthelium* spp., *Carex crinita, Carex frankii, Carex intumescens, Carex leptalea, Mitchella repens, Sphagnum* spp., and others. Various of these herbs may be locally dominant in patches. Woody vines are common; some typical species are *Smilax laurifolia, Smilax rotundifolia, Toxicodendron radicans, Berchemia scandens*, and others. This association lacks some of the species characteristic of related vegetation types from further south, such as *Morella caroliniensis (= Myrica heterophylla), Toxicodendron vernix, Ilex coriacea, Clethra alnifolia*, and *Persea palustris*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This swamp tupelo forest was sampled once in the park. The site is an intermittently flooded flat with poorly drained silty clay soil. The unvegetated surface is dominated by litter/duff with some wood. Evidence of disturbance includes the presence of exotic plants (described as severe in some places but which species was not recorded).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (70% cover) canopy, 20-35 m tall, and sparse (30%) subcanopy (15-20 m) are dominated by *Nyssa biflora*. The sparse (20-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of *Itea virginica, Nyssa biflora*, and *Viburnum nudum*. The herbaceous layer (70%) is dominated by *Justicia ovata* and *Saururus cernuus*.
Global Vegetation: The open tree canopy of stands is typically dominated by *Nyssa biflora*, with some combination of *Liquidambar styraciflua* and *Acer rubrum* (NatureServe Ecology unpubl. data). In addition, *Pinus taeda* may be present in some stands. The subcanopy (and possibly the canopy in some examples) contains substantial *Magnolia virginiana*; this stratum may also contain *Ilex opaca var. opaca* and *Cornus foemina*. Canopy cover in these seeps is not complete, and the shrub and herbaceous layers may be well-developed. The shrub stratum contains *Ilex opaca var. opaca, Viburnum nudum var. nudum, Hamamelis virginiana*, and *Itea virginica*, which may be dominant. Other shrubs present include *Viburnum dentatum, Ilex decidua, Cornus foemina, Arundinaria gigantea ssp. tecta*, and others. The herbaceous layer includes *Osmunda regalis var. spectabilis, Osmunda cinnamomea, Woodwardia areolata, Solidago patula var. strictula, Sagittaria latifolia, Penthorum sedoides, Mikania scandens, Juncus effusus, Chelone glabra, Dichanthelium* spp., *Carex crinita, Carex frankii, Carex intumescens, Carex leptalea, Mitchella repens, Sphagnum* spp., and others. Various of these herbs may be locally dominant in patches. Woody vines are common; some typical species are *Smilax laurifolia, Smilax rotundifolia, Toxicodendron radicans, Berchemia scandens*, and others. This association lacks some of the species characteristic of related vegetation types from further south, such as *Morella caroliniensis (= Myrica heterophylla), Toxicodendron vernix, Ilex coriacea, Clethra alnifolia*, and *Persea palustris*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Nyssa biflora*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Itea virginica*, *Nyssa biflora*, *Viburnum nudum*
Herb (field)	Flowering forb	*Justicia ovata*, *Saururus cernuus*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Nyssa biflora*
Tree subcanopy	Broad-leaved evergreen tree	*Magnolia virginiana*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hamamelis virginiana*, *Viburnum nudum* var. *nudum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carex bromoides*, *Carex leptalea*, *Magnolia virginiana*, *Nyssa biflora*, *Viburnum nudum*
Global: *Hamamelis virginiana*, *Liquidambar styraciflua*, *Magnolia virginiana*, *Nyssa biflora*, *Viburnum nudum* var. *nudum*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (29-Mar-2001). This association seems to be floristically distinct from related types to the north and south, but its complete range is not known.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:

- *Acer rubrum var. trilobum - Nyssa sylvatica / Rhododendron canescens - Viburnum nudum var. nudum / Woodwardia areolata* Seep Forest (CEGL004425) from the northern part of the Upper East Gulf Coastal Plain, with less evergreen shrub dominance.
- *Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis* Swamp Forest (CEGL004772) from further south in the East Gulf Coastal Plain, with more evergreen shrub dominance.
- *Nyssa biflora - (Acer rubrum) / Ilex opaca / Leucothoe axillaris / Carex atlantica ssp. capillacea* Swamp Forest (CEGL004427)
- *Nyssa biflora - Acer rubrum var. trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida* Swamp Forest (CEGL004645)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi in the vicinity of M155.
Global Range: This saturated forest occurs in the southern Upper East Gulf Coastal Plain of Alabama and possibly Mississippi, and possibly the nearby Ridge and Valley/Piedmont transition area of Alabama (231Dd).
Nations: US
States/Provinces: AL, MS
TNC Ecoregions: 43:C, 50:P
USFS Ecoregions (1994/95): 231Bc:CCC, 231Bg:CCC, 231Dd:CPP
Federal Lands: NPS (Natchez Trace); USFS (Talladega, Talladega (Oakmulgee), Talladega (Talladega)?, Tombigbee)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.283.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., Wieland 1994b, Wieland 2000b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M031. Southern Coastal Plain Floodplain Forest

G033. Bald-cypress - Tupelo Floodplain Forest

Water Tupelo Swamp Forest

***Nyssa aquatica* Swamp Forest**
Water Tupelo Swamp Forest
Identifier: CEGL002419

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Bald-cypress - Tupelo Floodplain Forest (G033)
Alliance	Water Tupelo Swamp (A0345)
Association	Water Tupelo Swamp Forest

ELEMENT CONCEPT

Global Summary: This semipermanently flooded water tupelo swamp forest is found in the Coastal Plain from Virginia south to Florida, west to Texas, and north in the Mississippi delta region to Missouri, Illinois, and Kentucky. Stands occur on permanently saturated soils on low, wet flats and sloughs, swales and backswamps, and the association is more common on floodplains of brownwater, rather than blackwater, rivers. Both organic and mineral soils may be present. The vegetation is dominated by dense, and occasionally pure, stands of *Nyssa aquatica* but often in association with *Taxodium distichum* (never very abundant in this type), *Liquidambar styraciflua, Planera aquatica, Nyssa biflora, Gleditsia aquatica, Fraxinus profunda*, and *Cephalanthus occidentalis*. The herbaceous layer is conspicuously sparse, and density is wholly dependent upon the extent and duration of flooding. Where water is permanent, herbaceous plants rely on substrates found on rotting logs, stumps, terraces, and buttresses of trees. Subcanopy density and forest tree recruitment are poor due to fluctuating water levels.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This water tupelo - bald-cypress swamp forest was sampled at four locations in the park. Sites are seasonally, semipermanently or permanently flooded bottomlands and depressions. Soils are poorly drained silty clay or very poorly drained muck. The unvegetated surface is dominated by litter/duff or standing water with some wood and bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.
Global Environment: Stands of this association occur on permanently saturated soils on low, wet flats and sloughs, swales and backswamps. The association is more common on floodplains of brownwater, rather than blackwater, rivers. Both organic and mineral soils may be present. Soil moisture is abundant and fairly permanent, often with a shallow impermeable clay layer which creates a shallow, perched water table. Anaerobic conditions are prevalent, with considerable gleying due to reduction of iron and manganese. Root zones often exhibit iron mottling and concretions. Soils are generally acidic (4.0-6.0 pH), with low nutrient availability. Historically, periods of flooding and drought have determined community dominance. Sediment deposition also modifies swamp forest communities by decreasing water depth. Excessive sedimentation can speed the natural transition of wetlands as they evolve to a drier condition. Bedrock is deeply buried Paleozoic rock, exhibiting little or no effect on community structure or composition. Unconsolidated alluvial sediments need further characterization.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (70-90% cover) canopy, 20-35 m tall, is dominated by *Nyssa aquatica* and *Taxodium distichum*. The sparse to moderate (20-50%) subcanopy (10-20 m) includes *Acer rubrum, Nyssa aquatica, Planera aquatica*, and *Quercus lyrata*. The very sparse (5-20%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with *Carpinus caroliniana* and *Itea virginica*. The herbaceous layer (10-90%) includes *Boehmeria cylindrica, Phanopyrum gymnocarpon*, and *Saururus cernuus*. One stand is covered with water and *Lemna minor*.
Global Vegetation: The vegetation is dominated by dense, and occasionally pure, stands of *Nyssa aquatica* but often in association with *Taxodium distichum* (never very abundant in this type), *Liquidambar styraciflua, Planera aquatica, Nyssa biflora, Gleditsia aquatica, Fraxinus profunda*, and *Cephalanthus occidentalis*. The herbaceous layer is conspicuously sparse, and density is wholly dependent upon the extent and duration of flooding. Where water is permanent, herbaceous plants rely on substrates found on rotting logs, stumps, terraces, and buttresses of trees. Some herbs which may be present at low densities on these elevated places include *Phanopyrum gymnocarpon, Pluchea camphorata, Boehmeria cylindrica, Rudbeckia laciniata, Sagittaria latifolia, Onoclea sensibilis, Triadenum walteri, Carex joorii, Carex glaucescens, Asclepias perennis, Saururus cernuus, Justicia ovata, Leersia lenticularis*, and others. The exotic plant species *Eichhornia crassipes* may a problem. Subcanopy density and forest tree recruitment are poor due to fluctuating water levels (TNC 1995a).

At Shiloh National Military Park (western Tennessee) this occurs with vegetation open-canopied, due to beaver activity (both impounding and chewing of bark which has killed trees). The dominant canopy tree is *Nyssa aquatica*. *Salix nigra* is also present in the canopy. *Acer rubrum* is the only subcanopy tree. Shrubs are fairly dense; *Acer rubrum, Alnus serrulata, Cornus foemina*, and *Itea virginica* are the most important, with *Nyssa aquatica, Cephalanthus occidentalis*, and *Salix nigra*. *Polygonum sagittatum, Leersia*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

oryzoides, Microstegium vimineum, Impatiens capensis, and *Polygonum punctatum* are the dominant herbaceous plants. Other herbs are *Scirpus cyperinus, Mikania scandens, Boehmeria cylindrica, Cicuta maculata, Apios americana, Triadenum walteri, Cinna arundinacea, Sagittaria latifolia (= Sagittaria longirostra), Erechtites hieraciifolia, Ludwigia decurrens, Peltandra virginica, Carex crinita, Commelina virginica, Bidens aristosa (= Bidens polylepis), Carex lupulina, Panicum dichotomiflorum, Bidens frondosa, Ceratophyllum demersum, Pilea pumila, Heteranthera reniformis, Saururus cernuus, Cuscuta gronovii, Gratiola virginiana, Ludwigia peploides ssp. glabrescens, Eclipta prostrata (= Eclipta alba), Galium tinctorium, Lobelia cardinalis*, and the exotic *Arthraxon hispidus*.

This community most commonly occurs in seasonally flooded riparian wetlands or lakes, where standing water is absent during parts of the year. Timing, duration, and depth of flooding are the major environmental factors governing vegetative composition within and among occurrences of forested swamps. Water tupelo is more commonly associated with riparian floodplain wetlands or margins of lakes or ponds where standing water occurs for only a few months of each year (usually winter and spring). Bald-cypress is more commonly associated with permanent deep-water forested wetlands.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Nyssa aquatica*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Saururus cernuus*
Herb (field)	Graminoid	*Phanopyrum gymnocarpon*
Floating aquatic	Aquatic herb	*Lemna minor*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Taxodium distichum*
Tree canopy	Broad-leaved deciduous tree	*Nyssa aquatica*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* var. *drummondii*, *Fraxinus caroliniana*, *Planera aquatica*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*, *Forestiera acuminata*
Short shrub/sapling	Dwarf-shrub	*Rosa palustris*
Herb (field)	Fern (Spore-bearing forb)	*Azolla mexicana*
Floating aquatic	Aquatic herb	*Lemna minor*, *Spirodela polyrrhiza*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Fraxinus caroliniana*, *Lemna minor*, *Nyssa aquatica*, *Phanopyrum gymnocarpon*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Carex decomposita* (G3G4); **Invasive/Exotic Plants**: *Arthraxon hispidus* (Medium/Low), *Eichhornia crassipes* (High), *Microstegium vimineum* (High/Medium); **Other Plants**: *Heteranthera multiflora* (G4), *Hottonia inflata* (G4), *Ilex amelanchier* (G4), *Ranunculus laxicaulis* (G5?)

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (19-Sep-2001). Depending on how historic distribution and abundance are factored into the rank, the rank could be considerably higher, perhaps a G3G4. Many stands have been extensively cleared.

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Global Comments: More work needs to be done to understand development of this community where the ranges of *Nyssa aquatica* and *Taxodium distichum* overlap, to determine the differences between this and a *Nyssa aquatica*-dominated forest that develops following logging of *Taxodium distichum*, and to determine the extent of geographic variation. Where bald-cypress and water tupelo ranges overlap, little is known about conditions which select for either or both species. Selective removal of bald-cypress can shift dominance in mixed bald-cypress - water tupelo stands to favor water tupelo. Water tupelo seem to select transitional zones between permanent water and upland habitat and seldom occur as a dominant component of the canopy where inundation is semipermanent or permanent.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Similar Associations:
- *Nyssa aquatica* Tidal Forest (CEGL008561)
- *Taxodium distichum - (Nyssa aquatica) / Forestiera acuminata - Planera aquatica* Floodplain Forest (CEGL002421) may resemble *Nyssa aquatica* forest in habitats where most bald-cypress have been removed by logging and a few very old trees remain.
- *Taxodium distichum - Nyssa aquatica - Acer rubrum / Itea virginica* Floodplain Forest (CEGL007422)
- *Taxodium distichum - Nyssa biflora / Berchemia scandens - Toxicodendron radicans / Woodwardia areolata* Swamp Forest (CEGL004429)
- *Taxodium distichum / Lemna minor* Floodplain Forest (CEGL002420)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The 11 sampled sites are in Mississippi between M380 and M385, and in the vicinity of M120, M160 and M175.
Global Range: This water tupelo swamp forest is found on the lower Atlantic Coastal Plain from southeastern Virginia to southeastern Georgia, the Gulf Coastal Plain from about Tallahassee, Florida, west to southeastern Texas, the Mississippi River Alluvial Plain to southern Illinois and southeastern Missouri, and the Arkansas River Valley in central Arkansas.
Nations: US
States/Provinces: AL:S3, AR, FL, GA, IL, KY, LA, MO, MS, SC, TN, TX:S3
TNC Ecoregions: 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 222A:CC, 222Cg:CCC, 222D:CP, 231Bc:CCC, 231Bd:CCC, 231Bg:CCC, 231Bj:CCC, 231E:C?, 231Ga:CCC, 232B:CC, 232Cg:CCC, 232Ch:CC?, 232F:CC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC
Federal Lands: DOD (Fort Benning?); DOE (Savannah River Site); NPS (Natchez Trace, Shiloh); USFS (Apalachicola?, Conecuh?, De Soto, Delta, Francis Marion, Kisatchie, Shawnee, Talladega, Talladega (Oakmulgee)); USFWS (Great Dismal Swamp)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.159, NATR.183, NATR.228, NATR.513.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal, mod. D. Faber-Langendoen, mod. R.E. Evans
References: ALNHP unpubl. data, Allard 1990, Ambrose 1990a, Applequist 1959, Burk 1977, Burns and Honkala 1990a, Burns and Honkala 1990b, Christensen 1988, Cowardin et al. 1979, Demaree 1932, Dennis 1988, Diamond 1993, Evans 1991, Evans et al. 2009, Ewel and Odum 1984b, Eyre 1980, Fleming et al. 2001, Foti 1994a, Foti 1994b, Foti et al. 1994, Klawitter 1962, Küchler 1964, LNHP 2009, Mitsch and Gosselink 1993, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Nelson 2010, Nordman et al. 2011, Oberholster 1993, Peet et al. unpubl. data, Penfound and Hall 1939, Pyne 1994, Radford and Martin 1975, Robertson et al. 1984, Schafale 2000, Schafale 2004, Schafale and Weakley 1990, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, Wharton 1989, Wharton et al. 1982, White and Anderson 1970, White and Madany 1978, Wieland 1994b, Wieland 2000b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Coastal Plain Planertree Floodplain Swamp Forest

***Planera aquatica* Floodplain Forest**
Planertree Floodplain Forest
Identifier: CEGL007394

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Bald-cypress - Tupelo Floodplain Forest (G033)
Alliance	Bald-cypress - Tupelo Southern Floodplain Forest (A3594)
Association	Coastal Plain Planertree Floodplain Swamp Forest

ELEMENT CONCEPT

Global Summary: This association consists of forests of the southeastern United States Coastal Plain in which *Planera aquatica* is dominant and may form an essentially monospecific canopy. Relatively few additional species are present in other vegetational strata, although these short-statured forests sometimes have a scattered emergent canopy of other tree species typical of flooded swamps. The herbaceous and vine/liana strata are sparse, and no species are known to be diagnostic of this type relative to other bottomlands. Due in part to extreme periods of inundation, this habitat is typically very low in species diversity.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This bottomland association is known from the park within the vicinity of Kosciusko, Mississippi. These examples are subjected to long periods of inundation, occurring in depressions lower in elevation than the surrounding bottomland forests. Soils are comprised of silty clay.
Global Environment: These forests are associated with southern Coastal Plain rivers, often in depressions a meter or more lower in elevation than the surrounding bottomland hardwood forests. Fine-textured soils in these areas contribute to long periods of inundation typical of backswamp environments while at the same time allowing for further deposition of fine-textured particles. Relatively low chroma values at these sites probably indicate anaerobic soil conditions (Fanning and Fanning 1989). Soil analyses at plot locations of this type in eastern Texas and western Louisiana document strongly acidic pH levels. Mundorff (1998) showed that these soils have higher levels of nitrogen, phosphorus, and potassium than other bottomland community types in the West Gulf Coastal Plain. Plots examined in eastern Texas are also fairly high in calcium and magnesium (Turner et al. unpubl. data).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The tree canopy is open (30% cover) and consists of *Taxodium distichum, Nyssa aquatica*, and lesser amounts of *Quercus lyrata* and *Quercus phellos*. The subcanopy is represented by a nearly monospecific (80%) occurrence of *Planera aquatica*. Herbs are of low diversity, with *Phanopyrum gymnocarpon* appearing dominant.
Global Vegetation: These forests are dominated by *Planera aquatica*, and in many cases form an essentially monospecific canopy of this species. These short-statured forests sometimes have a scattered emergent canopy of *Taxodium ascendens, Taxodium distichum, Nyssa biflora, Populus heterophylla, Acer negundo, Fraxinus caroliniana, Liquidambar styraciflua, Platanus occidentalis, Carya aquatica, Celtis laevigata, Nyssa aquatica, Platanus occidentalis, Quercus lyrata*, and *Fraxinus pennsylvanica*, among others. *Quercus lyrata* is the second most important overstory tree species documented in this association in eastern Texas. Midstory and shrub species in eastern Texas are *Cephalanthus occidentalis* and *Cornus foemina*. The herbaceous and vine/liana strata are sparse, and common species include *Lindernia dubia, Commelina diffusa, Triadenum walteri, Polygonum hydropiperoides, Pluchea camphorata, Saururus cernuus, Boehmeria cylindrica, Echinodorus cordifolius, Justicia ovata, Packera glabella (= Senecio glabellus), Ampelopsis arborea, Campsis radicans, Toxicodendron radicans, Vitis rotundifolia*, and *Parthenocissus quinquefolia*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Planera aquatica*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Planera aquatica*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Planera aquatica*
Global: *Planera aquatica*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (1-Dec-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Possible Kentucky occurrences are only a few hectares in size.

ELEMENT DISTRIBUTION

Global Range: This association is found in the Coastal Plain of the southeastern United States.
Nations: US
States/Provinces: AL, AR, FL, GA, KY?, LA, MS, OK, SC, TN, TX
TNC Ecoregions: 38:P, 40:C, 41:C, 42:C, 43:C, 44:C, 53:C, 56:P, 57:C
USFS Ecoregions (1994/95): 231Bh:CC?, 231Bi:CC?, 231Bj:CC?, 231Ea:CCC, 231Ej:CCC, 231F:CC, 232Ba:CC?, 232Bc:CC?, 232Bd:CC?, 232Be:CC?, 232Bh:CC?, 232Bj:CCC, 232Bk:CC?, 232Bl:CC?, 232Bm:CC?, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Br:CC?, 232Bs:CCC, 232Cb:CCC, 232Cc:CC?, 232Cd:CC?, 232Cf:CC?, 232Dc:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCP, 234Ae:CCP, 234Af:CCP, 234Ag:CCC, 234Ah:CCP, 234Ai:CCC, 234Aj:CCP, 234Ak:CCP, 234Al:CCP, 234Am:CCC, 234An:CCC
Federal Lands: NPS (Congaree Swamp, Natchez Trace, Shiloh); USFS (Angelina, Apalachicola, Davy Crockett, Sabine?, Sam Houston?); USFWS (Reelfoot?)

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: A.S. Weakley, mod. R.E. Evans
References: FNAI 1992a, FNAI 1992b, FNAI 2010a, Fanning and Fanning 1989, LNHP 2009, Mundorff 1998, Peet et al. unpubl. data, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998b, Turner et al. 1999, Turner et al. n.d., Wharton et al. 1982

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Bald-cypress Swamp

***Taxodium distichum / Lemna minor* Floodplain Forest**
Bald-cypress / Common Duckweed Floodplain Forest
Identifier: CEGL002420

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Bald-cypress - Tupelo Floodplain Forest (G033)
Alliance	Bald-cypress - Tupelo Southern Floodplain Forest (A3594)
Association	Bald-cypress Swamp

ELEMENT CONCEPT

Global Summary: This bald-cypress swamp is found in the Atlantic and Gulf coastal plains of the United States in a variety of ecological settings. Examples may occur in oxbow lakes and ponds, and along the banks of rivers and lakes in saturated or flooded soils. This type is characterized by a monospecific canopy of straight, tall individuals of *Taxodium distichum* above shallow to deep water (depths ranging from soil saturation to approximately 6 m) during all or most of the year. Flooding is seasonal, occurring during winter and spring. Stands have a sparse to moderate subcanopy and depauperate shrub and herb layers. The trunks of the canopy trees typically form swelled buttresses. Canopy cover is variable, from at or near 100% to less than 60% in some examples. More open examples of this type tend to occur in deeper water. In the deepest water situations scattered trees grow over an open water surface covered by floating and submersed aquatic plants. *Taxodium distichum* regeneration is absent in areas of permanent inundation, as seed germination does not occur in standing water. The subcanopy and herbaceous layers are dependent upon timing, duration, and depth of flooding. *Cephalanthus occidentalis* and *Rosa palustris* may be common shrubs in some examples of this community, while *Fraxinus caroliniana* (in its range) and *Acer rubrum var. drummondii* are common in the subcanopy. Shallow water emergents, floating-leaved aquatics, such as *Azolla caroliniana, Brasenia schreberi, Cabomba caroliniana, Hydrocotyle ranunculoides, Limnobium spongia, Spirodela punctata, Wolffia columbiana, Lemna* spp. *Nymphaea* spp., and submerged hydrophytes, such as *Ceratophyllum demersum, Egeria densa, Myriophyllum aquaticum*, and *Potamogeton nodosus*, are common in permanent water zones throughout the range of *Taxodium distichum* swamps. This community is differentiated from other swamp forests by lacking *Nyssa* spp. as other than occasional individuals. This is the only community type currently defined outside Florida with *Taxodium distichum* as the sole dominant.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This bald-cypress swamp forest was sampled at three locations in the park. Sites are seasonally, semipermanently or permanently flooded depressions and floodplains with very poorly drained muck or silty clay soil. The unvegetated surface is dominated by standing water (up to 100%) with some litter/duff, wood and bare soil. Evidence of disturbance includes past logging and flooding.

Global Environment: This community occurs on a variety of inundated topographic habitats, including oxbow ponds, natural lakes, drowned floodplains, backwater sloughs, along river edges, and in various isolated depressions within the floodplain. It is more commonly associated with brownwater than blackwater rivers. The community usually is linear in outline as it occurs in river floodplains and oxbows. Occurrences generally are surrounded by bottomland hardwood communities. Bedrock is deeply buried Paleozoic rock and has little or no effect on plant communities. Unconsolidated alluvial sediments need further characterization. Soil types on which it is found are very poorly drained. This includes impounded water (e.g., abandoned millponds, beaver ponds) and other habitats with relatively stable water levels. Hydrologic regime is the most important environmental determinant of the distribution of this community. Sites experience frequent flooding to near permanent ponding. Soils are always saturated. Floodwater may be 3 m or more deep and may be stagnant or flow up to 7 km/hour (Eyre 1980). *Taxodium distichum* is adapted to surviving under prolonged flooding, although exposed unflooded soils are necessary for seedling establishment. Saturated soils, with standing water all or most of the year, select for plants which exhibit special adaptations for existence in an environment with limited oxygen and nutrient availability. Seasonal flood pulses deposit sediment which can, when excessive, cause plant stress and speed wetland succession. Prolonged inundation does not allow for bald-cypress regeneration within the swamp and restricts new growth to perimeter low-water zones. Bald-cypress also has minimal sprouting ability, erratic reproduction, and slow growth which makes it a poor competitor with *Nyssa aquatica* (Wharton et al. 1982).

In Illinois, bald-cypress swamps occur on nearly level, deep soils on broad flats and narrow depressions or sloughs in the floodplains of the Mississippi and Ohio rivers. Soils are difficult to till and have silty clay surface and subsurface layers, high shrink-swell capacity, low organic matter, and slow permeability with ponding of water common. Bald-cypress swamps exhibit reduced soil chemistry while substrates are saturated.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very sparse to dense (5-80% cover) canopy, 15-35 m tall, and sparse to moderate (30-70%) subcanopy (10-20 m) are dominated by *Taxodium distichum*; additional trees may include *Acer rubrum var. drummondii, Fraxinus pennsylvanica, Nyssa aquatica, Nyssa biflora*, and *Salix nigra*. The very sparse (5-20%) tall-shrub (2-5 m) and short-shrub

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

(0.5-1 m) layers may include *Alnus serrulata, Cephalanthus occidentalis, Itea virginica, Nyssa biflora*, and *Taxodium distichum*. The herbaceous layer (40-80%) is dominated by *Hydrocotyle ranunculoides, Lemna minor*, and *Phanopyrum gymnocarpon*.
Global Vegetation: The vegetation is characterized by a monospecific canopy of straight, tall individuals of *Taxodium distichum* with a sparse to moderate subcanopy and depauperate shrub and herb layers. Trees are generally very tall and straight with their trunks forming swelled buttresses. Canopy cover is extremely variable, from densely closed forests to sparse canopies. *Taxodium distichum* regeneration is absent in areas of permanent inundation, as seed germination does not occur in standing water. The subcanopy and herbaceous layers are dependent upon timing, duration, and depth of flooding. *Cephalanthus occidentalis* and *Rosa palustris* are common shrubs in this community, while *Fraxinus caroliniana* (in its range) and *Acer rubrum var. drummondii* are common in the subcanopy. A common vine is *Brunnichia ovata*. Shallow water emergents, floating-leaved aquatics, such as *Azolla caroliniana, Brasenia schreberi, Cabomba caroliniana, Limnobium spongia, Spirodela punctata, Wolffia columbiana, Lemna minor, Nymphaea* spp., and submerged hydrophytes, such as *Ceratophyllum demersum*, are common in permanent water zones throughout the range of this type. In the southern part of the range (e.g., southern Alabama) *Lemna minor* is replaced by *Lemna valdiviana*. Other important aquatic species may include *Ludwigia palustris, Ludwigia peploides*, and *Hydrolea uniflora*. The most open-canopied examples, in deeper water, may support dense colonies of *Nuphar advena*, and often greater cover of *Nelumbo lutea, Cabomba caroliniana, Ceratophyllum demersum, Egeria densa*, and *Wolffia columbiana* (Van Kley and Hine 1998). Interestingly, cover of the epiphyte *Tillandsia usneoides* apparently peaks in more closed-canopied situations. Common herbaceous species from occurrences in southwestern Arkansas include *Bidens discoidea, Carex lupulina, Carex glaucescens, Echinodorus cordifolius, Heliotropium indicum, Leersia oryzoides, Limnobium spongia, Lycopus rubellus, Polygonum hydropiperoides, Proserpinaca palustris*, and *Saururus cernuus* (J. Campbell pers. comm. 1999, D. Zollner pers. comm. 1999, TNC 1995a). The exotic plant species *Eichhornia crassipes* may a problem.

Bald-cypress swamps are similar in species composition and physiognomy throughout their range. Water levels determine species composition, density, and regeneration. Sites exhibit pronounced variability in herbaceous growth, and many species are specially adapted to flooded conditions. Bald-cypress swamps exhibit shifts in vegetative dominance largely governed by water fluctuations, windthrows, beaver predation, senescence, and fire. Bald-cypress forest understory varies from sparse herbaceous growth to very dense and diverse herbaceous flora. Bald-cypress reaches its greatest size in areas of permanent inundation.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Taxodium distichum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Alnus serrulata*, *Cephalanthus occidentalis*, *Itea virginica*, *Nyssa biflora*, *Taxodium distichum*
Herb (field)	Flowering forb	*Hydrocotyle ranunculoides*
Herb (field)	Graminoid	*Phanopyrum gymnocarpon*
Floating aquatic	Aquatic herb	*Lemna minor*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Taxodium distichum*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*, *Carya aquatica*, *Fraxinus caroliniana*, *Fraxinus profunda*, *Gleditsia aquatica*, *Nyssa biflora*, *Planera aquatica*, *Salix nigra*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cephalanthus occidentalis*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Forestiera acuminata*
Floating aquatic	Aquatic herb	*Lemna minor*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cephalanthus occidentalis*, *Itea virginica*, *Lemna minor*, *Taxodium distichum*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Carex decomposita* (G3G4); **Invasive/Exotic Plants**: *Eichhornia crassipes* (High); **Other Plants**: *Carex oxylepis* (G5?), *Dichanthelium commutatum* (G5), *Dryopteris celsa* (G4), *Heteranthera multiflora* (G4), *Hottonia inflata* (G4), *Ilex amelanchier* (G4), *Iris fulva* (G5), *Ranunculus laxicaulis* (G5?)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (19-Sep-2001).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Comments: This is the only community type currently defined outside Florida with *Taxodium distichum* as the sole dominant. Stands are possible in suitable habitat anywhere within the range of *Taxodium distichum*; however, it is more commonly recognized outside of, or near the edge of, the range of *Nyssa aquatica* which otherwise is frequently codominant with *Taxodium distichum*. Classification can become difficult where excessive logging has removed most of the mature bald-cypress. Logging, and possibly alteration of hydrologic regimes, may create an unnaturally open canopy more typical of woodland communities. Water tupelo regeneration is prevalent at these disturbed sites, often replacing bald-cypress as the dominant plant species. Unless canopy composition is severely altered, this criterion is currently used to establish species dominance. Where logging causes classification difficulties, adjacent undisturbed occurrences may be used to ascertain pre-disturbance dominance.

Global Similar Associations:

- *Nyssa aquatica* Swamp Forest (CEGL002419) lacks bald-cypress as a significant contributor to canopy dominance.
- *Taxodium distichum - (Nyssa aquatica) / Forestiera acuminata - Planera aquatica* Floodplain Forest (CEGL002421) has similar hydrologic characteristics but differs by exhibiting a canopy codominated by bald-cypress and water tupelo.
- *Taxodium distichum - Nyssa aquatica - Acer rubrum / Itea virginica* Floodplain Forest (CEGL007422)
- *Taxodium distichum - Nyssa aquatica / Fraxinus caroliniana* Floodplain Forest (CEGL007431) is a brownwater Atlantic Coastal Plain seasonally flooded type of flowing rivers.
- *Taxodium distichum - Populus heterophylla* Floodplain Forest (CEGL005201)
- *Taxodium distichum - Taxodium ascendens / Panicum hemitomon - Sclerolepis uniflora* Swamp Woodland (CEGL004465)
- *Taxodium distichum - Taxodium ascendens / Panicum hemitomon* Swamp Woodland (CEGL004466)
- *Taxodium distichum / Cephalanthus occidentalis / Boehmeria cylindrica - Ceratophyllum muricatum* Maritime Swamp Forest (CEGL004079)
- *Taxodium distichum / Cephalanthus occidentalis / Juncus repens* Swamp Woodland (CEGL004653)
- *Taxodium distichum / Planera aquatica - Forestiera acuminata* Lakeshore Swamp Woodland (CEGL007909)
- *Taxodium distichum* East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)
- *Taxodium distichum* West Gulf Coastal Plain Lakeshore Swamp Woodland (CEGL008497)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Mississippi between M125 and M130 and in the vicinity of M45.

Global Range: This bald-cypress swamp is found in the Atlantic and Gulf coastal plains of the United States. Stands are possible in suitable habitat anywhere within the range of *Taxodium distichum*, i.e., the lower Atlantic Coastal Plain from Virginia to southern Florida, the lower Gulf Coastal Plain to southeastern Texas, and the Mississippi River Alluvial Plain to southern Illinois. However, it is more commonly recognized outside of, or near the edge of, the range of *Nyssa aquatica* which otherwise is frequently codominant with *Taxodium distichum*. Such areas include southwestern Arkansas and northwestern Louisiana, southeastern Oklahoma, eastern Mississippi and adjacent Alabama, southern Indiana, peninsular Florida, northeastern Virginia, eastern Maryland and Delaware.

Nations: US

States/Provinces: AL, AR, FL, GA, IL, IN, KY, LA, MO, MS, NC, OK, SC, TN, TX:S3, VA

TNC Ecoregions: 31:C, 38:C, 40:C, 41:C, 42:C, 43:C, 44:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions (1994/95): 222A:CC, 222Cg:CC?, 222D:CP, 222G:CC, 231Bg:CCC, 231E:CP, 231Fa:CCC, 232Bb:CCC, 232C:CC, 232Fa:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC

Federal Lands: DOE (Savannah River Site); NPS (Chickasaw NRA, Natchez Trace); USFS (Angelina, Apalachicola, Conecuh, Davy Crockett, De Soto, Delta, Holly Springs?, Homochitto?, Kisatchie, Ocala, Osceola, Sabine, Sam Houston, Shawnee, St. Francis?, Tombigbee?, Tuskegee?); USFWS (Chickasaw NWR, Reelfoot, Military Ocean Terminal)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.102, NATR.103, NATR.553.

Local Description Authors: M.J. Russo

Global Description Authors: M. Guetersloh, mod. S. Landaal and D. Faber-Langendoen

References: Allard 1990, Ambrose 1990a, Applequist 1959, Blair and Hubbell 1938, Bruner 1931, Burdant et al. 1977, Burns and Honkala 1990a, Campbell pers. comm., Christensen 1988, Cowardin et al. 1979, Dennis 1988, Diamond 1993, Duck and Fletcher 1945, Evans 1991, Evans et al. 2009, Ewel and Odum 1984b, Eyre 1980, FNAI 1992a, FNAI 2010a, Faircloth 1971, Foti 1994a, Foti 1994b, Foti et al. 1994, Hoagland 1997, Hoagland 2000, Hoagland et al. 1996, Homoya et al. 1988, Illinois Nature Preserve Commission 1973, Klawitter 1962, Küchler 1964, LNHP 2009, Little 1980b, Martin et al. 1993a, Mitsch and Gosselink 1986a, NatureServe Ecology - Southeastern U.S. unpubl. data, NatureServe n.d., Nelson 1986, Nelson 2010, Nordman et al. 2011, Oberholster 1993, Osborn 1941, Penfound and Hall 1939, Pyne 1994, Radford and Martin 1975, Rawinski 1992, Rice 1963, Robertson et al. 1984, Salas et al. 2010c, Schafale 2012, Schafale and Weakley 1990, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, TNHS unpubl. data, Turner et al. 1999, UNESCO 1973, Van Kley and Hine 1998, Voigt and Mohlenbrock 1964, Wharton 1989, Wharton et al. 1982, White and Anderson 1970, White and Madany 1978, Wieland 1994b, Wieland 2000b, Zollner pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G034. Oak - Sweetgum Floodplain Forest

Red Maple - Green Ash Seasonally Flooded Swamp

***Acer rubrum - Fraxinus pennsylvanica / Saururus cernuus - (Phanopyrum gymnocarpon)* Swamp Forest**
Red Maple - Green Ash / Lizard's-tail - (Savanna Panicgrass) Swamp Forest
Identifier: CEGL007380

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Southeastern Sweetgum - Green Ash Floodplain Forest (A3625)
Association	Red Maple - Green Ash Seasonally Flooded Swamp

ELEMENT CONCEPT

Global Summary: These are temporarily to seasonally flooded bottomland or swamp forests found on somewhat poorly to very poorly drained muck or clay loam soil. Stands are dominated by *Acer rubrum*, or by a combination of *Acer rubrum, Fraxinus pennsylvanica*, and *Liquidambar styraciflua*; *Acer rubrum* may be present in all woody strata. The canopy can range in density from 50 to 90% cover. Additional tree species include *Acer negundo, Nyssa aquatica, Nyssa sylvatica, Quercus michauxii*, and *Ulmus americana*, among others. The sparse to moderate tall-shrub and short-shrub layers may contain *Acer rubrum, Carpinus caroliniana, Cornus foemina, Ilex decidua, Itea virginica, Lindera benzoin, Nyssa aquatica*, and *Quercus laurifolia*. Also present are the vines *Berchemia scandens, Bignonia capreolata, Toxicodendron radicans*, and *Vitis rotundifolia*. The herbaceous layer can be dominated by *Arisaema dracontium, Boehmeria cylindrica, Impatiens capensis, Leersia virginica, Microstegium vimineum* (invasive exotic), *Onoclea sensibilis, Packera glabella, Penthorum sedoides, Phanopyrum gymnocarpon, Pilea pumila*, and/or *Saururus cernuus*. Examples have been documented in the Piedmont of Georgia, the coastal plains of Mississippi, and the Interior Low Plateau of Tennessee.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This red maple swamp forest was sampled at three locations in the park. Sites are temporarily to seasonally flooded bottomlands with somewhat poorly to very poorly drained muck or clay loam soil. The unvegetated surface is made up of litter/duff, wood, bare soil, and standing water. Evidence of disturbance includes trash, wind damage, and the presence of exotic plants.
Global Environment: These are temporarily to seasonally flooded bottomland or swamp forests found on somewhat poorly to very poorly drained muck or clay loam soil. Wharton et al. (1982) cite the topographic setting for the "Red maple-green ash" type as wet flats and alluvial floodplains.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to very dense (50-90% cover) canopy, 20-50 m tall, and sparse to moderate (10-50%) subcanopy (15-20 m) are dominated by *Acer rubrum*; additional tree species include *Acer negundo, Liquidambar styraciflua, Nyssa sylvatica*, and *Ulmus americana*, among others. The sparse to moderate (5-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers may contain *Acer rubrum, Carpinus caroliniana, Fraxinus pennsylvanica, Itea virginica, Nyssa aquatica*, and *Quercus laurifolia*. The herbaceous layer (60%) can be dominated by *Microstegium vimineum* (invasive exotic), *Penthorum sedoides, Phanopyrum gymnocarpon, Saururus cernuus*, and/or *Toxicodendron radicans*.
Global Vegetation: Stands are dominated by *Acer rubrum*, or by a combination of *Acer rubrum, Fraxinus pennsylvanica*, and *Liquidambar styraciflua*; *Acer rubrum* may be present in all woody strata and may be *Acer rubrum var. drummondii* in some examples. The canopy can range in density from 50 to 90% cover. Additional tree species include *Acer negundo, Nyssa aquatica, Nyssa sylvatica*, and *Ulmus americana*, among others. The sparse to moderate (5-50%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers may contain *Acer rubrum, Carpinus caroliniana, Fraxinus pennsylvanica, Itea virginica, Lindera benzoin, Nyssa aquatica*, and *Quercus laurifolia*. The herbaceous layer (60%) can be dominated by *Microstegium vimineum* (invasive exotic), *Penthorum sedoides, Phanopyrum gymnocarpon*, and/or *Saururus cernuus*. In addition, other herbs that may be present include *Carex grayi, Laportea canadensis*, and *Leersia virginica* (NatureServe Ecology - Southeastern U.S. unpubl. data 2015). Wharton (1978) describes a stand from the Alcovy River floodplain downstream of the Highway 278 bridge (Newton County, Georgia) as containing *Acer rubrum, Fraxinus pennsylvanica, Liquidambar styraciflua*, and *Quercus michauxii*, with an understory of *Cornus foemina (= Cornus stricta), Ilex decidua*, and *Lyonia ligustrina*. Also present are the vines *Berchemia scandens, Bignonia capreolata, Toxicodendron radicans*, and *Vitis rotundifolia*. Herbs and ferns include *Arisaema dracontium, Boehmeria cylindrica, Impatiens capensis, Onoclea sensibilis, Packera glabella, Pilea pumila*, and *Saururus cernuus*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fraxinus pennsylvanica*, *Itea virginica*
Herb (field)	Liana	*Toxicodendron radicans*
Herb (field)	Flowering forb	*Penthorum sedoides*, *Saururus cernuus*
Herb (field)	Graminoid	*Microstegium vimineum*, *Phanopyrum gymnocarpon*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum*, *Acer rubrum* var. *drummondii*
Tree canopy	Broad-leaved deciduous tree	*Fraxinus pennsylvanica*, *Liquidambar styraciflua*
Herb (field)	Flowering forb	*Saururus cernuus*
Herb (field)	Graminoid	*Microstegium vimineum*, *Phanopyrum gymnocarpon*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acer rubrum*, *Fraxinus pennsylvanica*, *Penthorum sedoides*
Global: *Acer rubrum*, *Acer rubrum* var. *drummondii*, *Fraxinus pennsylvanica*, *Phanopyrum gymnocarpon*, *Saururus cernuus*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Perilla frutescens* (Low)
Global: Invasive/Exotic Plants: *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (ruderal) (6-Aug-2015).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This type is no longer deemed to be "ruderal" and is therefore placed in *Liquidambar styraciflua - Fraxinus pennsylvanica - Acer rubrum* Flooded & Swamp Forest Alliance (A3625) in Oak - Sweetgum Floodplain Forest Group (G034). An alternative placement would be *Fraxinus pennsylvanica - Platanus occidentalis - Ulmus americana* Coastal Plain Floodplain Forest Alliance (A3707) in Southern Ash - Elm - Willow Floodplain Forest Group (G759).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in the vicinity of M175 (Mississippi), and M368, M383 (Tennessee). There are also AA points from near M48 (Mississippi).
Global Range: This association has been documented from the East Gulf Coastal Plain and Upper East Gulf Coastal Plain of Mississippi and from the Interior Low Plateau of Tennessee. It is likely to occur in Alabama, and it has been reported from the Piedmont of Georgia **(**Wharton et al. 1982).
Nations: US
States/Provinces: AL, GA, MS, TN
TNC Ecoregions: 43:C, 44:C, 52:C, 53:C
USFS Ecoregions (1994/95): 221:C, 222Eg:CCC, 231Aa:CCC, 231Bg:CCC, 232Bb:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.161, NATR.620, NATR.622; AA points N0023, N0063, N0551.
Local Description Authors: M.J. Russo, mod. M. Pyne
Global Description Authors: M. Pyne
References: Eastern Ecology Working Group n.d., Nordman et al. 2011, Wharton 1978, Wharton et al. 1982

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest

***Platanus occidentalis - Liquidambar styraciflua - (Ulmus americana) / (Crataegus viridis)* Floodplain Forest**
American Sycamore - Sweetgum - (American Elm) / (Green Hawthorn) Floodplain Forest
Identifier: CEGL007335

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Southeastern Sweetgum - Green Ash Floodplain Forest (A3625)
Association	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest

ELEMENT CONCEPT

Global Summary: This floodplain forest of the Upper East and West Gulf coastal plains has a canopy dominated by *Platanus occidentalis* and *Liquidambar styraciflua*. Examples may be found on stabilized natural levees, point bars and first bottoms of large streams and rivers. Depending upon location and previous disturbance history (including hydrologic regime), a number of other tree species may also be present in lesser amounts. These may include *Ulmus americana, Carya illinoinensis, Nyssa biflora, Celtis laevigata, Populus deltoides, Quercus nigra, Salix nigra, Fraxinus pennsylvanica, Betula nigra, Acer negundo*, and *Carya aquatica*. Shrubs are sparse to moderately dense in this community with covers ranging from 10-40%. Species may include *Crataegus viridis, Ilex decidua, Lindera benzoin, Carpinus caroliniana*, and *Aesculus pavia var. pavia*. Characteristic herbs include *Elymus hystrix, Boehmeria cylindrica, Chasmanthium latifolium*, and *Viola* spp. Patches of *Arundinaria gigantea* can be common in this community.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sycamore - sweetgum floodplain forest was sampled at eight locations in the park. Sites are intermittently to temporarily flooded bottomlands. Soils include well- to moderately well-drained silt loam and somewhat to very poorly drained silty clay. The unvegetated surface is dominated by litter/duff with some wood and occasional bare soil and standing water. Evidence of disturbance includes roads/trails, past logging/clearing, flooding, wind damage, erosion, and the presence of exotic plants.

Global Environment: This forest occurs on stabilized natural levees, point bars and first bottoms of small- to large-sized alluvial streams and rivers in the Gulf Coastal Plain from Texas as far eastward as Alabama and Georgia. Soils are seasonally/temporarily flooded. In much of its range this community is inundated or saturated typically for 1 or 2 months during the growing season with a frequency ranging from 51 to 100 years out of every 100. The inundation persists almost continuously during the winter and early spring (Wharton et al. 1982, Smith 1988c).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of this community is quite variable, ranging from moderately dense (70% cover) mature forests 20-50 m tall to very dense (90%) stunted forests 5-10 m tall. *Liquidambar styraciflua* and *Platanus occidentalis* dominate; additional tree species include *Quercus nigra* and *Ulmus americana*. The sparse to moderate (20-60%) subcanopy (15-20 m) includes canopy species, *Acer rubrum, Carpinus caroliniana, Celtis laevigata, Ostrya virginiana*, and *Ulmus alata*. Common and/or abundant species in the sparse to moderate (10-70%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers include *Arundinaria gigantea, Carpinus caroliniana, Carya* spp., *Fraxinus pennsylvanica, Quercus* spp., and *Ulmus* spp. The herbaceous layer (10-40%) includes *Botrychium dissectum, Carex* spp., *Chasmanthium* spp., *Polygonum virginianum, Polystichum acrostichoides, Solidago* spp., and *Symphyotrichum lateriflorum*. Vines (5-20%) include *Bignonia capreolata, Lonicera japonica* (exotic), *Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.

Global Vegetation: The canopy of stands of this association is dominated by *Platanus occidentalis* and *Liquidambar styraciflua*. The canopy cover ranges from 60-100%. Other canopy associates may include *Carya illinoinensis, Nyssa biflora, Celtis laevigata, Populus deltoides, Quercus nigra, Salix nigra, Fraxinus pennsylvanica, Betula nigra, Acer negundo*, and *Carya aquatica*. *Ulmus americana* may also be present in some examples and may have been an historically common component of this type. However, *Ulmus americana* is currently less abundant due to a vascular fungus (Dutch elm disease) that has severely reduced populations of this species (Harlow et al. 1991). Shrubs are sparse to moderately dense in this community with covers ranging from 10-40%. Floodplain communities in general are particularly prone to exotics, likely due to frequent flooding disturbances of the ground cover and the deposition of high-nutrient alluvial material. *Lonicera japonica, Microstegium vimineum*, and *Ligustrum sinense* may come to dominate large areas of this forest to the exclusion of native species. More floristic data are available (NatureServe Ecology unpubl. data), but more comprehensive data are needed.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Platanus occidentalis*, *Ulmus americana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Carpinus caroliniana*, *Fraxinus pennsylvanica*
Shrub/sapling (tall & short)	Graminoid	*Arundinaria gigantea*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Herb (field)	Flowering forb	*Polygonum virginianum*, *Symphyotrichum lateriflorum*
Herb (field)	Graminoid	*Carex cherokeensis*, *Chasmanthium latifolium*, *Chasmanthium sessiliflorum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Platanus occidentalis*, *Ulmus americana*
Short shrub/sapling	Broad-leaved deciduous tree	*Carpinus caroliniana*, *Ilex decidua*, *Lindera benzoin*
Short shrub/sapling	Broad-leaved deciduous shrub	*Aesculus pavia*, *Crataegus viridis*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Arundinaria gigantea*, *Carex cherokeensis*, *Chasmanthium latifolium*, *Elymus virginicus*
Global: *Arundinaria gigantea*, *Boehmeria cylindrica*, *Chasmanthium latifolium*, *Elymus hystrix*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Murdannia keisak* (Medium/Low), *Poncirus trifoliata* ()
Global: **Vulnerable Plants**: *Amsonia ludoviciana* (G3); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (25-Feb-2004). There is little data available to support a comprehensive evaluation of this forest association. It has a potentially large range from the West Gulf Coastal Plain across the Mississippi River to the Upper East Gulf Coastal Plain. However, intact flooding regimes of coastal plain rivers are necessary to perpetuate this type, and most such rivers within this type's range have been altered through dam construction and/or channelization. The extent to which this forest will continue to exist under altered flow regimes is unknown. More data are needed to determine the stability of this natural forest, as opposed to non-natural examples with similar species composition. Given these factors a rank of G3G4 has been assigned.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This association was originally defined to cover a very broad geographic range (from western Texas to the Coastal Plain of North Carolina and Virginia) and may need substantial revision. Its range has subsequently become more restricted (currently to the Upper East Gulf Coastal Plain, and the Upper West Gulf Coastal Plain and West Gulf Coastal Plain from Georgia and Alabama west to Texas).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (7) and Tennessee (1) in the vicinity of M25, M55, M70, M80, and M320.
Global Range: This community ranges across the Gulf Coastal Plain from Georgia to Texas, but is apparently absent from the Mississippi River Alluvial Plain (but possibly in the Red River Plain). It may occur as far north as western Tennessee.
Nations: US
States/Provinces: AL, AR?, GA, LA, MS, TN, TX:S4
TNC Ecoregions: 40:C, 41:C, 43:C, 53:C
USFS Ecoregions (1994/95): 222Cg:CCC, 231Be:CCC, 231Bh:CCC, 231Bi:CCC, 231Ef:CCC, 231Eg:CCP, 231Eh:CCC, 232Bb:CCC, 232Bd:CCC, 232F:CC, 234Ai:PPP
Federal Lands: DOD (Fort Benning); NPS (Natchez Trace, Shiloh, Vicksburg); USFS (Angelina, Bienville, Davy Crockett, Holly Springs, Kisatchie, Sabine, Sam Houston, St. Francis?, Tombigbee?, Tuskegee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.172, NATR.339, NATR.538, NATR.540, NATR.541, NATR.543, NATR.565.
Local Description Authors: M.J. Russo
Global Description Authors: J.E. Mohan, mod. K.D. Patterson and S. Landaal, mod. R.E. Evans
References: Allard 1990, Diamond 1993, Eyre 1980, Harlow et al. 1991, LNHP 2009, Lea et al. 2013, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Oberholster 1993, Schotz pers. comm., Smith 1988c, Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNHS unpubl. data, USFS 1988, Wharton et al. 1982, Wieland 1994b, Wieland 2000b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Laurel Oak Bottomland Forest

***Quercus laurifolia / Carpinus caroliniana / Justicia ovata* Riparian Forest**
Laurel Oak / American Hornbeam / Loose-flower Water-willow Riparian Forest
Identifier: CEGL007348

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Coastal Plain Oak - Loblolly Pine Floodplain Forest (A3628)
Association	Laurel Oak Bottomland Forest

ELEMENT CONCEPT

Global Summary: This bottomland forest often borders blackwater streams in the Atlantic and Gulf coastal plains. It is dominated by *Quercus laurifolia*, but *Nyssa biflora* is common as well. Other species that occur sparingly include *Taxodium distichum, Quercus nigra, Nyssa aquatica, Liquidambar styraciflua*, and *Acer rubrum*. *Fraxinus caroliniana* and *Carpinus caroliniana* are characteristic of the subcanopy. Dominance of the shrub layer may vary from stand to stand. Occasionally, *Arundinaria gigantea* or *Sabal minor* will form a conspicuous understory cover. *Itea virginica* may also dominate. The ground surface is covered by a combination of decaying leaves and exposed mud. The sparse herbaceous layer often contains only *Justicia ovata, Saururus cernuus*, and *Proserpinaca palustris*, but other species are possible, including *Asclepias perennis* and *Campsis radicans*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This laurel oak bottomland forest was sampled at three locations in the park. Sites are seasonally/temporarily flooded depressions and floodplains with very poorly drained muck soil. The unvegetated surface is dominated by litter/duff with some wood, bare soil and standing water. Evidence of disturbance includes roads/trails, flooding, and the presence of exotic plants.
Global Environment: This bottomland forest often borders blackwater streams in the Atlantic and Gulf coastal plains. The ground surface is covered by a combination of decaying leaves and exposed mud; the herbaceous layer is sparse.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-80% cover) canopy, 20-35 m tall, is dominated by *Quercus laurifolia*, as is the sparse (30-40%) subcanopy (10-20 m); additional tree species may include *Liquidambar styraciflua, Pinus taeda, Quercus lyrata, Quercus michauxii, Quercus nigra, Quercus pagoda, Quercus phellos, Quercus texana*, and *Ulmus americana*. The sparse (20-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are comprised of *Carpinus caroliniana, Fraxinus pennsylvanica, Quercus laurifolia*, other *Quercus* spp., and *Sebastiania fruticosa*. The herbaceous layer is sparse (20-40%) and may include *Boehmeria cylindrica, Chasmanthium*, spp., *Mitchella repens, Saururus cernuus*, and *Trachelospermum difforme*. Vines (20-30%), often found climbing into the shrub layers, include *Bignonia capreolata, Campsis radicans, Smilax glauca*, and *Smilax rotundifolia*.
Global Vegetation: This bottomland forest is dominated by *Quercus laurifolia*, but *Nyssa biflora* is common as well. Other species that occur sparingly include *Taxodium distichum, Quercus nigra, Nyssa aquatica, Liquidambar styraciflua*, and *Acer rubrum*. *Fraxinus caroliniana* and *Carpinus caroliniana* are characteristic of the subcanopy. Dominance of the shrub layer may vary from stand to stand. Occasionally, *Arundinaria gigantea* or *Sabal minor* will form a conspicuous understory cover. *Itea virginica* may also dominate. The ground surface is covered by a combination of decaying leaves and exposed mud. The sparse herbaceous layer often contains only *Justicia ovata, Saururus cernuus*, and *Proserpinaca palustris*, but other species are possible, including *Asclepias perennis* and *Campsis radicans*. In a stand in the Ocala National Forest (Florida), the canopy includes *Quercus laurifolia, Liquidambar styraciflua, Fraxinus pennsylvanica, Acer rubrum, Carya aquatica*, and *Sabal palmetto*; subcanopy species include canopy species and *Nyssa biflora, Carpinus caroliniana, Taxodium distichum*, and *Persea palustris*. Woody vines include *Parthenocissus quinquefolia, Smilax bona-nox, Smilax glauca, Smilax laurifolia, Toxicodendron radicans*, and *Vitis aestivalis*. Shrubs include *Sabal minor, Itea virginica, Sideroxylon lycioides*, and *Viburnum obovatum*. Herbs include *Crinum americanum, Hypoxis curtissii, Dichanthelium* sp., *Osmunda regalis var. spectabilis*, and *Rhynchospora mixta*. Also present are the epiphytes *Tillandsia usneoides, Tillandsia bartramii*, and *Phlebodium aureum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus laurifolia*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Carpinus caroliniana*, *Fraxinus pennsylvanica*, *Quercus laurifolia*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Sebastiania fruticosa*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Mitchella repens*, *Saururus cernuus*, *Trachelospermum difforme*
Herb (field)	Graminoid	*Chasmanthium laxum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Boehmeria cylindrica*, *Carpinus caroliniana*, *Justicia ovata*, *Quercus laurifolia*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Triadica sebifera* (High)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (15-Oct-2002). This is not an inherently rare forest type. It is widely distributed, but is restricted to a particular set of environmental conditions, primarily on blackwater streams. Some examples are protected on public land. Many examples have been lost to flooding from impoundments, timber removal, and conversion to agriculture or other commercial forest types. Threats include fragmentation from powerline corridors and sewerline easements, siltation from land disturbance and development upstream, and anthropogenic flooding from wildlife subimpoundments and other hydrologic enhancements. The exotic species *Lonicera japonica, Ligustrum sinense*, and *Microstegium vimineum* may invade stands of this association. Stands on impounded rivers may suffer from altered hydrologies.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: There are ACE (Ashepoo-Combahee-Edisto) data; see also Jones et al.'s (1981b) Laurel oak - water oak community (22 stands sampled). This association is known from TNC's Altamaha River Bioreserve. It is also reported from Fort Gordon, Georgia (L. Gawin pers. comm.). Related vegetation in the Mobile-Tensaw Delta WMA in Alabama is actually dominated primarily by *Nyssa biflora* (A. Schotz pers. comm.). This type is described as *Nyssa aquatica - Fraxinus pennsylvanica - Taxodium distichum / Sabal minor* Floodplain Forest (CEGL008463).
Global Similar Associations:

- *Nyssa aquatica - Fraxinus pennsylvanica - Taxodium distichum / Sabal minor* Floodplain Forest (CEGL008463) is similar, but stands are dominated by *Nyssa biflora*.
- *Nyssa biflora - Quercus nigra - Quercus laurifolia - Pinus taeda / Carpinus caroliniana* Riparian Forest (CEGL007350) formerly in the same alliance as this (Weakley et al. 1996).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Mississippi between M70 and M75, M150 and M155, and in the vicinity of M130.
Global Range: This forest is found in the Atlantic and Gulf coastal plains from North Carolina south to Florida and west to Alabama and possibly Mississippi.
Nations: US
States/Provinces: AL:S3, FL, GA, MS, NC, SC
TNC Ecoregions: 43:C, 53:C, 55:C, 56:C, 57:C
USFS Ecoregions (1994/95): 231Bg:CCC, 231Bi:CCC, 232Bq:CCC, 232Bs:CCC
Federal Lands: DOD (Fort Benning, Fort Gordon?); DOE (Savannah River Site); NPS (Natchez Trace); USFS (Francis Marion, Ocala)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.516, NATR.520, NATR.536.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal
References: Allard 1990, Jones et al. 1981b, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Overcup Oak - Sweetgum Bottomland Forest

***Quercus lyrata - Liquidambar styraciflua / Forestiera acuminata* Floodplain Forest**
Overcup Oak - Sweetgum / Eastern Swamp-privet Floodplain Forest
Identifier: CEGL002424

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Overcup Oak Bottomland Forest (A3629)
Association	Overcup Oak - Sweetgum Bottomland Forest

ELEMENT CONCEPT

Global Summary: This forest is common in river swamps and low, moist bottomlands in the Mississippi River Alluvial Plain, the Red River Valley of Louisiana, and adjacent parts of the West Gulf Coastal Plain of Texas and Arkansas. It ranges north to southern Illinois, southeastern Indiana, and western Kentucky, and east to parts of Mississippi and Alabama. The mosaic of possible hydrologic conditions results in considerable species diversity, but *Quercus lyrata* and *Liquidambar styraciflua* are usually dominant. It is distinguished from other *Quercus lyrata* forests of the Gulf region by lacking *Quercus texana*, and having more *Liquidambar styraciflua* than *Carya aquatica* [see Similar Associations). This type is drier than forests in which *Carya aquatica* is codominant. Other canopy species commonly include *Ulmus americana, Carya aquatica, Fraxinus profunda, Celtis laevigata, Acer rubrum, Acer saccharinum*, and *Quercus palustris* (north of the range of *Quercus texana*). Trees in this forest are generally tall (30-45 m [100-150 feet]), and often exhibit thick trunks and stout branches that form broad irregular crowns. Oaks are generally of medium height, while *Liquidambar* may reach 45 m (150 feet) in height with tall, straight trunks. Canopy closure is complete (70-100%), and subcanopy, shrub, herbaceous, and vine density and diversity are directly affected by the timing, duration, and depth of seasonal flooding. The subcanopy in some occurrences is dense and is dominated by *Crataegus viridis* and *Ulmus americana*. The shrub layer is dominated by *Forestiera acuminata, Planera aquatica, Cornus foemina (= Cornus stricta), Ilex decidua*, and *Cephalanthus occidentalis*. Vines may be dense and include *Brunnichia ovata, Campsis radicans*, and *Vitis* spp. Commonly encountered herbaceous species include *Boehmeria cylindrica, Carex lupulina, Commelina virginica, Laportea canadensis, Ludwigia palustris, Pilea pumila, Polygonum hydropiperoides, Triadenum tubulosum*, and *Cinna arundinacea* (in the more northern parts of the association's distribution). Herbaceous growth and diversity will be limited in areas of consistently longer hydroperiod. Stands occur on level to gently sloping bottomlands along streams and rivers, in sinkhole basins, or in shallow sloughs. Flooding occurs seasonally or during periods of heavy precipitation, often resulting in ponding. A high water table is present. The deep soils (greater than 100 cm in depth), derived from alluvial parent material, are somewhat poorly drained and are seasonally wet.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This overcup oak - sweetgum forest was sampled at two locations in the park. Sites are seasonally or permanently flooded bottomlands and floodplains with very poorly drained muck soil. The unvegetated surface is dominated by standing water with some litter/duff, some wood and bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.

Global Environment: Stands occur on level to gently sloping bottomlands along streams and rivers, in sinkhole basins, or in shallow sloughs, usually in the most poorly drained floodplain backwaters where flooding extends well into the growing season and soils are clayey (Wharton et al. 1982). Flooding occurs seasonally or during periods of heavy precipitation, often resulting in ponding. A high water table is present. The deep soils (greater than 100 cm in depth), derived from alluvial parent material, are somewhat poorly drained and are seasonally wet. Soils which support this community include dominantly level or nearly level soils that formed in alluvium on poorly drained floodplains. These soils are deep, fine- to very fine-textured (clays) and have excessive moisture available for vegetation during the growing season (hydric). They have a udic or aquic moisture regime and a thermic temperature regime (classification: Alfisols - Vertic Haplaquolls, Haplaquepts, Haplaquents - fine, very fine - montmorillonitic, mixed-mesic). In Illinois, soil series which are typically found supporting this element include Darwin silty clay, Jacob clay, Cape silty clay loam, and Karnak silty clay. In Illinois, the soil series are poorly to very poorly drained, light-colored, extremely acidic, and formed on deep silty clay sediments more than 125 cm thick. Bedrock is deeply buried (>170 cm) and consists of Paleozoic deposits and stratified Cenozoic marine deposits. This community is subject to frequent, shallow flooding which can extend well into the growing season. Occasional prolonged deep flooding causes increased tree mortality, creating openings which are quickly recolonized after the water recedes (Johnson and Bell 1976).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of the two sampled stands is quite different; one is a dense (20-70% cover) canopy 15-20 m tall, and sparse (40%) subcanopy (10-15 m), while the other has a sparse (20%) canopy 5-10 m tall and moderate (60%) tall-shrub layer. *Quercus lyrata* and *Liquidambar styraciflua* dominate the tree layers; *Nyssa aquatica, Nyssa biflora*, and *Quercus laurifolia* may also be present. Shrubs include *Acer rubrum, Cephalanthus occidentalis, Diospyros virginiana, Forestiera acuminata, Ilex verticillata, Itea virginica, Planera aquatica, Salix nigra*, and *Vaccinium fuscatum*. Herbs are sparse; *Saururus cernuus* dominates. Vines (up to 20%) include *Brunnichia ovata, Smilax glauca*, and *Smilax rotundifolia*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Vegetation: This forest is dominated by broad-leaved deciduous trees with a southern affinity, such as *Quercus lyrata* and *Liquidambar styraciflua* (Voigt and Mohlenbrock 1964), but in southern Illinois, *Quercus palustris* often occurs within this element. Other canopy species commonly encountered include *Ulmus americana, Fraxinus profunda, Celtis laevigata*, and *Acer saccharinum*. Trees in this forest often exhibit thick trunks and stout branches that form a broad, irregular crown. Oaks are generally of medium height, while *Liquidambar styraciflua* may reach 45 m in height with tall, straight trunks which are clear of branches for two-thirds of its height. The subcanopy in some occurrences is dense and is dominated by *Crataegus viridis* and *Ulmus americana*. The shrub layer is dominated by *Forestiera acuminata, Planera aquatica, Cornus foemina (= Cornus stricta), Ilex decidua*, and *Cephalanthus occidentalis*. Commonly encountered herbaceous species include *Boehmeria cylindrica, Carex lupulina, Commelina virginica, Laportea canadensis, Ludwigia palustris, Pilea pumila, Polygonum hydropiperoides, Triadenum tubulosum*, and *Cinna arundinacea* (in the more northern parts of the association's distribution). Vines are often quite dense and include *Brunnichia ovata (= Brunnichia cirrhosa), Campsis radicans*, and *Vitis* spp. Vegetative density and diversity within this natural community fluctuates with the depth and duration of seasonal flooding. In a stand attributed to this type found in the Davy Crockett National Forest (Texas), vines include *Berchemia scandens, Bignonia capreolata, Brunnichia ovata, Campsis radicans, Cocculus carolinus, Smilax bona-nox, Toxicodendron radicans*, and *Wisteria frutescens*. Herbs include *Acalypha rhomboidea, Amsonia* sp., *Boehmeria cylindrica, Leersia oryzoides, Lobelia cardinalis, Panicum rigidulum var. rigidulum, Polygonum virginianum, Saururus cernuus, Trachelospermum difforme, Triadenum* sp., *Viola* sp., and *Pleopeltis polypodioides*.

Considerable variability in species composition is possible within and among occurrences of this natural community throughout its range. This variability is a result of hydrologic influences, particularly the duration and depth of seasonal flooding, as well as soil physical properties, and the amount of light penetrating the tree canopy. In southern Illinois, the typical variety of red maple found in this type is *Acer rubrum var. drummondii*. Plant species which dominate this natural community have a strong southern affinity (Voigt and Mohlenbrock 1964) and reach their northernmost extension in the floodplains of the Mississippi and Ohio rivers in southern Illinois and Indiana.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus lyrata*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*, *Diospyros virginiana*, *Forestiera acuminata*, *Ilex verticillata*, *Itea virginica*
Herb (field)	Flowering forb	*Saururus cernuus*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus lyrata*, *Ulmus americana*
Tree canopy	Broad-leaved deciduous tree	*Fraxinus profunda*, *Nyssa aquatica*
Tree subcanopy	Broad-leaved deciduous tree	*Celtis laevigata*
Shrub/sapling (tall & short)	Liana	*Brunnichia ovata*, *Campsis radicans*, *Vitis palmata*
Tall shrub/sapling	Broad-leaved deciduous tree	*Ilex decidua*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Crataegus viridis*, *Forestiera acuminata*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Pilea pumila*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Forestiera acuminata*, *Quercus lyrata*, *Saururus cernuus*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium)
Global: Other Plants: *Quercus palustris* (G5, reaches its southernmost limits in this community), *Quercus texana* (G4G5, reaches its northernmost limits in this community)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (9-Oct-2001). Despite that this is a broad-ranging type, many stands have been impacted or destroyed by extensive clearing, timber harvesting, and hydrological alteration. It is possible that this type may be ranked higher (G3G4) because of extensive clearing, timber harvesting, and drainage of stands. Rank changed from G4G5 MP 2001-09-03.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: In this environment, *Quercus lyrata* is often present in nearly pure stands. In southern Illinois, where this community reaches the northern extension of its range, species with a more northern affinity (*Quercus palustris, Acer rubrum*) may occur in sufficient numbers to cause classification difficulties. The presence and relative density of *Quercus lyrata* should be the primary species characteristic used to identify this natural community. On the Sam Houston National Forest, a plot attributed here contains *Carya aquatica* and *Fraxinus pennsylvanica* and is difficult to place with certainty.
Global Similar Associations:

- *Quercus lyrata - Carya aquatica - (Quercus texana) / Forestiera acuminata* Floodplain Forest (CEGL002423) is wetter and possibly less diverse, with some range overlap.
- *Quercus lyrata - Carya aquatica* Floodplain Forest (CEGL007397) occurs on the Atlantic and East Gulf coastal plains.
- *Quercus lyrata - Quercus palustris / Acer rubrum var. drummondii / Itea virginica - (Lindera melissifolia)* Floodplain Forest (CEGL004778)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M205 and M210 and in the vicinity of M130.
Global Range: This community is most prevalent in northwestern Louisiana, southwestern Arkansas, and extreme eastern Texas but extends northward into Missouri, southern Illinois, western Tennessee, western Kentucky, and southern Indiana, and east to parts of Mississippi and Alabama.
Nations: US
States/Provinces: AL, AR, IL, IN, KY, LA, MO, MS, TN, TX:S4
TNC Ecoregions: 40:C, 41:C, 42:C, 43:C, 44:C, 53:P
USFS Ecoregions (1994/95): 231A:CP, 231Bg:CCC, 231C:CP, 231Ef:CCC, 231Eg:CCP, 231Eh:CCP, 232B:CP, 232C:CP, 232Fa:CCC, 232Fe:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC
Federal Lands: NPS (Natchez Trace, Shiloh); USFS (Angelina, Davy Crockett, Sam Houston, St. Francis); USFWS (Reelfoot?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.517, NATR.528.
Local Description Authors: M.J. Russo
Global Description Authors: M. Guetersloh, mod. S. Landaal and D. Faber-Langendoen
References: Behler 1988, Benyus 1989, Braun 1950, Bull and Farrand 1977, Campbell pers. comm., Clark and Hutchinson 1994, Cowardin et al. 1979, Diamond 1993, Evans 1991, Evans et al. 2009, Eyre 1980, Foti 1994b, Foti et al. 1994, Fralish 1988b, Homoya et al. 1988, Illinois Nature Preserve Commission 1973, Johnson and Bell 1976, Küchler 1964, LNHP 2009, McKnight et al. 1981, Miller and Tehon 1929, Mohlenbrock 1986, Mohlenbrock and Voigt 1959, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1985, Nelson 2010, Niering 1979, Nordman et al. 2011, Platt and Brantley 1993, Ribbeck pers. comm., Robertson et al. 1984, SAF 1967, Schotz pers. comm., Schwartz and Schwartz 1959, Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, Thornbury 1965, Turner et al. 1999, Turner et al. n.d., UNESCO 1973, Voigt and Mohlenbrock 1964, Wharton et al. 1982, White and Madany 1978, Zollner pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Swamp Chestnut Oak - Sweetgum Mesic Floodplain Forest

***Quercus michauxii - Quercus shumardii - Liquidambar styraciflua / Arundinaria gigantea* Swamp Forest**
Swamp Chestnut Oak - Shumard Oak - Sweetgum / Giant Cane Swamp Forest
Identifier: CEGL002099

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Interior Swamp Chestnut Oak Bottomland Forest (A3630)
Association	Swamp Chestnut Oak - Sweetgum Mesic Floodplain Forest

ELEMENT CONCEPT

Global Summary: This swamp chestnut oak - hardwood forest is a bottomland community found in the central and south-central United States along borders and first bottoms of rivers, streams, and swamps, particularly along the Mississippi River, Ohio River, Tennessee River and their tributaries. Soils which support this association are deep, moist, rich, loamy, typically somewhat acidic to circumneutral, and well-drained. Short periods of inundation in the fall and winter can occur. Canopy diversity can be high in this community. Stands are typically dominated by *Quercus michauxii, Quercus shumardii, Liquidambar styraciflua*, and *Carya laciniosa*. Other hickories which can be present include *Carya ovata* and *Carya alba*. Canopy closure is at or near 100%. The subcanopy is dense and dominated by *Carpinus caroliniana* and *Ulmus alata*. Dominant shrubs include *Ilex decidua, Cornus foemina*, and *Viburnum dentatum*. The herbaceous layer is dense and dominated by *Carex* spp. and a diverse and varied assemblage of grasses and forbs, including *Arundinaria gigantea* which often forms dense, almost impenetrable stands particularly where canopy openings allow sunlight to reach the forest floor. Vines are prevalent in the subcanopy and understory of this community; the most commonly encountered are *Toxicodendron radicans, Campsis radicans*, and *Parthenocissus quinquefolia*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This swamp chestnut oak - sweetgum forest was sampled at five locations in the park. Sites are temporarily flooded bottomlands and floodplains with moderately well-drained to poorly drained silt loam, clay loam, or silty clay soil. The unvegetated surface is dominated by litter/duff (up to 100%) with some wood and bare soil. Evidence of disturbance includes armadillo rooting, flooding, and the presence of exotic plants.

Global Environment: Key environmental factors include deep, rich alluvial soils, periodic flooding, and water near the surface during most of the year. Stands occur on level or nearly level to gently sloping soils that formed in alluvium on floodplains. They are subject to infrequent, short-duration, shallow flooding (<1.5 m). Seasonal flooding (early winter and late spring) contributes nutrients and sediments to this dynamic and productive ecosystem. Soils are deep, medium-textured, typically with a somewhat acidic or circumneutral pH. Ponding of water may occur where impermeable clay layers are present. Soils can be sandy on terraces and first bottoms. Soil information in Illinois was collected from site-specific field analysis completed by the USDA-Soil Conservation Service and USDA-County Soil Surveys.

Soils which support this natural community include dominantly level or nearly level to gently sloping soils that formed in alluvium on floodplains. These soils are deep, medium-textured, and have adequate or excessive moisture available for vegetation during the growing season. They have a udic or aquic moisture regime, a thermic temperate regime, and montmorillonitic or mixed mineralogy. Soils are Aquepts, Aqualfs, Aquents, Udolls, and Udalfs. Haplaquepts, Ochraqualfs, Fluvaquents, Natraqualfs, Ochraqualfs, and Hapludalfs are found in backswamp areas and older natural levees. Dystrochrepts, Udifluvents, and Fluvaquents occur in smaller areas. Soils Associations which would support this community in southern Illinois include Belknap-Wakeland, Darwin-Medway-Cairo, Jacob-Booker, Ginat-Weinbach-Sciotoville, Armiesburg-Emma, and Belknap-Bonnie-Cape. Bedrock is deeply buried (>175 cm) and consists of Paleozoic deposits and stratified Cenozoic marine deposits. Shale or sandstone bedrock can occur at about 170 cm.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (70-80% cover) canopy, 15-35 m tall, is codominated by *Liquidambar styraciflua* and *Quercus michauxii* along with less amounts of *Acer rubrum, Liriodendron tulipifera, Quercus nigra, Quercus pagoda, Quercus shumardii, Tilia americana var. caroliniana*, and *Ulmus americana*. Dominants in the moderate (40-50%) subcanopy (10-15 m) include *Acer rubrum var. trilobum, Carpinus caroliniana, Ostrya virginiana, Quercus michauxii, Tilia americana var. caroliniana, Ulmus alata, Ulmus americana*, and *Ulmus rubra*. The sparse (20-30%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are made up of canopy/subcanopy species along with various species of *Carya, Cornus, Fraxinus, Ilex, Quercus, Ulmus*, as well as *Asimina triloba* and *Sambucus canadensis*. Common and/or abundant herbs (20-30%) include *Cardamine bulbosa, Carex* spp., *Galium tinctorium, Onoclea sensibilis, Phanopyrum gymnocarpon*, and *Polygonum punctatum*. Vines (up to 20%) include *Bignonia capreolata, Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*.

Global Vegetation: This is a floodplain forest dominated by broad-leaved deciduous trees. Although canopy diversity can be high, this community is dominated by *Quercus michauxii, Quercus shumardii, Liquidambar styraciflua*, and sometimes *Carya laciniosa*. If *Quercus pagoda* is not a component of this type, that would restrict its range to regions to the interior and north of the Coastal Plain, but this was not the original intent. *Quercus pagoda* may be present in the Mississippi River Alluvial Plain, but will be rare or absent

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

in stands outside of the Coastal Plain (e.g., Interior Low Plateau, Ozarks). Trees exhibit good growth and attain heights in excess of 30 m (up to 60 m for *Quercus shumardii*), with straight, thick trunks which are clear of branches for nearly two-thirds of their height. Canopy closure is at or near 100%. The subcanopy is dense and dominated by *Carpinus caroliniana* and *Ulmus alata*. Dominant shrubs include *Ilex decidua, Cornus foemina*, and *Viburnum dentatum*. The herbaceous layer is dense and dominated by *Carex* spp. and a diverse and varied assemblage of grasses and forbs, including *Arundinaria gigantea*, which often forms dense, almost impenetrable stands particularly where canopy openings allow sunlight to reach the forest floor. Vines are prevalent in the subcanopy and understory of this community; the most commonly encountered are *Toxicodendron radicans, Campsis radicans*, and *Parthenocissus quinquefolia* (TNC 1995a). In the southern Cumberland Plateau of northern Alabama, the community is found on limestone-derived soils. The midstory stratum is dominated by *Ulmus rubra, Acer barbatum* and *Carpinus caroliniana*. Also in this area, *Aesculus pavia* is a characteristic species of the understory, in addition to scattered dense patches of *Arundinaria gigantea*.

Species variability and physiognomic differences within and among occurrences of this type are directly related to the duration and depth of seasonal flooding, soil physical properties, and the amount of light penetrating the tree canopy. Considerable variability in species composition is possible within and among occurrences of this natural community throughout its range. This variability is a result of hydrologic influences, particularly the duration and depth of seasonal flooding. Historically, giant cane was much more prevalent. In southern Illinois, Public Land Survey notes mention dense stands of this species, and Theodore Roosevelt describes canebrakes stretching for miles and so dense as to choke out other plants.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus shumardii*
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus michauxii*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus florida*, *Ilex decidua*, *Sambucus canadensis*
Herb (field)	Liana	*Bignonia capreolata*
Herb (field)	Flowering forb	*Galium tinctorium*, *Polygonum punctatum*
Herb (field)	Graminoid	*Phanopyrum gymnocarpon*
Herb (field)	Fern (Spore-bearing forb)	*Onoclea sensibilis*

Global

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus michauxii*
Tree canopy	Broad-leaved deciduous tree	*Carya laciniosa*, *Fraxinus pennsylvanica*, *Liquidambar styraciflua*, *Quercus pagoda*
Tree subcanopy	Broad-leaved deciduous tree	*Carpinus caroliniana*, *Carya laciniosa*, *Ulmus americana*
Shrub/sapling (tall & short)	Liana	*Campsis radicans*, *Parthenocissus quinquefolia*, *Toxicodendron radicans*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cornus foemina*, *Ilex decidua*, *Lindera benzoin*
Herb (field)	Flowering forb	*Galium circaezans*, *Impatiens capensis*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Arundinaria gigantea*, *Quercus michauxii*, *Quercus shumardii*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Clinopodium gracile* (), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Poncirus trifoliata* ()

Global: Other Plants: *Quercus texana* (G4G5, often found in this community on wet, poorly-drained clay soils in the Mississippi River Alluvial Basin)

Natchez Trace Parkway Threats Comments:

Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (4-Oct-2004). This is a widely distributed community, but high-quality extensive examples are rare. Extensive logging and drainage have reduced the extent of this type. Hydrological changes resulting from impoundments threaten the long-term existence and replacement of this type.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Distribution of this association in the Midwest needs further assessment. In Kentucky, the type is known from the Peal Wildlife Management Area, Ballard County, in the Upper East Gulf Coastal Plain, where it occurs adjacent to cypress sloughs and swamps. Examples occur on Macon Ridge, Louisiana. *Quercus shumardii* produces large quantities of acorns, but germination is low and regeneration is subsequently poor. As a result of these characteristics, *Quercus shumardii* may be absent from much of its original range. In such cases *Quercus michauxii* and *Quercus pagoda* are often the dominant oaks in this community type. The presence of only a few *Quercus shumardii* individuals may warrant its inclusion in this element. Careful consideration of past disturbance must be considered when determining the classification status of this natural community. Stands in the Bankhead National Forest of Alabama may occur on limestone-derived soils. *Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana* Floodplain Forest (CEGL004678) represents equivalent vegetation in the Atlantic Coastal Plain which is not otherwise included here.
Global Similar Associations:

- *Acer saccharum - Carya cordiformis / Asimina triloba* Floodplain Forest (CEGL005035)
- *Liquidambar styraciflua - Quercus michauxii - Carya laciniosa / Fagus grandifolia - (Aesculus flava)* Swamp Forest (CEGL007702) is a variant from the Interior Low Plateau of Tennessee.
- *Liquidambar styraciflua - Quercus michauxii / Acer rubrum var. drummondii / Packera glabella - Carex tribuloides* Wet Ravine Forest (CEGL008444)
- *Liquidambar styraciflua - Quercus pagoda - Carya* spp. / *Carpinus caroliniana / Carex* spp. Floodplain Forest (CEGL007353) is found in the northern Upper East Gulf Coastal Plain, with more *Quercus pagoda*, on slightly lower terraces.
- *Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana* Floodplain Forest (CEGL004678) is found in the Atlantic Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The five sampled sites are in Mississippi between M120 and M125 and in the vicinity of M70, M130, and M175.
Global Range: This community can occur on bottomlands and along streams and the borders of swamps in the Mississippi, Ohio and Tennessee river valleys from central Arkansas, Louisiana and Mississippi, to west-central Tennessee, northern Alabama, western Kentucky, southern Missouri, southern Illinois, and extreme southwestern Indiana. Distribution of this association in the Midwest and Cumberlands needs further assessment.
Nations: US
States/Provinces: AL, AR, IL, IN, KY, LA, MO, MS, OK?, TN
TNC Ecoregions: 38:C, 39:?, 40:C, 42:C, 43:C, 44:C, 50:C
USFS Ecoregions (1994/95): 221He:CCC, 222Al:CCC, 222Ao:CCP, 222Ca:CCC, 222Cb:CCC, 222Ch:CCC, 222Db:CCC, 222Dc:CCC, 222Di:CCC, 222Eb:CPP, 222Ff:CCC, 222Gc:CCC, 231A:CP, 231Bg:CCC, 231Bi:CCC, 231Bj:CCC, 231Cd:CCC, 231E:CP, 232B:CP, 232C:CP, 232F:CP, 234Ac:CCC, 234An:CCC, M221Cd:CCC
Federal Lands: NPS (Chickasaw NRA, Natchez Trace, Shiloh); USFS (Bankhead, Daniel Boone, Delta, Mark Twain, Ouachita, Ouachita (Coastal Plain), Ouachita (Mountains)?, Shawnee, St. Francis?, Tombigbee?); USFWS (Chickasaw NWR?, Reelfoot)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.077, NATR.104, NATR.160, NATR.507, NATR.534.
Local Description Authors: M.J. Russo
Global Description Authors: M. Guetersloh, mod. S. Landaal and D. Faber-Langendoen
References: Behler 1988, Benyus 1989, Braun 1950, Bull and Farrand 1977, Clark and Hutchinson 1994, Collingwood and Brush 1984, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Evans et al. 2009, Fralish 1988b, Homoya et al. 1988, Little 1980a, McKnight et al. 1981, Miller and Tehon 1929, Mohlenbrock 1986, Mohlenbrock and Voigt 1959, Nelson 1985, Nelson 2010, Niering 1979, Nordman et al. 2011, Platt and Brantley 1993, Powell 1985, Robertson et al. 1984, SAF 1967, Salas et al. 2010c, Schotz pers. comm., Schwartz and Schwartz 1959, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1995a, Thornbury 1965, Voigt and Mohlenbrock 1964, Wharton et al. 1982, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Sweetgum - Cherrybark Oak Floodplain Forest

***Liquidambar styraciflua - Quercus pagoda - Carya* spp. / *Carpinus caroliniana / Carex* spp. Floodplain Forest**
Sweetgum - Cherrybark Oak - Hickory species / American Hornbeam / Sedge species Floodplain Forest
Identifier: CEGL007353

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Coastal Plain Swamp Chestnut Oak Bottomland Forest (A3631)
Association	Sweetgum - Cherrybark Oak Floodplain Forest

ELEMENT CONCEPT

Global Summary: This bottomland hardwood forest is found on higher terraces of floodplains in the northern Upper East Gulf Coastal Plain and East Gulf Coastal Plain, as well as portions of the adjacent Piedmont, of the United States. The canopy of stands is dominated by *Liquidambar styraciflua, Quercus pagoda*, and *Carya* spp. (including *Carya cordiformis, Carya ovata, Carya laciniosa, Carya ovalis*). This type was originally described from Shiloh National Park (Hardin County, Tennessee), where the understory may contain *Carpinus caroliniana, Fraxinus pennsylvanica, Ulmus americana, Carya alba, Carya ovalis*, and *Quercus nigra*. Portions of the stand may exhibit canopy dominance by *Liquidambar styraciflua, Platanus occidentalis*, and *Carya* spp., with lower coverage by oaks. Shrubs include *Asimina triloba, Arundinaria gigantea*, and *Ilex decidua*, along with smaller individuals of successional tree species such as *Acer negundo* and *Celtis laevigata*. Woody and herbaceous vines found here include *Bignonia capreolata, Vitis rotundifolia, Parthenocissus quinquefolia, Dioscorea villosa, Smilax bona-nox, Toxicodendron radicans, Amphicarpaea bracteata*, and *Passiflora lutea*. Herbs include *Arisaema dracontium, Arisaema triphyllum, Aristolochia serpentaria, Hymenocallis caroliniana (= Hymenocallis occidentalis), Ruellia* sp., *Laportea canadensis, Polygonum virginianum, Spigelia marilandica, Carex debilis, Carex grayi, Carex squarrosa, Carex tribuloides, Chasmanthium latifolium, Viola* spp., and *Commelina virginica*. Examples of this association which have sustained extensive recent disturbance will likely contain much *Smilax* sp. and *Rubus* sp. in the shrub layer. The exotics *Ligustrum sinense, Alliaria petiolata*, and *Microstegium vimineum* may be present in examples of this association.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sweetgum - cherrybark oak forest was sampled at eight locations in the park. Sites are temporarily or intermittently flooded bottomlands. Soils are moderately well-drained silt, silt loam and silty clay or poorly drained clay loam, silt and silt loam. The unvegetated surface is dominated by litter/duff with some wood and bare soil. Evidence of disturbance includes flooding and the presence of exotic plants.
Global Environment: This bottomland hardwood forest is found on higher terraces of floodplains. Soils on which this type is found (Shiloh National Park, Hardin County, Tennessee) include the Collins and the Waverly silt loams, at an elevation of about 115 m (380 feet). It is also found at about 12 m (40 feet) elevation in Monroe County, Alabama, on a high terrace of the Alabama River.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (60-90% cover) canopy, 20-50 m tall, is codominated by *Liquidambar styraciflua* and *Quercus pagoda*, as is the moderate (30-50%) subcanopy (10-20 m); additional tree species include *Carpinus caroliniana, Fraxinus pennsylvanica, Liriodendron tulipifera, Pinus taeda, Quercus michauxii, Quercus nigra, Quercus phellos*, and *Ulmus americana*. The sparse to moderate (10-60%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Acer rubrum, Carya* spp., *Corylus americana, Fagus grandifolia*, and *Ilex* spp. The herbaceous layer (5-70%) may contain *Arundinaria gigantea, Boehmeria cylindrica, Carex* spp., *Leersia virginica*, and *Polygonum virginianum*. Common vines (10-30%) are *Bignonia capreolata, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy of stands of this bottomland hardwood forest is dominated by *Liquidambar styraciflua, Quercus pagoda*, and *Carya* spp. (including *Carya cordiformis, Carya ovata, Carya laciniosa, Carya ovalis*). The understory may contain *Carpinus caroliniana, Fraxinus pennsylvanica, Ulmus americana, Carya alba, Carya ovalis*, and *Quercus nigra*. Portions of the stand may exhibit canopy dominance by *Liquidambar styraciflua, Platanus occidentalis*, and *Carya* spp., with lower coverage by oaks. Shrubs include *Asimina triloba, Arundinaria gigantea* and *Ilex decidua*, along with smaller individuals of successional tree species such as *Acer negundo* and *Celtis laevigata*. Woody and herbaceous vines found here include *Bignonia capreolata, Vitis rotundifolia, Parthenocissus quinquefolia, Dioscorea villosa, Smilax bona-nox, Smilax rotundifolia, Menispermum canadense, Toxicodendron radicans, Amphicarpaea bracteata*, and *Passiflora lutea*. Herbs include *Arisaema dracontium, Arisaema triphyllum, Aristolochia serpentaria, Hymenocallis caroliniana (= Hymenocallis occidentalis), Ruellia* sp., *Leersia* sp., *Boehmeria cylindrica, Laportea canadensis, Polygonum virginianum, Spigelia marilandica, Carex debilis, Carex grayi, Carex squarrosa, Carex tribuloides, Chasmanthium latifolium, Viola* spp., and *Commelina virginica*. The exotics *Ligustrum sinense, Alliaria petiolata*, and *Microstegium vimineum* may be present in examples of this association.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus pagoda*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Polygonum virginianum*
Herb (field)	Graminoid	*Arundinaria gigantea*, *Leersia virginica*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya cordiformis*, *Carya laciniosa*, *Carya ovalis*, *Carya ovata*, *Liquidambar styraciflua*, *Quercus pagoda*
Tree subcanopy	Broad-leaved deciduous tree	*Carpinus caroliniana*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Arundinaria gigantea*, *Liquidambar styraciflua*, *Quercus pagoda*
Global: *Carpinus caroliniana*, *Carya cordiformis*, *Carya laciniosa*, *Carya ovalis*, *Carya ovata*, *Liquidambar styraciflua*, *Quercus pagoda*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Invasive/Exotic Plants: *Alliaria petiolata* (High/Medium), *Ligustrum sinense* (High/Medium), *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (5-Jan-2001). This bottomland forest is described from southern Tennessee and the East Gulf Coastal Plain and Piedmont of Alabama. It could occur in adjacent states (Arkansas, Mississippi). Its full range is not known, and a comparative assessment of its relationship to related types is not complete. It is not an inherently rare forest type, but is at least moderately widespread, and is presumed to be relatively common throughout its range, although its full range is not known. It is not restricted to any highly specific geologic substrates. It is poorly documented through EOs, and not much data are available on the specific condition of examples of this type. Some high-quality examples are protected on Shiloh National Military Park. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus pagoda, Carya* spp.) and loss of herbaceous species diversity from the disturbance effects of logging. In all probability, most examples which are not on public land have been repeatedly logged and their composition altered thereby. Remaining unprotected examples are threatened by timber removal, conversion to other managed forest types, and/or development into residential or commercial real estate. The exotics *Ligustrum sinense, Alliaria petiolata*, and *Microstegium vimineum* may be present in examples of this association. The Grank was formerly G3?. Changing it to G3G4 makes it evident that any uncertainty about the rank is in the G4 direction rather than the G2 direction.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Based on plot data from Shiloh National Military Park, Tennessee, and Alabama River, McDuffie Landing. The full range of this type is not known, and a comparative assessment of its relationship to related types (e.g., *Quercus pagoda - Quercus nigra / Halesia diptera / Chasmanthium sessiliflorum - Dicliptera brachiata* Floodplain Forest (CEGL007354)) is not complete. To the north, this type would conceptually blend into *Quercus michauxii - Quercus shumardii - Liquidambar styraciflua / Arundinaria gigantea* Swamp Forest (CEGL002099), and to the south it would blend into CEGL007354, but the precise range limits are not clear. However, this type occurs in areas which are not as flood prone as CEGL007354.
Global Similar Associations:

- *Liquidambar styraciflua - Quercus michauxii - Carya laciniosa / Fagus grandifolia - (Aesculus flava)* Swamp Forest (CEGL007702) of the southern Interior Low Plateau of Tennessee.
- *Quercus michauxii - Quercus shumardii - Liquidambar styraciflua / Arundinaria gigantea* Swamp Forest (CEGL002099) of more northerly distribution, on slightly more elevated terraces.
- *Quercus nigra - Quercus pagoda - Carya myristiciformis / Cercis canadensis* Floodplain Forest (CEGL004770) from the southern East Gulf Coastal Plain, possibly overlapping in range; consider merge.
- *Quercus pagoda - Quercus nigra / Halesia diptera / Chasmanthium sessiliflorum - Dicliptera brachiata* Floodplain Forest (CEGL007354) from the southern East Gulf Coastal Plain, related and overlapping in range; occurs at a lower, more flood prone level, clarify differences.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (1) and Mississippi (7).
Global Range: This bottomland forest is described from the Upper East Gulf Coastal Plain of southern Tennessee and the East Gulf Coastal Plain and Piedmont of Alabama. It could occur in adjacent states (e.g., Mississippi), but its full range is not known.
Nations: US
States/Provinces: AL, MS, TN
TNC Ecoregions: 43:C, 52:C, 53:C
USFS Ecoregions (1994/95): 222Cc:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCC, 231Ab:CCC, 231Be:CCC, 231Bg:CCC, 231Bh:CCC, 231Bk:CCC, 232Bb:CCC, 232Bs:CCC
Federal Lands: DOD (Claiborne Lake); NPS (Horseshoe Bend, Natchez Trace, Shiloh); USFS (Holly Springs?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.105, NATR.158, NATR.223, NATR.268, NATR.334, NATR.337, NATR.358, NATR.382.
Local Description Authors: M.J. Russo
Global Description Authors: D.J. Allard, mod. M. Pyne and H. Summer
References: ALNHP unpubl. data, Gallyoun et al. 1996, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Coastal Plain Small River Oak Bottomland Forest

***Quercus pagoda - Quercus nigra / Halesia diptera / Chasmanthium sessiliflorum - Dicliptera brachiata* Floodplain Forest**
Cherrybark Oak - Water Oak / Two-wing Silverbell / Longleaf Woodoats - Branched Foldwing Floodplain Forest
Identifier: CEGL007354

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Coastal Plain Swamp Chestnut Oak Bottomland Forest (A3631)
Association	Southern Coastal Plain Small River Oak Bottomland Forest

ELEMENT CONCEPT

Global Summary: This forest occurs on terraces, and possibly second bottoms, of creeks and small brownwater rivers of the coastal plains of the southeastern United States (South Atlantic, East Gulf, and Upper East Gulf). Flooding is annual, but the water table usually is well below the soil surface throughout most of the growing season. The canopy of this creek and small river bottomland forest is dominated by some combination of *Quercus pagoda, Quercus nigra, Liquidambar styraciflua, Quercus michauxii, Pinus taeda*, and *Quercus laurifolia*. Other canopy species include *Ulmus alata, Ulmus americana, Quercus lyrata, Fraxinus americana, Celtis laevigata, Liquidambar styraciflua*, and others. Examples from Oaky Woods Wildlife Management Area in Houston County, Georgia, can include *Quercus sinuata*. The subcanopy is well-developed and contains species such as *Carpinus caroliniana, Halesia diptera, Cornus florida, Acer rubrum, Ilex opaca var. opaca, Carya laciniosa, Morus rubra, Acer rubrum var. trilobum, Cercis canadensis*, and *Acer barbatum*. The diverse and variable shrub layer may contain *Symplocos tinctoria, Euonymus americanus, Ilex decidua, Aralia spinosa, Alnus serrulata, Halesia diptera, Hamamelis virginiana, Crataegus marshallii, Lindera benzoin, Nyssa sylvatica, Fraxinus pennsylvanica, Asimina triloba, Forestiera ligustrina, Diospyros virginiana*, and *Rubus argutus*. In addition, *Sabal minor* and/or *Rhapidophyllum hystrix* may be in some stands and can be the dominant shrub. Woody vines may include *Toxicodendron radicans, Bignonia capreolata, Berchemia scandens, Campsis radicans, Gelsemium sempervirens, Vitis rotundifolia, Smilax bona-nox, Smilax rotundifolia*, and *Cocculus carolinus*. The sparse to moderately well-developed herbaceous stratum contains species such as *Apios americana, Arundinaria gigantea, Boehmeria cylindrica, Botrychium dissectum, Commelina virginica, Carex* spp., *Chasmanthium latifolium, Chasmanthium sessiliflorum, Dichanthelium* sp., *Dicliptera brachiata, Elephantopus carolinianus, Polygonum virginianum, Passiflora lutea*, and *Mitchella repens*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This cherrybark oak - water oak forest was sampled at nine locations in the park. Sites are temporarily flooded bottomlands and floodplains. Soils range from moderately well-drained silt or silt loam to poorly drained silty clay. The unvegetated surface is dominated by litter/duff with some wood, bare soil and standing water. Evidence of disturbance includes roads/trails, wind damage, past logging, flooding, and the presence of exotic plants.
Global Environment: This forest occurs on terraces, and possibly second bottoms, of creeks and small brownwater rivers of the coastal plains of the southeastern United States (South Atlantic, East Gulf, and Upper East Gulf). Flooding is annual, but the water table usually is well below the soil surface throughout most of the growing season.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-80% cover) canopy, 15-35 m tall, is codominated by *Quercus nigra* and *Quercus pagoda*; additional tree species include *Liquidambar styraciflua, Pinus taeda*, and other *Quercus* spp. The moderate (40-60%) subcanopy (10-20 m) includes *Carpinus caroliniana, Carya* spp., *Fagus grandifolia, Ostrya virginiana, Ostrya virginiana*, and canopy oaks. The sparse to dense (20-70%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Acer rubrum, Callicarpa americana, Diospyros virginiana, Euonymus americanus, Fraxinus pennsylvanica, Halesia diptera, Ilex decidua, Symplocos tinctoria, Ulmus alata*, and *Vaccinium elliottii*. Herbs and vines are sparse (5-20%) and include *Bignonia capreolata, Chasmanthium* spp., *Dichanthelium boscii, Elephantopus carolinianus, Mitchella repens, Polystichum acrostichoides, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy of this creek bottomland forest is dominated by some combination of *Quercus pagoda, Quercus nigra, Liquidambar styraciflua, Quercus michauxii, Pinus taeda*, and *Quercus laurifolia*. Other canopy species include *Ulmus alata, Ulmus americana, Quercus lyrata, Fraxinus americana, Celtis laevigata, Liquidambar styraciflua*, and others. Examples from Oaky Woods Wildlife Management Area in Houston County, Georgia, can include *Quercus sinuata*. The subcanopy is well-developed and contains species such as *Carpinus caroliniana, Halesia diptera, Cornus florida, Acer rubrum, Ilex opaca var. opaca, Carya laciniosa, Morus rubra, Acer rubrum var. trilobum, Cercis canadensis*, and *Acer barbatum*. The diverse and variable shrub layer may contain *Symplocos tinctoria, Euonymus americanus, Ilex decidua, Aralia spinosa, Alnus serrulata, Halesia diptera, Hamamelis virginiana, Crataegus marshallii, Lindera benzoin, Nyssa sylvatica, Fraxinus pennsylvanica, Asimina triloba, Forestiera ligustrina, Diospyros virginiana*, and *Rubus argutus*. In addition, *Sabal minor* may be in some stands. Woody vines may include *Toxicodendron radicans, Bignonia capreolata, Berchemia scandens, Campsis radicans, Gelsemium sempervirens, Vitis rotundifolia, Smilax bona-nox, Smilax rotundifolia*, and *Cocculus carolinus*. The sparse to moderately well-developed herbaceous stratum contains species such as *Apios americana, Arundinaria gigantea, Boehmeria cylindrica, Botrychium dissectum, Commelina virginica, Carex* spp., *Chasmanthium*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

latifolium, Chasmanthium sessiliflorum, Dichanthelium sp., *Dicliptera brachiata, Elephantopus carolinianus, Polygonum virginianum, Passiflora lutea*, and *Mitchella repens*. In addition, an example in the Talladega National Forest of Alabama (Oakmulgee Ranger District) contains the herbs *Ageratina altissima, Dichanthelium commutatum, Desmodium nudiflorum, Leersia virginica, Dioscorea quaternata, Sanicula canadensis, Saururus cernuus, Lobelia cardinalis*, and *Hymenocallis caroliniana (= Hymenocallis occidentalis)* (NatureServe Ecology unpubl. data). *Prunus caroliniana* may also occur in stands of this type, but whether as a natural component or as an escape has not been determined. The exotics *Lonicera japonica* and *Ligustrum sinense* may be present in stands of this association.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*, *Quercus pagoda*
Tree subcanopy	Broad-leaved deciduous tree	*Carya ovalis*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Diospyros virginiana*, *Halesia diptera*, *Ilex decidua*
Herb (field)	Graminoid	*Chasmanthium sessiliflorum*, *Dichanthelium boscii*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus nigra*, *Quercus pagoda*
Tree subcanopy	Broad-leaved deciduous tree	*Halesia diptera*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Ilex decidua*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carya ovalis*, *Halesia diptera*, *Quercus pagoda*
Global: *Chasmanthium sessiliflorum*, *Dicliptera brachiata*, *Halesia diptera*, *Ilex decidua*, *Quercus nigra*, *Quercus pagoda*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Global: Vulnerable Plants: *Trillium reliquum* (G3); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (15-Oct-2002). Some examples have been lost to flooding from impoundments, removal of commercially valuable timber species, and conversion to agriculture or other commercial forest types. Threats include fragmentation from powerline corridors and sewerline easements, siltation from land disturbance and development upstream, and anthropogenic flooding from wildlife subimpoundments and other hydrologic enhancements. The exotic species *Lonicera japonica, Ligustrum sinense*, and *Microstegium vimineum* may invade stands of this association. Stands on impounded rivers may suffer from altered hydrologies. Some examples are afforded some protection at Fort Benning (Georgia/Alabama) and on national forest lands.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: One stand attributed to this type is from a slough in a larger river (the Alabama). *Prunus caroliniana* may also occur in stands of this type, but whether as a natural component or as an escape has not been determined. The exotics *Lonicera japonica* and *Ligustrum sinense* may be present in stands of this association. To the north, this type would conceptually blend into *Liquidambar styraciflua - Quercus pagoda - Carya* spp. / *Carpinus caroliniana / Carex* spp. Floodplain Forest (CEGL007353), but its precise range limits are not clear.
Global Similar Associations:

- *Liquidambar styraciflua - Quercus pagoda - Carya* spp. / *Carpinus caroliniana / Carex* spp. Floodplain Forest (CEGL007353) mainly from further north in the Upper East Gulf Coastal Plain, range boundaries need clarification. Where these two types overlap in bottomlands of the Alabama River, CEGL007353 occurs on higher terraces.
- *Quercus nigra - Quercus pagoda - Carya myristiciformis / Cercis canadensis* Floodplain Forest (CEGL004770) of distinctly calcareous substrates in the East Gulf Coastal Plain.
- *Quercus pagoda - Liquidambar styraciflua - Pinus taeda* Floodplain Forest (CEGL007899) of the West Gulf Coastal Plain.
- *Quercus pagoda - Quercus phellos - Quercus lyrata - Quercus michauxii / Chasmanthium latifolium* Swamp Forest (CEGL007356) described from Triassic basins of the Piedmont.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The nine sampled sites are in Mississippi between M70 and M75, M115 and M120, M120 and M125, M130 and M135, M190 and M195, and in the vicinity of M50, M55, M140, and M205.
Global Range: This forest occurs on creeks and brownwater rivers of the coastal plains of the southeastern United States (South Atlantic, East Gulf, and Upper East Gulf) from Georgia to Mississippi. Its status in Florida is not known. In the South Atlantic Coastal Plain, it has only been documented from central Georgia in association with Blackbelt geology in Houston County.
Nations: US
States/Provinces: AL, FL?, GA, MS
TNC Ecoregions: 43:C, 53:C, 56:C
USFS Ecoregions (1994/95): 231Bc:CCC, 231Bg:CCC, 231Bh:CCC, 231Bi:CCC, 231Bj:CCC, 231Bl:CCC, 232Bb:CCC, 232Bd:CC?, 232Br:CCC, 232Bs:CCC
Federal Lands: DOD (Claiborne Lake, Fort Benning); NPS (Natchez Trace); USFS (Homochitto, Talladega, Talladega (Oakmulgee), Tombigbee?, Tuskegee?); USFWS (Eufaula)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.269, NATR.316, NATR.361, NATR.508, NATR.510, NATR.514, NATR.522, NATR.533, NATR.558.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal, mod. M. Pyne
References: ALNHP 2002, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

East Gulf Coastal Plain Oak-Sweetgum Small Stream Floodplain Forest

***Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum)* Floodplain Forest**
Willow Oak - Water Oak - White Oak / (Slender Woodoats , Longleaf Woodoats) Floodplain Forest
Identifier: CEGL004771

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Coastal Plain Willow Oak - Water Oak - Laurel Oak Forest (A3632)
Association	East Gulf Coastal Plain Oak-Sweetgum Small Stream Floodplain Forest

ELEMENT CONCEPT

Global Summary: This forest is common along small floodplains in the East Gulf Coastal Plain of Mississippi, Alabama, and possibly adjacent states. *Quercus phellos* or *Quercus nigra* may dominate this temporarily flooded forest; some stands may contain considerable *Liquidambar styraciflua*, and *Quercus alba* may be present. Some other associated species include *Pinus glabra, Pinus taeda, Quercus pagoda, Quercus alba, Quercus laurifolia, Quercus similis, Ulmus alata, Carya alba, Carya glabra, Carya ovata, Nyssa biflora*, and others. Occurrences often have many species in the canopy, and variability of species composition from occurrence to occurrence may be relatively large. The subcanopy/shrub stratum is well-developed and contains canopy species, as well as *Crataegus viridis, Chionanthus virginicus, Acer rubrum, Vaccinium elliottii, Ilex decidua, Ilex vomitoria, Vaccinium stamineum, Cornus florida, Sabal minor, Sambucus canadensis, Crataegus marshallii, Arundinaria gigantea*, and others. Some woody vines present. The herbaceous layer also may contain many species with no clear dominants.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This willow oak - water oak forest was sampled at 17 locations in the park. Sites are temporarily to intermittently flooded bottomlands. Soils range from well-drained to very poorly drained, and everything in between, and include loam, sandy loam, silt, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff (up to 100%) with some wood and occasional bare soil and standing water (up to 80%). Evidence of disturbance includes roads/trails, past logging, flooding, and the presence of exotic plants.
Global Environment: This forest is common along small floodplains in the East Gulf Coastal Plain of Mississippi, Alabama, and possibly adjacent states.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (30-90% cover) canopy, 15-35 m tall, is codominated by *Quercus nigra* and *Quercus phellos*; additional species include *Liquidambar styraciflua* and other *Quercus* spp. The sparse to moderate (30-70%) subcanopy (10-20 m) is dominated by *Acer rubrum, Fraxinus pennsylvanica, Liquidambar styraciflua*, and *Ulmus americana*. The sparse to moderate (10-70%) tall-shrub (2-5 m) and short-shrub (0.5-2 m) layers are made up of canopy/subcanopy species along with *Carpinus caroliniana, Halesia diptera, Ilex decidua, Ligustrum sinense* (invasive exotic), and *Ulmus alata*. The herbaceous layer (5-60%) is dominated by tree seedlings, *Arundinaria gigantea, Athyrium filix-femina ssp. asplenioides, Cardamine bulbosa, Decumaria barbara, Galium aparine, Galium tinctorium*, and/or Lolium arundinaceum (exotic). Vines (5-30%), often found climbing into the shrub layers, include *Lonicera japonica* (exotic), *Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. This community also supports Mississippi state-rare *Carex laxiflora*.
Global Vegetation: *Quercus phellos* and/or *Quercus nigra* may dominate this temporarily flooded forest; some associated canopy species include *Pinus glabra, Pinus taeda, Quercus pagoda, Quercus alba, Quercus laurifolia, Quercus similis, Ulmus alata, Carya alba, Carya glabra, Carya ovata, Nyssa biflora, Liquidambar styraciflua*, and others. Occurrences often have many species in the canopy, and variability of species composition from occurrence to occurrence may be relatively large. A stand placed here from the Tuskegee National Forest (Macon County, Alabama) additionally contains substantial *Liriodendron tulipifera* and *Magnolia virginiana* in the canopy and subcanopy. The subcanopy/shrub stratum is well-developed and contains canopy species, as well as *Crataegus viridis, Chionanthus virginicus, Acer rubrum, Vaccinium elliottii, Ilex decidua, Ilex vomitoria, Vaccinium stamineum, Cornus florida, Sabal minor, Sambucus canadensis, Crataegus marshallii, Arundinaria gigantea*, and others. Some woody vines present include *Berchemia scandens, Bignonia capreolata, Gelsemium sempervirens, Parthenocissus quinquefolia, Smilax bona-nox, Smilax glauca, Smilax rotundifolia, Toxicodendron radicans*, and *Vitis rotundifolia*. The herbaceous layer also may contain many species with no clear dominants. Among the species that may be present in this stratum are *Chasmanthium sessiliflorum, Elephantopus carolinianus, Scutellaria integrifolia, Uvularia sessilifolia, Pedicularis canadensis, Botrychium dissectum, Lycopus rubellus, Dichanthelium boscii, Eupatorium semiserratum, Viola x primulifolia, Mitchella repens, Carex* sp. (*Carex joorii*?, *Carex glaucescens*?), and others. In the Tuskegee National Forest stand assigned here, some additional herbs include *Chasmanthium laxum* (dominant), *Dioscorea quaternata, Athyrium filix-femina ssp. asplenioides, Woodwardia areolata, Dichanthelium* sp., *Osmunda regalis, Scleria* sp., *Sanicula canadensis, Onoclea sensibilis, Ruellia caroliniensis*, and *Thaspium barbinode*. The exotics *Lonicera japonica* and *Ligustrum sinense* may be present in some stands of this association.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*, *Quercus nigra*, *Quercus phellos*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Halesia diptera*, *Ilex decidua*, *Ulmus alata*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus alba*, *Quercus nigra*, *Quercus phellos*
Herb (field)	Graminoid	*Chasmanthium laxum*, *Chasmanthium sessiliflorum*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cardamine bulbosa*, *Quercus nigra*, *Quercus phellos*
Global: *Chasmanthium laxum*, *Chasmanthium sessiliflorum*, *Quercus alba*, *Quercus nigra*, *Quercus phellos*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Carex laxiflora* (G5, MS state-rare); **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lolium arundinaceum* (High/Medium), *Lonicera japonica* (High/Medium), *Paspalum notatum* (Insignificant), *Paspalum urvillei* ()
Global: **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (4-Oct-2004). This forest is common along small floodplains in the East Gulf Coastal Plain of Mississippi, Alabama, and possibly adjacent states. Many small floodplains in Mississippi have been affected by hydrological alteration from drainage projects and also are cleared for agriculture. There are threats from the invasive plants *Lonicera japonica* (Japanese honeysuckle) and *Ligustrum sinense* (Chinese privet) which are relatively common in forested bottomlands in Mississippi. Remaining examples tend to be fragmented and small. Many bottomlands not cleared for agriculture are in *Pinus taeda* (loblolly pine) plantations.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Documented from the Bienville National Forest, Mississippi (M. Pyne, S. Landaal 8-97), the Talladega National Forest (Oakmulgee Ranger District), and the Tuskegee National Forest (August 2000). The exotics *Lonicera japonica* and *Ligustrum sinense* may be present in some stands of this association. Some stands assigned here (e.g., plot TALO.3 -Compartment 10 #3) contain *Magnolia virginiana* and *Acer rubrum* in the understory and seem "transitional" to a saturated forest (e.g., *Magnolia virginiana - Nyssa biflora / Carpinus caroliniana / Thelypteris noveboracensis - Athyrium filix-femina* Swamp Forest (CEGL004722)).
Global Similar Associations:
- *Quercus alba - Carya ovata - Liriodendron tulipifera - (Quercus phellos) / Cornus florida* Forest (CEGL007709)
- *Quercus phellos - Quercus laurifolia - Nyssa biflora / Arundinaria gigantea ssp. tecta - Sabal minor* Floodplain Forest (CEGL007846) an apparently related type of the Atlantic Coastal Plain.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The 17 sampled sites are in Mississippi between M45 and M50, M125 and M130, M160 and M165, M170 and M175, and in the vicinity of M85, M105, M160, M210, and M225.
Global Range: This forest is found in the East Gulf Coastal Plain and Upper East Gulf Coastal Plain of Mississippi, Alabama, and possibly adjacent states.
Nations: US
States/Provinces: AL, GA?, LA?, MS
TNC Ecoregions: 43:C, 53:C
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bb:CCC, 231Bc:CCC, 231Bd:CCC, 231Bg:CCC, 231Bi:CCC, 232Bb:CCC, 232Bj:CCP, 232Bk:CCC
Federal Lands: DOD (Fort Benning?); NPS (Natchez Trace); USFS (Bienville, De Soto, Homochitto?, Talladega, Talladega (Oakmulgee), Tombigbee?, Tuskegee); USFWS (Eufaula)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.006, NATR.007, NATR.010, NATR.011, NATR.152, NATR.179, NATR.202, NATR.262, NATR.264, NATR.270, NATR.276, NATR.278, NATR.293, NATR.318, NATR.327, NATR.332, NATR.529.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal, mod. C.W. Nordman
References: ALNHP 2002, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Piedmont Loblolly Pine - Mixed Oak Floodplain Forest

***Pinus taeda - Quercus (phellos, nigra, laurifolia)* Floodplain Forest**
Loblolly Pine - (Willow Oak, Water Oak, Laurel Oak) Floodplain Forest
Identifier: CEGL007551

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Oak - Sweetgum Floodplain Forest (G034)
Alliance	Piedmont Willow Oak Floodplain Forest (A3633)
Association	Piedmont Loblolly Pine - Mixed Oak Floodplain Forest

ELEMENT CONCEPT

Global Summary: This association is found in the Piedmont and probably the Upper East Gulf Coastal Plain, potentially ranging from South Carolina to Mississippi. Stands are dominated by *Pinus taeda* with *Quercus nigra* and/or *Quercus phellos*, with *Liquidambar styraciflua* and/or *Liriodendron tulipifera*. *Quercus laurifolia* is possible in some stands in the Upper East Gulf Coastal Plain. Some other trees that may be present include *Acer rubrum, Fraxinus americana, Nyssa sylvatica, Quercus alba*, and *Sassafras albidum*. Shrubs may include *Acer leucoderme, Aesculus sylvatica, Carya alba, Halesia carolina, Ostrya virginiana, Vaccinium elliottii*, and *Viburnum* spp. Herbs may include *Chasmanthium latifolium, Desmodium nudiflorum, Galium tinctorium, Mitchella repens, Passiflora lutea*, and *Polystichum acrostichoides*. Vines may include *Bignonia capreolata, Decumaria barbara, Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia*. This association is distinguished from other Piedmont floodplain forests by the presence (and general codominance) of these more "southern" or "coastal" canopy trees (*Quercus nigra* and/or *Quercus laurifolia*). It is documented from the Piedmont of Georgia, with data from the Chattahoochee National Recreation Area (NPS) and the Oconee National Forest.

VEGETATION DESCRIPTION

Global Vegetation: Stands are dominated by *Pinus taeda* with *Quercus nigra* and/or *Quercus phellos*, with *Liquidambar styraciflua* and/or *Liriodendron tulipifera*. *Quercus laurifolia* is possible in some stands in the Upper East Gulf Coastal Plain. Some other trees that may be present include *Acer rubrum, Fraxinus americana, Nyssa sylvatica, Quercus alba*, and *Sassafras albidum*. Shrubs may include *Acer leucoderme, Aesculus sylvatica, Carya alba, Halesia carolina, Ostrya virginiana, Vaccinium elliottii*, and *Viburnum* spp. Herbs may include *Chasmanthium latifolium, Desmodium nudiflorum, Galium tinctorium, Mitchella repens, Passiflora lutea*, and *Polystichum acrostichoides*. Vines may include *Bignonia capreolata, Decumaria barbara, Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis rotundifolia* (NatureServe Ecology unpubl. data).

On the Oconee National Forest (Georgia Piedmont), a stand compatible with the general alliance concept (OCON.8) is dominated by *Pinus taeda, Quercus nigra, Liquidambar styraciflua*, and *Acer barbatum*. Also found here are *Acer negundo* (in the subcanopy) and *Chasmanthium sessiliflorum, Bromus kalmii, Smilax glauca, Polystichum acrostichoides, Vitis rotundifolia*, and *Trachelospermum difforme* (NatureServe Ecology unpubl. data).

Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNR (3-Sep-2002). This conceptual placeholder type cannot be ranked until its concept and range are clarified and better defined.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak

ELEMENT DISTRIBUTION

Global Range: This association is found in the Piedmont and probably the Upper East Gulf Coastal Plain, potentially ranging from South Carolina to Mississippi.
Nations: US
States/Provinces: AL?, GA, MS, SC
TNC Ecoregions: 43:P, 52:C
USFS Ecoregions (1994/95): 231B:PP, 232A:PP
Federal Lands: NPS (Chattahoochee River, Natchez Trace); USFS (Bienville?, Holly Springs?, Oconee, Sumter (Piedmont)?, Sumter?, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tombigbee?, Tuskegee?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: A.S. Weakley, mod. M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G759. Southern Ash - Elm - Willow Floodplain Forest

Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest

***Salix nigra - Acer (rubrum, saccharinum) / Alnus serrulata - Cephalanthus occidentalis* Swamp Forest**
Black Willow - (Red Maple, Silver Maple) / Hazel Alder - Common Buttonbush Swamp Forest
Identifier: CEGL007703

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Southern Ash - Elm - Willow Floodplain Forest (G759)
Alliance	Coastal Plain Depression Willow Forest (A1914)
Association	Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest

ELEMENT CONCEPT

Global Summary: This wetland willow forest association may occur on the margins of natural depression ponds, but it also includes vegetation on the margins of impoundment reservoirs. The canopy near the shoreline is dominated by *Salix nigra*. Other *Salix* species (including *Salix caroliniana*) may be present in some examples. *Acer rubrum* and *Acer saccharinum* are also important species. *Cephalanthus occidentalis* and *Acer rubrum* usually dominate the shrub layer. *Alnus serrulata* and *Itea virginica* are also present. *Triadenum walteri* grows on hummocks at the bases of trees and shrubs. *Juncus effusus* is often found in the herbaceous layer.

ENVIRONMENTAL DESCRIPTION

Global Environment: This wetland willow forest association may occur on the margins of natural depression ponds, but it also includes vegetation on the margins of impoundment reservoirs.

VEGETATION DESCRIPTION

Global Vegetation: In typical examples, the canopy is dominated by *Salix nigra*. Other *Salix* species (including *Salix caroliniana*) may be present in some examples. *Acer rubrum* and *Acer saccharinum* are also important species. *Cephalanthus occidentalis* and *Acer rubrum* usually dominate the shrub layer. *Alnus serrulata* and *Itea virginica* are also present. *Triadenum walteri* may grow on hummocks at the bases of trees and shrubs. *Juncus effusus* is often found in the herbaceous layer. The exotics *Lonicera japonica* and *Rosa multiflora* may be found in some examples.

MOST ABUNDANT SPECIES

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum*, *Acer saccharinum*, *Salix nigra*
Tall shrub/sapling	Broad-leaved deciduous tree	*Alnus serrulata*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*

CHARACTERISTIC SPECIES

Global: *Acer rubrum*, *Acer saccharinum*, *Alnus serrulata*, *Cephalanthus occidentalis*, *Juncus effusus*, *Salix nigra*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G5 (30-Dec-2008). This is a natural to semi-natural, successional community dominated by native species. It may occur on the margins of natural depression ponds, but it also includes vegetation on the margins of impoundment reservoirs.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Natchez Trace Parkway Comments: CEGL002103 was originally used for Salix nigra forests at NATR. For several reasons (revised biogeography, hydrology more pond than riparian), CEGL007703 is a preferable assignment for these areas. A. Strassman (pers. comm. 2016): The AA sites I'm confident of are south of milepost 175 (French Camp is at about milepost 182). They are AA sites 19, 121, 315, 337, 725, 775, and 875. There are three further north in Tennessee, but two are shrub/forest and one is a highly-disturbed mixed floodplain. No plots were ever assigned to any willow forests. However, plots NATR.518 and NATR.535 are assigned to CEGL003901 and both are appear to be over 5 m with one noted as a willow forest. These two might warrant review. Both were collected in 2009 and would likely be forests at this point if they have not been disturbed.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Comments: The range of this *Salix nigra* pond association was adjusted, in part to resolve some issues with revisions to a previously overly generalized and overly well-distributed *Salix nigra* riparian association (CEGL002103). This concept (CEGL007703) may be too narrowly defined. Further review is needed, but it is a better choice for the vegetation along the Natchez Trace Parkway in any case.

At Arnold Air Force Base (Coffee and Franklin counties, Tennessee), this wetland community occurs along the border of Woods Reservoir. This community often grades into an herbaceous community dominated by *Juncus effusus*. Investigate merge with *Salix nigra / (Cephalanthus occidentalis)* Swamp Forest (CEGL004773), a related type found to the south and west.

Global Similar Associations:

- *Salix nigra / (Cephalanthus occidentalis)* Swamp Forest (CEGL004773) is a related, more southern and western type.

ELEMENT DISTRIBUTION

Global Range: This type occurs in the Interior Low Plateau of Tennessee and also the adjacent Upper East Gulf Coastal Plain and Cumberlands/Southern Ridge and Valley. Its range includes Kentucky and Tennessee, as well as Alabama, Mississippi, and possibly Georgia.

Nations: US

States/Provinces: AL, GA?, KY, MS?, TN

TNC Ecoregions: 43:C, 44:C, 50:C

USFS Ecoregions (1994/95): 221H:PP, 222C:CP, 222Dg:CCC, 222Eb:CCC, 222Eg:CCC, 222En:CCC, 222Eo:CCC, 231Be:CCC, 231Bg:CCC, 231Bi:CCC, 231C:CP, 232Bb:CCC, 232Bd:CCC

Federal Lands: DOD (Arnold); NPS (Mammoth Cave, Natchez Trace); USFS (Daniel Boone)

ELEMENT SOURCES

Local Description Authors:

Global Description Authors: M. Pyne, C.S. Major and M.J. Russo

References: Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Nuttall Oak - Sugarberry Bottomland Forest

***Quercus texana - Celtis laevigata - Ulmus (americana, crassifolia) - (Gleditsia triacanthos)* Floodplain Forest**
Nuttall Oak - Sugarberry - (American Elm, Cedar Elm) - (Honey-locust) Floodplain Forest
Identifier: CEGL004619

USNVC CLASSIFICATION

Division	Southeastern North American Flooded & Swamp Forest (1.B.3.Nb)
Macrogroup	Southern Coastal Plain Floodplain Forest (M031)
Group	Southern Ash - Elm - Willow Floodplain Forest (G759)
Alliance	West Gulf Coastal Plain Elm - Sugarberry Floodplain Forest (A3709)
Association	Nuttall Oak - Sugarberry Bottomland Forest

ELEMENT CONCEPT

Global Summary: These are forests of large bottomlands, found in the Mississippi River Alluvial Plain, the Upper West Gulf Coastal Plain, the Upper East Gulf Coastal Plain, and possibly the East Gulf Coastal Plain, in Mississippi, Arkansas, and possibly Louisiana and other adjacent states. The canopy contains a variable mixture of *Quercus texana, Celtis laevigata, Ulmus americana*, and *Ulmus crassifolia*. Some stands may contain *Gleditsia triacanthos* in the canopy or subcanopy, but this tree has very brittle wood, and many specimens have been lost to storm and wind damage. Other associated species may include *Fraxinus pennsylvanica* and *Liquidambar styraciflua*. These forests are slightly higher in elevation than those dominated by *Quercus lyrata* and *Quercus texana*. More information is needed on the composition and distribution of this type.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This honey-locust - mixed hardwood forest was sampled twice in the park. Sites are temporarily to intermittently flooded bottomlands and floodplains with somewhat poorly drained silty clay soil. The unvegetated surface is made up of litter/duff and bare soil. Evidence of disturbance includes roads/trails, past logging, grazing/browsing, and the presence of exotic plants.
Global Environment: These are forests of large bottomlands, found in the Mississippi River Alluvial Plain, the Upper West Gulf Coastal Plain, the Upper East Gulf Coastal Plain, and possibly the East Gulf Coastal Plain, in Mississippi, Arkansas, and possibly other adjacent states. These forests are slightly higher in elevation than those dominated by *Quercus lyrata* and *Quercus texana*.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to dense (50-80% cover) canopy, 15-35 m tall, is dominated by *Celtis laevigata, Gleditsia triacanthos, Liquidambar styraciflua*, and *Quercus nigra*. The moderate (40-60%) subcanopy (10-20 m) may include canopy species, *Acer negundo, Morus rubra, Ostrya virginiana*, and *Ulmus americana*. Common shrubs in the sparse (20-40%) tall-shrub (2-5 m) and short-shrub (0.5-1 m) layers are *Frangula caroliniana, Ligustrum sinense* (invasive exotic), *Lindera benzoin, Ostrya virginiana*, and *Sideroxylon lycioides*. The herbaceous layer is dense (80-90%) and dominated by *Carex cherokeensis, Chasmanthium sessiliflorum*, and/or *Microstegium vimineum* (invasive exotic). Vines (up to 30%) include *Cocculus carolinus, Parthenocissus quinquefolia, Toxicodendron radicans*, and *Vitis rotundifolia*.
Global Vegetation: The canopy contains a variable mixture of *Quercus texana, Celtis laevigata, Ulmus americana*, and *Ulmus crassifolia*. Some stands may contain *Gleditsia triacanthos* in the canopy or subcanopy, but this tree has very brittle wood, and many specimens have been lost to storm and wind damage. Other associated species may include *Fraxinus pennsylvanica* and *Liquidambar styraciflua*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Celtis laevigata*, *Gleditsia triacanthos*, *Liquidambar styraciflua*, *Quercus nigra*
Tree subcanopy	Broad-leaved deciduous tree	*Ulmus americana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Frangula caroliniana*, *Lindera benzoin*, *Ostrya virginiana*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Ligustrum sinense*, *Sideroxylon lycioides*
Herb (field)	Liana	*Cocculus carolinus*
Herb (field)	Graminoid	*Carex cherokeensis*, *Chasmanthium sessiliflorum*, *Microstegium vimineum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Celtis laevigata*, *Fraxinus pennsylvanica*, *Liquidambar styraciflua*, *Quercus texana*, *Ulmus americana*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Celtis laevigata*, *Gleditsia triacanthos*, *Liquidambar styraciflua*
Global: *Celtis laevigata*, *Quercus texana*, *Ulmus americana*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Melia azedarach* (Medium/Low), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (7-Sep-1999).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:
- *Fraxinus pennsylvanica - Ulmus americana - (Quercus texana) / Bidens aristosa - Leersia virginica* Floodplain Forest (CEGL007987) D. Zollner (pers. comm. 2001) says these may be the same.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi in the vicinity of M15 and M55.
Global Range: These forests of large bottomlands are found in the Mississippi River Alluvial Plain, the Upper West Gulf Coastal Plain, the Upper East Gulf Coastal Plain, and possibly the East Gulf Coastal Plain, in Mississippi, Arkansas, and possibly other adjacent states.
Nations: US
States/Provinces: AL, AR, LA?, MS, TN?, TX?
TNC Ecoregions: 31:C, 40:C, 41:P, 42:C, 43:C, 53:P
USFS Ecoregions (1994/95): 231Bh:CCC, 231Ea:CCC, 231Ec:CCC, 231Ed:CCP, 231F:C?, 232Bd:CCC, 232Bs:CCC, 232Eb:CCC, 232Fc:CPP, 232Fd:CPP, 234Aa:CCC, 234Ac:CCC, 234Ag:CCC, 234Ah:CCP, 234Ai:CC?, 234Ak:CC?, 234Al:CC?, 234Am:CCP, 234An:CCC
Federal Lands: NPS (Jean Lafitte, Natchez Trace); USFS (Delta, St. Francis)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.168, NATR.576.
Local Description Authors: M.J. Russo
Global Description Authors: K. Ribbeck and T. Foti, mod. M. Pyne
References: Eyre 1980, LNHP 2009, Martin and Smith 1991, Nordman et al. 2011, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Zollner pers. comm.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

2. SHRUB & HERB VEGETATION

2.B.2. Temperate Grassland & Shrubland

2.B.2.Nc. Eastern North American Grassland & Shrubland

M508. Central Interior Calcareous Scrub & Grassland

G174. South-Central Patch Prairie

Highland Rim Wet-Mesic Prairie

***Andropogon gerardii - Schizachyrium scoparium - Dichanthelium scoparium - Rhynchospora glomerata* Grassland**
Big Bluestem - Little Bluestem - Broom Witchgrass - Clustered Beaksedge Grassland
Identifier: CEGL004006

USNVC CLASSIFICATION

Division	Eastern North American Grassland & Shrubland (2.B.2.Nc)
Macrogroup	Central Interior Calcareous Scrub & Grassland (M508)
Group	South-Central Patch Prairie (G174)
Alliance	South-Central Mesic Patch Prairie (A3889)
Association	Highland Rim Wet-Mesic Prairie

ELEMENT CONCEPT

Global Summary: This is a wet-mesic phase of prairies of the Eastern Highland Rim of south-central Tennessee. May Prairie, Coffee County, Tennessee, is the only remaining high-quality example of this vegetation type, which was apparently once represented at other sites (though never extensive). Stands are dominated by *Andropogon gerardii, Schizachyrium scoparium, Dichanthelium scoparium*, and *Rhynchospora glomerata*. This community is distinguished from most other prairie communities by its strong representation of a southern, Coastal Plain component in its flora, including various *Rhynchospora* spp., *Dichanthelium* spp., and others. It is distinguished from the associated community at May Prairie, *Schizachyrium scoparium - Panicum anceps - Panicum virgatum - Lespedeza capitata - Scleria* spp. Grassland (CEGL004063) by being wetter, and having a stronger component of species such as *Rhynchospora glomerata, Rhynchospora globularis, Rhynchospora capitellata, Eryngium integrifolium, Dichanthelium scoparium, Dichanthelium aciculare, Rosa setigera*, and *Scleria verticillata*. This association is also reported from a site in the Northern Loessal Hills of Mississippi (Natchez Trace Parkway), more information is needed.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This mixed herbaceous vegetation was sampled once in the park. The site is on a gentle slope with well-drained clay loam soil. The unvegetated surface is made up of equal amounts of litter/duff and bare soil. Evidence of disturbance includes mowing and the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (90% cover) herbaceous layer (up to 1 m tall when unmowed) is a diverse mixture of graminoid and forb species with no one species being particularly dominant. The most abundant species are *Coreopsis tripteris, Dichanthelium scoparium, Elymus virginicus, Eupatorium rotundifolium, Helianthus angustifolius, Paspalum floridanum, Schizachyrium scoparium, Scutellaria incana, Solidago odora*, and *Symphyotrichum dumosum*. In addition, there may be a few scattered trees and shrubs, including *Diospyros virginiana, Nyssa sylvatica, Pinus taeda, Quercus nigra*, and *Rhus copallinum*. More information is needed on whether this stand of vegetation is correctly affiliated with this association.
Global Vegetation: Stands of this association are dominated by *Andropogon gerardii, Schizachyrium scoparium, Dichanthelium scoparium*, and *Rhynchospora glomerata*. This community is distinguished from most other prairie communities by its strong representation of a southern, Coastal Plain component in its flora, including various *Rhynchospora* spp., *Dichanthelium* spp., and others. It is distinguished from the associated community at May Prairie, *Schizachyrium scoparium - Panicum anceps - Panicum virgatum - Lespedeza capitata - Scleria* spp. Grassland (CEGL004063) by being wetter, and having a stronger component of species such as *Rhynchospora glomerata, Rhynchospora globularis, Rhynchospora capitellata, Eryngium integrifolium, Dichanthelium scoparium, Dichanthelium aciculare, Rosa setigera*, and *Scleria verticillata*. A putative example from a site in the Northern Loessal Hills of Mississippi (Natchez Trace Parkway) contains *Coreopsis tripteris, Dichanthelium scoparium, Elymus virginicus, Eupatorium rotundifolium, Helianthus angustifolius, Paspalum floridanum, Schizachyrium scoparium, Scutellaria incana, Solidago odora*, and *Symphyotrichum dumosum*, along with a few scattered trees and shrubs, including *Diospyros virginiana, Nyssa sylvatica, Pinus taeda, Quercus nigra*, and *Rhus copallinum*. More information is needed on whether this stand of vegetation is correctly affiliated with this association.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Eupatorium rotundifolium*, *Scutellaria incana*
Herb (field)	Graminoid	*Dichanthelium scoparium*, *Paspalum floridanum*, *Schizachyrium scoparium*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Andropogon gerardii*, *Dichanthelium scoparium*, *Rhynchospora glomerata*, *Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Dichanthelium scoparium*, *Paspalum floridanum*, *Schizachyrium scoparium*
Global: *Andropogon gerardii*, *Dichanthelium scoparium*, *Rhynchospora glomerata*, *Schizachyrium scoparium*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1 (13-Dec-1999). This prairie-like community is restricted to the barrens of Tennessee's southeastern Highland Rim, where this vegetation develops in shallow upland flats and depressions over loess where hardpans have formed in the soil. This flat to gently sloping landscape was probably affected by frequent fire, which would have carried through these shallow upland wetland depressions. The only remaining high-quality example of this vegetation type is at May Prairie State Natural Area, in Coffee County, Tennessee. It was apparently once represented at other sites which have been destroyed but was never extensive. It is the wetter phase of the herbaceous vegetation at May Prairie. This site is highly vulnerable to the succession effects of fire suppression and is under ecological management.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This is the wetter phase of May Prairie, Coffee County, Tennessee. Based on data from DeSelm (1990). Alliance placement is uncertain. Also, this community may actually be a wetland and should be placed in another formation.
Global Similar Associations:

- *Andropogon gerardii - (Andropogon glomeratus, Panicum virgatum, Sorghastrum nutans)* Grassland (CEGL007705) possibly affected by disturbance?
- *Andropogon gerardii - Schizachyrium scoparium - (Calamagrostis coarctata, Panicum virgatum)* Grassland (CEGL007706) less wet than CEGL007705 and CEGL004006.
- *Schizachyrium scoparium - Panicum anceps - Panicum virgatum - Lespedeza capitata - Scleria* spp. Grassland (CEGL004063) is not as wet.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi between M175 and M180.
Global Range: This type is found in the Eastern Highland Rim of south-central Tennessee. In addition, this association is also reported from a site in the Northern Loessal Hills of Mississippi (Natchez Trace Parkway), more information is needed.
Nations: US
States/Provinces: MS, TN
TNC Ecoregions: 43:C, 44:C
USFS Ecoregions (1994/95): 222Eb:CCC, 231Bg:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.162.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne and A.S. Weakley
References: Allard 1990, DeSelm 1989a, DeSelm 1990, Nordman et al. 2011, Pyne 1994, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M123. Eastern North American Ruderal Grassland & Shrubland

G059. Eastern North American Ruderal Meadow & Shrubland

Little Bluestem Old-field Grassland

***Schizachyrium scoparium - (Andropogon virginicus) - Solidago* spp. Ruderal Meadow**
Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Ruderal Meadow
Identifier: CEGL006333

USNVC CLASSIFICATION

Division	Eastern North American Grassland & Shrubland (2.B.2.Nc)
Macrogroup	Eastern North American Ruderal Grassland & Shrubland (M123)
Group	Eastern North American Ruderal Meadow & Shrubland (G059)
Alliance	Northern & Central Dry Old-field Grassland & Shrubland (A3934)
Association	Little Bluestem Old-field Grassland

ELEMENT CONCEPT

Global Summary: This broadly defined vegetation type includes old fields of well-drained soils, either sandy or shallow to bedrock. They are characterized by dominance of warm-season grasses. *Schizachyrium scoparium* is characteristic and nearly always present. Species composition is variable, depending on land-use history, but in general this vegetation is quite wide-ranging in northeastern and midwestern states. In addition to the nominal species, other associates may include *Andropogon virginicus, Eragrostis spectabilis, Festuca rubra, Deschampsia flexuosa, Danthonia spicata, Nuttallanthus canadensis (= Linaria canadensis), Rubus flagellaris, Panicum virgatum, Dichanthelium depauperatum (= Panicum depauperatum), Potentilla simplex, Dichanthelium meridionale (= Panicum meridionale), Dichanthelium dichotomum (= Panicum dichotomum), Solidago rugosa*, and *Carex pensylvanica*. Scattered shrubs are often present, including *Comptonia peregrina, Morella pensylvanica, Gaylussacia baccata*, and scattered tree saplings, such as *Prunus serotina, Sassafras albidum*, and *Juniperus virginiana*. *Polytrichum juniperinum* and other *Polytrichum* spp. are common bryophytes.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This little bluestem old field vegetation was sampled at four locations in the park. Sites are flat lowlands or ridgetops with well-drained to somewhat poorly drained silt or clay loam soil. Sites include hay field/pasture and a maintained powerline right-of-way. Other evidence of disturbance includes ATV tracks, grazing/browsing, and the presence of exotic plants.
Global Environment: This vegetation occurs on well-drained soils, either on sandy flats or on dry knolls with shallow soils. The vegetation arises spontaneously after soil disturbance.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to entirely closed (50-100% cover) herbaceous layer is dominated by *Schizachyrium scoparium*. Other common and/or abundant species include species of *Andropogon, Desmodium, Dichanthelium, Eupatorium, Solidago, Symphyotrichum, Helianthus angustifolius, Solidago canadensis*, and *Vernonia missurica*.
Global Vegetation: *Schizachyrium scoparium* is characteristic and nearly always present. Species composition is variable, depending on land-use history, but in general, this vegetation is quite wide-ranging in northeastern and midwestern states. In addition to the nominal species, other associates may include *Andropogon virginicus, Eragrostis spectabilis, Festuca rubra, Deschampsia flexuosa, Centaurea biebersteinii (= Centaurea maculosa), Danthonia spicata, Hypericum perforatum, Nuttallanthus canadensis (= Linaria canadensis), Rubus flagellaris, Panicum virgatum, Dichanthelium depauperatum (= Panicum depauperatum), Potentilla simplex, Dichanthelium meridionale (= Panicum meridionale), Dichanthelium dichotomum (= Panicum dichotomum), Solidago juncea, Solidago nemoralis, Solidago rugosa, Hieracium* spp., and *Carex pensylvanica*. Scattered shrubs are often present, including *Comptonia peregrina, Morella pensylvanica, Gaylussacia baccata*, and scattered tree saplings, such as *Prunus serotina, Sassafras albidum*, and *Juniperus virginiana*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Helianthus angustifolius*, *Solidago canadensis*, *Vernonia missurica*
Herb (field)	Graminoid	*Schizachyrium scoparium*

Global

Stratum	Lifeform	Species
Short shrub/sapling	Dwarf-shrub	*Rubus flagellaris*
Herb (field)	Flowering forb	*Solidago juncea*, *Solidago nemoralis*, *Solidago rugosa*
Herb (field)	Graminoid	*Schizachyrium scoparium*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Andropogon virginicus*, *Schizachyrium scoparium*, *Solidago canadensis*
Global: *Andropogon virginicus*, *Schizachyrium scoparium*, *Solidago juncea*, *Solidago nemoralis*, *Solidago rugosa*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lespedeza cuneata* (Medium), *Lonicera japonica* (High/Medium), *Paspalum notatum* (Insignificant), *Verbena brasiliensis* ()
Global: Other Plants: *Panicum virgatum* (G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (19-Jan-2006). This vegetation type includes pasture and post-agricultural fields.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This type is distinguished, in theory, from the very similar *Dactylis glomerata - Phleum pratense - Festuca* spp. - *Solidago* spp. Ruderal Meadow (CEGL006107) by the dominance of warm-season grasses as opposed to cool-season grasses (*Phleum, Festuca*) dominating CEGL006107. Additional data will be required to see how this distinction holds up and what geographic differences might accompany such a distinction.
Global Similar Associations:

- *Dactylis glomerata - Phleum pratense - Festuca* spp. - *Solidago* spp. Ruderal Meadow (CEGL006107)
- *Lolium (arundinaceum, pratense)* Ruderal Grassland (CEGL004048)
- *Panicum virgatum - (Andropogon virginicus)* Ruderal Meadow (CEGL006616)
- *Phleum pratense - Bromus pubescens - Helenium autumnale* Ruderal Meadow (CEGL004018)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (2) and Tennessee (2) between M0 and M5, M315 and M320, and in the vicinity of M70.
Global Range: This vegetation is quite wide-ranging in northeastern and midwestern states, and possibly occurs at higher elevations in the southeastern states.
Nations: US
States/Provinces: CT, MA, ME, MS, NH, NJ, NY, PA, RI, TN, VT
TNC Ecoregions: 43:C, 44:C, 48:C, 60:C, 61:C, 62:C
USFS Ecoregions (1994/95): 212Fc:CCC, 221Ab:CCC, 221Bc:CCC, 221Bd:CCC, 222Eg:CCC, 222Ib:CCC, 231Bi:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Bd:CCC
Federal Lands: NPS (Appalachian Trail [Lower New England], Boston Harbor Islands, Cape Cod, Delaware Water Gap, Gateway, Natchez Trace, Saratoga, Upper Delaware, Weir Farm); USFWS (E.B. Forsythe, Great Swamp, Iroquois)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.348, NATR.580, NATR.616, NATR.623.
Local Description Authors: M.J. Russo
Global Description Authors: L.A. Sneddon, mod. S.C. Gawler
References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Edinger et al. 2007, Edinger et al. 2008a, House 1917, Largay and Sneddon 2010, Metzler et al. 2009, NRCS 2001b, NRCS 2004a, NatureServe 2009, Niering et al. 1970, Nordman et al. 2011, Perles et al. 2007, Perles et al. 2008, Sneddon et al. 2010, Swain and Kearsley 2000, Swain and Kearsley 2001, Walz et al. 2008

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

2.B.2.Ne. Southeastern North American Grassland & Shrubland

M309. Southeastern Coastal Plain Patch Prairie

G175. Southeastern Coastal Plain Patch Prairie

Black Belt Prairie

***Schizachyrium scoparium - Sorghastrum nutans - Dalea candida - Liatris squarrosa - (Silphium terebinthinaceum)* Black Belt Grassland**

Little Bluestem - Indiangrass - White Prairie-clover - Scaly Blazingstar - (Prairie Rosinweed) Black Belt Grassland

Identifier: CEGL004664

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Coastal Plain Patch Prairie (M309)
Group	Southeastern Coastal Plain Patch Prairie (G175)
Alliance	Coastal Plain Little Bluestem Prairie (A3318)
Association	Black Belt Prairie

ELEMENT CONCEPT

Global Summary: This herbaceous association includes tallgrass prairies of the Black Belt of Alabama, Mississippi, and southern Tennessee (McNairy County), with outlying occurrences southwards in the Chunnenuggee Hills, Red Hills, and Lime Hills of southern Alabama (in Washington, Wilcox, Monroe, and Clark counties). This community occurs on calcareous soils of the Sumter and Binnsville series, described as beds of marly clay over Selma Chalk. In Alabama, the formations on which this system primarily occurs are the Demopolis Chalk and the Mooreville Chalk. In Tennessee, only the Demopolis is mapped. The area has an average annual precipitation of 130-140 cm and a frost-free period of 200-250 days. This prairie is dominated by *Andropogon glomeratus, Andropogon virginicus, Bouteloua curtipendula, Panicum virgatum, Schizachyrium scoparium*, and *Sorghastrum nutans*, with lesser amounts of *Paspalum floridanum, Setaria parviflora*, and *Sporobolus indicus* (exotic). *Juniperus virginiana var. virginiana* may invade examples. Moist, seepy inclusions within this herbaceous matrix are often dominated by *Rhynchospora colorata* and *Scleria verticillata*; *Rhynchospora divergens, Lythrum alatum var. lanceolatum, Mitreola petiolata*, and *Gratiola floridana* also occur but much less frequently.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This grassland community was sampled at four locations in the park. Sites are gentle to somewhat steep midslopes with mostly southern and eastern aspects. Soils are moderately well-drained to somewhat poorly drained clay and silty clay. The unvegetated surface is dominated by litter/duff with some wood and often considerable bare soil. Evidence of disturbance includes roads/trails, the presence of exotic plants, and fire suppression; lack of fire is resulting in the loss of this community through the invasion of eastern red-cedar.

Global Environment: This tallgrass prairie community occurs on calcareous soils of the Sumter and Binnsville series, described as beds of marly clay over Selma Chalk, in Alabama and Mississippi. In Alabama, the formations on which this system primarily occurs are the Demopolis Chalk and the Mooreville Chalk. In Tennessee, only the Demopolis is mapped (Hardeman 1966). The area has an average annual precipitation of 130-140 cm and a frost-free period of 200-250 days.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: This community is defined by the moderate to dense (50-80% cover) herbaceous layer. However, most stands are being encroached by trees (5-10 m) and shrubs (1-5 m), mostly notably *Juniperus virginiana*, with up to 60% cover. Graminoids dominate the herb layer and include *Andropogon glomeratus, Andropogon virginicus, Panicum virgatum, Schizachyrium scoparium*, and *Sorghastrum nutans*. Still, forbs are diverse and abundant; common species include *Berchemia scandens, Blephilia ciliata, Dalea purpurea, Desmodium marilandicum, Helenium autumnale, Ratibida pinnata*, and *Silphium terebinthinaceum*. This community also supports Mississippi state-rare *Agalinis aphylla, Agalinis oligophylla, Castilleja coccinea, Penstemon tenuis, Spiranthes magnicamporum, Symphyotrichum ericoides*, and *Symphyotrichum puniceum*.

Global Vegetation: This prairie association is dominated by *Andropogon glomeratus, Andropogon virginicus, Bouteloua curtipendula, Panicum virgatum*, and *Schizachyrium scoparium*, with lesser amounts of *Paspalum floridanum, Setaria parviflora*, and *Sporobolus indicus* (exotic). Other common species include *Aristida purpurascens var. virgata, Arnoglossum plantagineum, Blephilia ciliata, Buchnera americana, Chamaecrista fasciculata, Crotalaria sagittalis, Dalea candida, Dalea purpurea, Desmanthus illinoensis, Desmodium ciliare, Dracopis amplexicaulis, Lespedeza virginica, Liatris aspera, Liatris squarrosa, Liatris squarrulosa, Linum sulcatum var. sulcatum, Neptunia lutea, Nothoscordum bivalve (= Allium bivalve), Ratibida pinnata, Ruellia humilis, Sabatia angularis, Silphium terebinthinaceum, Silphium trifoliatum var. latifolium, Sisyrinchium albidum, Solidago nemoralis, Symphyotrichum dumosum (= Aster dumosus)*, and *Symphyotrichum patens (= Aster patens)*. Additional characteristic but less common species include *Asclepias verticillata, Asclepias viridiflora, Agalinis auriculata, Agalinis gattingeri, Agalinis oligophylla, Agalinis purpurea, Anemone berlandieri, Anemone caroliniana, Aristida longispica, Asclepias viridiflora, Asclepias viridis,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Berchemia scandens, Carex cherokeensis, Fimbristylis puberula, Hedyotis nigricans, Houstonia purpurea var. calycosa, Ranunculus fascicularis, Scutellaria parvula, Oligoneuron rigidum var. glabratum (= Solidago rigida ssp. glabrata), Spiranthes magnicamporum, Symphyotrichum ericoides (= Aster ericoides), and *Verbena simplex*. Remnants of this vegetation may occur on hillsides. *Juniperus virginiana var. virginiana* may invade examples. Moist, seepy inclusions within this herbaceous matrix are often dominated by *Rhynchospora colorata* and *Scleria verticillata*; *Rhynchospora divergens, Lythrum alatum var. lanceolatum, Mitreola petiolata*, and *Mecardonia acuminata* also occur but much less frequently (A. Schotz pers. comm.). Woody plants in adjacent areas or small-patch inclusions include *Quercus muehlenbergii, Fraxinus americana, Cercis canadensis, Juniperus virginiana var. virginiana, Frangula caroliniana (= Rhamnus caroliniana), Sideroxylon lanuginosum (= Bumelia lanuginosa), Crataegus* spp., and *Cornus drummondii*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Silphium terebinthinaceum*
Herb (field)	Graminoid	*Andropogon glomeratus*, *Panicum virgatum*, *Schizachyrium scoparium*, *Sorghastrum nutans*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Andropogon glomeratus*, *Andropogon virginicus*, *Bouteloua curtipendula*, *Panicum virgatum*, *Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Agalinis oligophylla*, *Dalea candida*, *Dalea purpurea*, *Penstemon tenuis*, *Ratibida pinnata*, *Schizachyrium scoparium*, *Sorghastrum nutans*, *Spiranthes magnicamporum*
Global: *Dalea candida*, *Liatris squarrosa*, *Schizachyrium scoparium*, *Silphium terebinthinaceum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Agalinis aphylla* (G3G4, MS state-rare), *Agalinis oligophylla* (G4, MS state-rare), *Castilleja coccinea* (G5, MS state-rare), *Penstemon tenuis* (G4, MS state-rare), *Spiranthes magnicamporum* (G4, MS state-rare), *Symphyotrichum ericoides* (G5, MS state-rare), *Symphyotrichum puniceum* (G5, MS state-rare); **Invasive/Exotic Plants**: *Daucus carota* (Low), *Lespedeza cuneata* (Medium), *Rosa bracteata* ()
Global: Vulnerable Plants: *Agalinis aphylla* (G3G4), *Agalinis auriculata* (G3), *Symphyotrichum ericoides* (G5, rare in MS and AL); **Invasive/Exotic Plants**: *Sporobolus indicus* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1 (28-Feb-1997). Nearly all of this association has been destroyed for agricultural use, or altered by grazing and fire suppression. No high-quality examples are known.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Occurrences south of the Black Belt in Alabama are sometimes referred to as "Jackson Prairies." These occurrences appear to have greater affinities to the Black Belt prairies (this association) than to the Jackson prairies of Mississippi, *Schizachyrium scoparium - Sorghastrum nutans - Dalea purpurea - Silphium integrifolium* Jackson Prairie Grassland (CEGL004020), and Louisiana, *Schizachyrium scoparium - Sorghastrum nutans* Jackson Prairie Grassland (CEGL004721).
Global Similar Associations:

- *(Quercus sinuata) / Sorghastrum nutans - Ratibida pinnata - Hedyotis nigricans var. nigricans - (Glandularia bipinnatifida)* Georgia Chalk Prairie Grassland (CEGL004247)
- *Schizachyrium scoparium - Sorghastrum nutans - Dalea purpurea - Silphium integrifolium* Jackson Prairie Grassland (CEGL004020) of Mississippi.
- *Schizachyrium scoparium - Sorghastrum nutans* Jackson Prairie Grassland (CEGL004721) of Louisiana.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi, in Lee County (3), and Pontotoc County (1).
Global Range: This vegetation type is primarily distributed in Alabama and Mississippi. There are also some remnants in southern Tennessee (McNairy County).
Nations: US
States/Provinces: AL:S1, MS, TN
TNC Ecoregions: 43:C, 53:?
USFS Ecoregions (1994/95): 231Ba:CCC, 231Bk:CCC
Federal Lands: NPS (Natchez Trace); USFS (Tombigbee)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.155, NATR.524, NATR.525, NATR.643.
Local Description Authors: M.J. Russo
Global Description Authors: R. Wieland and A. Schotz
References: ALNHP unpubl. data, Ambrose pers. comm., DeSelm and Murdock 1993, Gunn 1985, Hardeman 1966, Leidolf and McDaniel 1998, Leidolf et al. 2002, Nordman et al. 2011, Rostlund 1957, Schotz and Barbour 2009, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Mississippi Jackson Calcareous Clay Prairie

***Schizachyrium scoparium - Sorghastrum nutans - Dalea purpurea - Silphium integrifolium* Jackson Prairie Grassland**
Little Bluestem - Indiangrass - Purple Prairie-clover - Wholeleaf Rosinweed Jackson Prairie Grassland
Identifier: CEGL004020

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Coastal Plain Patch Prairie (M309)
Group	Southeastern Coastal Plain Patch Prairie (G175)
Alliance	Coastal Plain Little Bluestem Prairie (A3318)
Association	Mississippi Jackson Calcareous Clay Prairie

ELEMENT CONCEPT

Global Summary: This association includes remnants of prairie vegetation in the Jackson Prairie region of the upper Coastal Plain of Mississippi and adjacent Alabama. Examples occur on calcareous clay islands consisting of gently sloping uplands surrounded by pine-hardwood forests on acidic soils. The most prominent tall grasses of this association are *Andropogon gerardii, Schizachyrium scoparium, Sorghastrum nutans*, and *Panicum virgatum*. Additional tall grasses include *Tripsacum dactyloides, Andropogon glomeratus*, and *Paspalum floridanum*. Along with *Schizachyrium scoparium*, two other species provided over 50% cover in prairie openings; these are *Carex cherokeensis* and *Helenium autumnale*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This little bluestem grassland was sampled at five locations in the park. Sites are gentle to somewhat steep lower to upper slopes of any aspect. Soils range from well-drained to somewhat poorly drained silt and silty clay. The unvegetated surface is may be dominated by litter/duff with some wood and bare soil or be completely lacking. Evidence of disturbance includes powerline right-of-way, mowing, the presence of exotic plants, and fire suppression; lack of fire is resulting in encroachment by loblolly pines at one site.
Global Environment: This prairie association is limited to the upper Coastal Plain of Mississippi, primarily in the Jackson Prairie region (Wieland 1995). Examples are found on the Jackson Group, the uppermost Eocene rock strata, more specifically, the Yazoo Clay Formation (Wieland 1995, Moran et al. 2003). The soils of these prairie openings (Chromic Hapluderts) are clayey and calcareous with high shrink-swell potential and high cation-exchange capacities (Moran et al. 2003). Most examples are presently mapped as the Maytag Series, a fine montmorillonitic, thermic Entic Chromudert (Wieland 1995).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (90-100% cover) herbaceous layer is dominated by *Schizachyrium scoparium*; other graminoids found at much lower covers are *Andropogon glomeratus, Andropogon virginicus, Dichanthelium scoparium, Panicum virgatum*, and *Sorghastrum nutans*. Common forbs and vines include *Ampelopsis arborea, Helianthus angustifolius, Solidago canadensis, Symphyotrichum dumosum*, and *Vernonia missurica*. Scattered trees and shrubs may include *Diospyros virginiana, Liquidambar styraciflua*, and *Pinus taeda*.
Global Vegetation: The most prominent tall grasses of this association are *Andropogon gerardii, Schizachyrium scoparium, Sorghastrum nutans*, and *Panicum virgatum*. Additional tall grasses include *Tripsacum dactyloides, Andropogon glomeratus*, and *Paspalum floridanum*. Along with *Schizachyrium scoparium*, two other species provided over 50% cover in prairie openings; these are *Carex cherokeensis* and *Helenium autumnale*. Other plants closely affiliated with less disturbed prairie openings include *Dalea purpurea, Dalea candida, Sporobolus compositus var. macer, Muhlenbergia capillaris, Penstemon laxiflorus (= Penstemon australis ssp. laxiflorus), Symphyotrichum novae-angliae (= Aster novae-angliae), Echinacea purpurea, Manfreda virginica, Ruellia purshiana, Desmanthus illinoensis*, and *Spiranthes magnicamporum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Helianthus angustifolius*, *Vernonia missurica*
Herb (field)	Graminoid	*Andropogon glomeratus*, *Andropogon virginicus*, *Dichanthelium scoparium*, *Panicum virgatum*, *Schizachyrium scoparium*, *Sorghastrum nutans*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Schizachyrium scoparium*, *Sorghastrum nutans*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Andropogon virginicus*, *Dichanthelium scoparium*, *Helianthus angustifolius*, *Schizachyrium scoparium*, *Vernonia missurica*
Global: *Dalea purpurea*, *Schizachyrium scoparium*, *Sorghastrum nutans*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Conium maculatum* (Medium/Low), *Lonicera japonica* (High/Medium), *Paspalum dilatatum* (), *Paspalum urvillei* (), *Sorghum halepense* (High/Medium), *Triadica sebifera* (High), *Verbena brasiliensis* ()
Global: Other Plants: *Spiranthes magnicamporum* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1 (21-Oct-2003). This community type has an extremely limited natural range in central Mississippi. It was historically rare and is considerably more so today (Wieland 1995). There are 65 openings recorded by the Mississippi Natural Heritage Program; less than 50% are in good or better condition and 80% are less than 5 hectares in size. Some examples occur on the Bienville National Forest, where some restoration and management have occurred. However, most occurrences have become degraded by fire suppression and other detrimental land uses. There are also three examples in Alabama.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Similar Associations:

- *(Quercus sinuata) / Sorghastrum nutans - Ratibida pinnata - Hedyotis nigricans var. nigricans - (Glandularia bipinnatifida)* Georgia Chalk Prairie Grassland (CEGL004247)
- *Schizachyrium scoparium - Panicum flexile - Carex microdonta* Grassland (CEGL004021) apparently confined to the Cook Mountain geologic formation in Louisiana.
- *Schizachyrium scoparium - Sorghastrum nutans - Dalea candida - Liatris squarrosa - (Silphium terebinthinaceum)* Black Belt Grassland (CEGL004664)
- *Schizachyrium scoparium - Sorghastrum nutans - Echinacea pallida - Dalea purpurea* Grassland (CEGL007769)
- *Schizachyrium scoparium - Sorghastrum nutans* Jackson Prairie Grassland (CEGL004721)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The five sampled sites are in Mississippi between M90 and M95, M105 and M110, and in the vicinity of M80, M90, and M105.

Global Range: This prairie type is endemic to central Mississippi and adjacent Washington, Choctaw, and Clarke counties of Alabama (A. Schotz pers. comm., Wieland 1995).
Nations: US
States/Provinces: AL, MS
TNC Ecoregions: 43:C, 53:?
USFS Ecoregions (1994/95): 231Bi:CCC, 231Bj:CC?, 231Bl:CCC, 232B:??
Federal Lands: NPS (Natchez Trace); USFS (Bienville)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.306, NATR.312, NATR.506, NATR.575, NATR.584.
Local Description Authors: M.J. Russo
Global Description Authors: mod. M. Pyne
References: Jones 1971, Moran et al. 2003, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., Wieland 1995

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M307. Southeastern Ruderal Grassland & Shrubland

G583. Southeastern Ruderal Grassland & Shrubland

Broomsedge Old-field Grassland

***Andropogon virginicus var. virginicus* Ruderal Grassland**
Broomsedge Bluestem Ruderal Grassland
Identifier: CEGL004044

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Broomsedge Old-field Grassland

ELEMENT CONCEPT

Global Summary: This association includes herbaceous-dominated vegetation that has been anthropogenically altered and/or maintained, especially on old fields and pastures. Examples support predominately native species or a mixture of native and exotic species, one of the most dominant or characteristic species being *Andropogon virginicus var. virginicus*. *Lolium pratense (= Festuca pratensis)* can dominate fields early in the season. This is a very common and wide-ranging association that can be quite variable in terms of species composition. Additional components are other perennial grasses and herbaceous species, most with pioneer or weedy tendencies, the exact composition of which will vary with geography, management history, and habitat.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional broomsedge bluestem vegetation was sampled at six locations in the park. Sites are gentle mid and lower slopes and ridges. Soils are well- to moderately well-drained clay loam, silt loam, and silty clay. The unvegetated surface, if any, is dominated by litter/duff. Evidence of disturbance includes mowing, grazing, past clearing, and the presence of exotic plants.
Global Environment: This vegetation typically occurs on old fields, pastures, and rocky sites. It will persist indefinitely under a regular mowing regime, e.g., in powerline corridors.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (30-100%) herbaceous layer is dominated by *Andropogon virginicus*; other common and/or abundant species include *Andropogon ternarius, Campsis radicans, Digitaria filiformis, Panicum anceps, Panicum virgatum, Paspalum laeve, Saccharum giganteum, Solidago canadensis*, and *Tridens flavus*.
Global Vegetation: Stands of this community are dominated by *Andropogon virginicus var. virginicus*, sometimes codominant with *Lolium pratense*. Associated species vary with geography and habitat and include typical pioneer species. Species with high cover values in plot samples attributed to this type include *Tridens flavus, Setaria parviflora (= Setaria geniculata), Eragrostis spectabilis*, and *Panicum anceps* (NatureServe Ecology unpubl. data). On the eastern Highland Rim of Tennessee (Arnold Air Force Base), associated species include *Diodia teres, Aristida dichotoma, Aristida oligantha, Packera anonyma (= Senecio anonymus), Paspalum laeve, Lespedeza virginica*, and *Plantago virginica*. *Rubus argutus* and *Smilax* spp. may be locally abundant but are not dominant. In clearcuts, *Schizachyrium scoparium, Danthonia spicata*, and *Dichanthelium* spp. are also common, as are occasional *Quercus* spp. and *Rubus argutus*. The plot at Shiloh National Military Park (western Tennessee) was a mowed field of mostly native species, dominated by *Andropogon virginicus var. virginicus*. *Paspalum setaceum* and *Tridens flavus* were codominant (with less cover). Other herbaceous plants with high cover values were *Setaria parviflora (= Setaria geniculata), Diodia teres, Schizachyrium scoparium*, and less common were *Packera anonyma, Sorghum halepense*, and *Cyperus retrorsus*. At less than 1% cover were *Polypremum procumbens, Oxalis stricta, Eragrostis spectabilis, Salvia lyrata, Solanum carolinense, Digitaria sanguinalis, Panicum anceps, Croton willdenowii (= Crotonopsis elliptica), Trifolium pratense, Kummerowia striata, Coreopsis pubescens, Plantago lanceolata*, and *Mecardonia acuminata*. At only a trace amount of cover were *Conyza canadensis, Acalypha virginica, Solidago* sp., *Erigeron annuus, Sida spinosa, Hypericum drummondii, Polygala verticillata, Eupatorium capillifolium, Passiflora incarnata*, and *Asclepias amplexicaulis*. In West Virginia, common associates include *Sorghastrum nutans, Dichanthelium clandestinum, Anthoxanthum odoratum, Phleum pratense, Dactylis glomerata, Daucus carota, Lotus corniculatus, Trifolium pratense, Leucanthemum vulgare, Solidago canadensis, Solidago rugosa*, and *Solidago nemoralis*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Andropogon ternarius*, *Andropogon virginicus*, *Panicum anceps*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Andropogon virginicus* var. *virginicus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Andropogon ternarius*, *Andropogon virginicus*, *Panicum anceps*
Global: *Andropogon virginicus* var. *virginicus*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Paspalum dilatatum* (), *Paspalum notatum* (Insignificant), *Pennisetum glaucum* (), *Sorghum halepense* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (8-Aug-2000). This is a ruderal community and represents vegetation resulting from succession following anthropogenic disturbance of an area. It is not a conservation priority for its own sake and does not receive a conservation rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Phenology can affect apparent composition: in West Virginia, fields visited early in the season had high cover of *Lolium pratense*, while those sampled later in the season were dominated by *Andropogon virginicus*.
Global Similar Associations:

- *Rhus copallinum - Andropogon virginicus* Ruderal Grassland (CEGL004035)
- *Schizachyrium scoparium - Andropogon (gyrans, ternarius, virginicus)* Grassland (CEGL007707)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (4) and Tennessee (2) between M375 and M380, M390 and M395, and in the vicinity of M65, M75, M95, and M320.
Global Range: This community ranges throughout most or all of the southeastern United States, extending north to Virginia and West Virginia.
Nations: US
States/Provinces: AL, AR, GA, IL, IN, KY, LA, MO?, MS, NC, OK, SC, TN, TX, VA, WV
TNC Ecoregions: 31:C, 32:C, 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:P, 52:C, 53:C, 56:C, 57:C, 59:C
USFS Ecoregions (1994/95): 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 222Cg:CCC, 222Eg:CCC, 231Aa:CCC, 231Ba:CCC, 231Be:CCC, 231Bi:CCC, 231Cc:CCC, 231Fa:CCP, 231Fb:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232B:CC, 232Ce:CCC, 232F:CC, 255Da:CCC, 255Dc:CCC, M221Aa:CCC, M221Ab:CCC, M221Ba:CC?, M221Bb:CCC, M221Bd:CC?, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCP, M221Dd:CCP, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Abe Lincoln Birthplace, Appalachian Trail [Central Appalachians], Big South Fork, Buffalo River, Chattahoochee River, Chickamauga-Chattanooga?, Cowpens, Fort Donelson, Kings Mountain, Little River Canyon, Mammoth Cave, Natchez Trace, Ninety Six, Shiloh, Stones River); USFS (Cherokee, George Washington, Jefferson, Oconee?, Ouachita (Coastal Plain)?, Ouachita (Mountains)?, Ouachita?, Ozark?, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tuskegee?); USFWS (Anahuac, Big Boggy?, Brazoria)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.208, NATR.243, NATR.579, NATR.586, NATR.598, NATR.612.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. C.W. Nordman and S.C. Gawler
References: Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2006, Hoagland 2000, Homoya et al. 1988, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman 2004a, Nordman et al. 2011, Penfound 1953, Pyne et al. 2010, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a, Tarr et al. 1980, Vanderhorst 2001a, Vanderhorst and Streets 2006, White 2004, White 2005, White and Govus 2003, White and Govus 2005, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Carpetgrass Grassland

***Axonopus fissifolius* Ruderal Herbaceous Vegetation [Park Special]**
Common Carpetgrass Ruderal Herbaceous Vegetation
Identifier: CEPS004833

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Ruderal Carpetgrass Grassland

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This common carpetgrass ruderal vegetation was sampled once in the park. The site is a flat alluvial terrace with somewhat poorly drained sandy clay soil. The unvegetated surface is dominated by litter/duff with some bare soil. The site may have been a wetland in the past that has since been drained and cleared for agriculture. Other evidence of disturbance includes the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (90% cover) herbaceous layer is strongly dominated by *Axonopus fissifolius*. Other herbs found at lower cover include *Andropogon virginicus, Schizachyrium scoparium*, and *Symphyotrichum dumosum*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Axonopus fissifolius*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Paspalum urvillei* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (12-Nov-2010).

CLASSIFICATION

Status: Nonstandard

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The sampled site is in Mississippi between M130 and M135.
Nations: US
States/Provinces: MS
TNC Ecoregions: 43:C
USFS Ecoregions (1994/95): 231Bg:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.521.
Local Description Authors: M.J. Russo
Global Description Authors:
References: Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Cogongrass Grassland

***Imperata cylindrica* Ruderal Grassland**
Cogongrass Ruderal Grassland
Identifier: CEGL004673

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Cogongrass Ruderal Grassland

ELEMENT CONCEPT

Global Summary: Grasslands of the sod-forming alien species *Imperata cylindrica*. This community is usually essentially monospecific, dominated by a dense turf of *Imperata cylindrica*. Many areas occupied by this community are abandoned agricultural lands or other disturbed areas, but others include barrier island dunes. Scattered trees (particularly of successional species) may occur.
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (25-Jun-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong

ELEMENT DISTRIBUTION

Nations: US
States/Provinces: AL, FL, GA?, MS
TNC Ecoregions: 53:C
USFS Ecoregions (1994/95): 232Bf:CCC, 232Bg:CCC, 232Bj:CCC, 232Db:CCC, 232Dc:CCC
Federal Lands: NPS (Natchez Trace); USFS (De Soto, Ocala); USFWS (Bon Secour, Grand Bay, Mississippi Sandhill Crane)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: A.S. Weakley
References: Schotz pers. comm., Southeastern Ecology Working Group n.d.

Cultivated Meadow

***Lolium (arundinaceum, pratense)* Ruderal Grassland**
(Tall Fescue, Meadow Ryegrass) Ruderal Grassland
Identifier: CEGL004048

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Cultivated Meadow

ELEMENT CONCEPT

Global Summary: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained. It is currently defined for the Central and 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. The dominant species in this type are the European "tall or meadow fescues" (*Lolium* or *Schedonorus* spp.) of uncertain and controversial generic placement. Several other exotic grasses, including *Agrostis gigantea, Dactylis glomerata, Holcus lanatus, Phleum pratense*, and *Poa pratensis*, are common associates. These communities are sometimes nearly monospecific but can also be very diverse and contain many native as well as exotic species of grasses, sedges, and forbs. Exotic forbs include the legumes *Lespedeza cuneata, Trifolium campestre, Trifolium hybridum, Trifolium pratense*, and *Trifolium repens*, as well as *Achillea millefolium var. occidentalis, Calystegia sepium, Daucus carota, Leucanthemum vulgare, Oxalis stricta*, and *Plantago lanceolata*. Common native herbs include *Apocynum cannabinum, Desmodium canescens, Dichanthelium clandestinum, Erigeron annuus, Fragaria virginiana, Potentilla simplex, Solanum carolinense, Solidago canadensis*, and *Verbesina occidentalis*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This fescue herbaceous vegetation was sampled at three locations in the park. Sites are flat alluvial terraces and floodplains that may experience periodic flooding or ponding. Soils are moderately well-drained to somewhat poorly drained clay loam, silt loam, and silty clay. The unvegetated surface is dominated by litter/duff and bare soil. These sites are former agricultural fields or cultivated meadows and the result of human disturbance; many exotic plants are present.
Global Environment: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained. It occurs in areas which have been cleared in the past, including abandoned farmlands, strip mines, and other areas disturbed by human activities.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to very dense (60-100% cover) herbaceous layer is dominated by *Lolium arundinaceum* or *Lolium pratense*; additional common and/or abundant herbs include *Acalypha rhomboidea, Campsis radicans, Chamaesyce nutans, Dichanthelium scoparium, Diodia virginiana, Panicum anceps, Plantago major, Solanum carolinense*, and *Symphyotrichum pilosum*.
Global Vegetation: This association represents early-successional herbaceous and herb-shrub vegetation dominated by or having a large component of exotic grasses and legumes. The dominant species in this association are the European "tall or meadow fescues" (*Lolium* or spp.). These communities are sometimes nearly monospecific but can also be very diverse and contain many native species of grasses, sedges, and forbs. Woody encroachment is restricted to low cover by *Toxicodendron radicans* and species of *Rubus*, both of which become more abundant in older stands. Scattered individuals of various shrubs may be present, including *Crataegus crus-galli, Fraxinus pennsylvanica, Fraxinus americana, Rosa multiflora, Robinia pseudoacacia, Cornus florida, Elaeagnus umbellata, Sambucus canadensis (= Sambucus nigra ssp. canadensis)*, and *Sassafras albidum*. In the Central Appalachians and northern Cumberlands, the dominant exotic grasses include *Agrostis gigantea, Dactylis glomerata, Holcus lanatus, Lolium pratense, Phleum pratense*, and *Poa pratensis*. Exotic forbs include the legumes *Lespedeza cuneata, Trifolium campestre, Trifolium hybridum, Trifolium pratense*, and *Trifolium repens*, as well as *Achillea millefolium var. occidentalis, Calystegia sepium, Daucus carota, Leucanthemum vulgare, Oxalis stricta*, and *Plantago lanceolata*. Common native herbs include *Apocynum cannabinum, Desmodium canescens, Dichanthelium clandestinum, Erigeron annuus, Fragaria virginiana, Potentilla simplex, Solanum carolinense, Solidago canadensis*, and *Verbesina occidentalis*. In the Black Belt region of Alabama and Mississippi, it is commonly found in mixture with *Paspalum dilatatum* (Bransby n.d.), and the exotic *Bromus tectorum* may be present in stands.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Lolium arundinaceum*, *Lolium pratense*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Agrostis gigantea*, *Phleum pratense*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Acalypha rhomboidea*, *Lolium arundinaceum*, *Lolium pratense*
Global: *Achillea millefolium*, *Apocynum cannabinum*, *Calystegia sepium*, *Dactylis glomerata*, *Daucus carota*, *Desmodium canescens*, *Dichanthelium clandestinum*, *Erigeron annuus*, *Fragaria virginiana*, *Holcus lanatus*, *Lespedeza cuneata*, *Leucanthemum vulgare*, *Oxalis stricta*, *Plantago lanceolata*, *Poa pratensis*, *Potentilla simplex*, *Solanum carolinense*, *Solidago canadensis*, *Trifolium hybridum*, *Trifolium pratense*, *Trifolium repens*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Allium vineale* (Medium/Insignificant), *Daucus carota* (Low), *Digitaria ischaemum* (), *Lolium arundinaceum* (High/Medium), *Lolium pratense* (High/Low), *Lonicera japonica* (High/Medium), *Paspalum dilatatum* (), *Paspalum notatum* (Insignificant), *Paspalum urvillei* (), *Rumex crispus* (Low/Insignificant), *Sorghum halepense* (High/Medium), *Verbena brasiliensis* ()
Global: Vulnerable Plants: *Berberis canadensis* (G3); **Invasive/Exotic Plants**: *Achillea millefolium* (), *Agrostis gigantea* (Medium/Low), *Bromus tectorum* (High), *Calystegia sepium* (), *Dactylis glomerata* (Medium/Insignificant), *Daucus carota* (Low), *Holcus lanatus* (High/Medium), *Lespedeza cuneata* (Medium), *Leucanthemum vulgare* (Medium/Low), *Phleum pratense* (Medium), *Plantago lanceolata* (High/Low), *Poa pratensis* (Medium), *Trifolium hybridum* (Medium/Low), *Trifolium pratense* (Low/Insignificant), *Trifolium repens* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (5-Jan-2000). This vegetation is dominated by an exotic species, is of anthropogenic origin, and is thus not a conservation priority.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: *Lolium pratense* and *Lolium arundinaceum* are two closely related species which were traditionally treated as *Festuca pratensis (= Festuca elatior)* and *Festuca arundinacea*, and could alternately be treated as *Schedonorus pratensis* and *Schedonorus arundinaceus*. Conversion to Kartesz (1999) standard has necessitated the shift to the *Lolium* names from *Festuca*.
Global Similar Associations:
- *Dactylis glomerata - Phleum pratense - Festuca* spp. - *Solidago* spp. Ruderal Meadow (CEGL006107)
- *Schizachyrium scoparium - (Andropogon virginicus) - Solidago* spp. Ruderal Meadow (CEGL006333)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (2) and Tennessee (1) between M70 and M75 and in the vicinity of M310 and M315.
Global Range: This association is currently documented from the southern half of the Central Appalachians through the Gulf Coastal Plain and west to the Ozarks and Ouachitas. It is possible throughout much of the eastern United States.
Nations: US
States/Provinces: AL, AR, GA, KY, MD, MO, MS, NC, OK, SC, TN, VA, WV
TNC Ecoregions: 38:C, 39:C, 40:P, 43:C, 44:C, 50:C, 51:C, 52:C, 57:C, 59:C
USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 222Eg:CCC, 231Ae:CCC, 231Ba:CCC, 231Bh:CCC, 231Bi:CCC, M221Cb:CCC, M221Cd:CCC, M221Dc:CCC, M221Dd:CCC, M222Ab:CCC, M231A:CC
Federal Lands: BIA (Eastern Band of Cherokee); NPS (Abe Lincoln Birthplace, Appalachian Trail [Southern Blue Ridge], Big South Fork, Blue Ridge Parkway, Buffalo River, Carl Sandburg Home, Chickamauga-Chattanooga, Cowpens, Cumberland Gap, Fort Donelson, Great Smoky Mountains, Guilford Courthouse, Kings Mountain, Little River Canyon, Mammoth Cave, Natchez Trace, New River Gorge, Ninety Six, Obed River, Russell Cave, Shiloh, Stones River, Thomas Stone, Vicksburg); USFS (Cherokee, Ouachita, Ouachita (Coastal Plain)?, Ouachita (Mountains), Ozark)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.177, NATR.619, NATR.631.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. S.C. Gawler
References: Bransby n.d., Heath et al. 1973, Hoagland 2000, Kartesz 1999, Lea et al. 2012, Lea et al. 2013, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman 2004a, Nordman et al. 2011, Pyne et al. 2010, Schmalzer and DeSelm 1982, Schotz et al. 2006, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007, White 2003, White 2004, White 2005, White 2006, White and Govus 2003, White and Govus 2005, White and Pyne 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Bahia Grass Grassland

***Paspalum notatum* Ruderal Grassland**
Bahia Grass Ruderal Grassland
Identifier: CEGL004700

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Ruderal Bahia Grass Grassland

ELEMENT CONCEPT

Global Summary: This association represents improved pastures, roadsides and lawns of the Southeastern Coastal Plain dominated by the introduced grass *Paspalum notatum*, on a wide variety of soils and sites. Various remnant native species occur to varying degrees and are sometimes codominant.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This bahia grass vegetation was sampled at four locations in the park. Sites range from flat alluvial terraces to gentle to somewhat steep midslopes. Soils are well- to moderately well-drained loam and silty clay. The unvegetated surface is dominated by litter/duff or bare soil. Evidence of disturbance includes roads/trails, clearing and mowing (old fields), and the presence of exotic plants.
Global Environment: This improved pasture association occurs on a wide variety of soils and sites in uplands of the Southeastern Coastal Plain.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense to very dense (70-100%) herbaceous layer is strongly dominated by *Paspalum notatum*; *Andropogon virginicus* may codominate. Additional species that may occur at much lower cover include *Kummerowia striata, Paspalum dilatatum, Salvia lyrata, Schizachyrium scoparium, Sorghum halepense*, and *Tridens flavus*.
Global Vegetation: These improved pastures, roadsides and lawns are dominated by *Paspalum notatum*, with varying degrees of native composition remaining. Various remnant native species occur to varying degrees and are sometimes codominant.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Andropogon virginicus*, *Paspalum notatum*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Paspalum notatum*

CHARACTERISTIC SPECIES

Global: *Paspalum notatum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Kummerowia striata* (Low), *Paspalum dilatatum* (), *Paspalum notatum* (Insignificant), *Paspalum urvillei* (), *Rumex obtusifolius* (), *Sorghum halepense* (High/Medium)
Global: Invasive/Exotic Plants: *Paspalum notatum* (Insignificant)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (25-Jun-1997). This vegetation is dominated by species not native to North America.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Although originally planted, *Paspalum notatum* maintains itself spontaneously, though especially so with continued grazing or mowing, and this vegetation is considered "ruderal." This vegetation is reported from the southeastern tip of the Upper East Gulf Coastal Plain, in the "loamhills" of Fort Benning, Georgia (M. Mulligan pers. comm. 2001).
Global Similar Associations:
- *Rhus copallinum - Andropogon virginicus* Ruderal Grassland (CEGL004035)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (2) and Mississippi (2).
Global Range: This improved pasture, roadside and lawn vegetation is found in the Southeastern Coastal Plain, including the states of Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.
Nations: US
States/Provinces: AL, FL, GA, LA, MS, SC, TX
TNC Ecoregions: 40:C, 41:C, 43:C, 52:C, 53:C, 55:C, 56:C
USFS Ecoregions (1994/95): 231Ab:CCC, 231Be:CCC, 231Bg:CCC, 231Bh:CCC, 231Bi:CCC, 232B:CC, 232D:CC, 232G:CC
Federal Lands: DOD (Fort Benning); NPS (Horseshoe Bend, Natchez Trace, Vicksburg); USFS (Ocala)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.136, NATR.530, NATR.594, NATR.648.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: Lea et al. 2013, Mulligan pers. comm., Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., Wolfe 1990

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Winged Sumac - Broomsedge Grassland

***Rhus copallinum - Andropogon virginicus* Ruderal Grassland**
Winged Sumac - Broomsedge Bluestem Ruderal Grassland
Identifier: CEGL004035

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Ruderal Winged Sumac - Broomsedge Grassland

ELEMENT CONCEPT

Global Summary: This association includes shrub-dominated vegetation that has been anthropogenically altered and/or maintained, especially on old fields and pastures. Examples support predominately native species or a mixture of native and exotic species, some of the most dominant or characteristic species being *Rhus copallinum* and *Andropogon virginicus var. virginicus*. This is a wide-ranging association that can be quite variable in terms of species composition. Additional components are other shrubs, tree seedlings and saplings, perennial grasses and herbaceous species, most with pioneer or weedy tendencies, the exact composition of which will vary with geography, management history, and habitat.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This shrub herbaceous successional vegetation was sampled at five locations in the park. Sites range from gentle to somewhat steep mid and upper slopes with mostly southern and western aspects. Soils range from rapidly drained sandy loam to well-drained or somewhat poorly drained clay loam, sandy clay and silty clay. The unvegetated surface is dominated by leaf litter/duff often with some small rocks and/or bare soil. Evidence of disturbance includes trails/roads, maintained powerline right-of-way, clearing for other uses, use of herbicides, fire, and the presence of exotic plants.
Global Environment: This vegetation typically occurs on old fields, old pastures, roadsides and rocky sites.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very sparse to dense (5-80% cover) shrub layer, 1-5 m tall, is dominated by *Rhus copallinum*. Additional shrubs and tree saplings may include *Acer negundo, Fraxinus americana, Juniperus virginiana, Ulmus alata*, and many others. The herbaceous layer (40-80%) is a mix of native and exotic species. Dominant and/or common species include *Ambrosia artemisiifolia, Andropogon virginicus, Conyza canadensis, Lespedeza cuneata, Lonicera japonica, Microstegium vimineum, Panicum virgatum, Rudbeckia triloba*, and *Solidago canadensis var. scabra*.
Global Vegetation: Examples support predominately native species or a mixture of native and exotic species, some of the most dominant or characteristic species being *Rhus copallinum* and *Andropogon virginicus var. virginicus*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhus copallinum*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Rhus copallinum*
Herb (field)	Graminoid	*Andropogon virginicus* var. *virginicus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ambrosia artemisiifolia*, *Andropogon virginicus*, *Conyza canadensis*, *Lespedeza cuneata*, *Rhus copallinum*, *Ulmus alata*
Global: *Andropogon virginicus* var. *virginicus*, *Rhus copallinum*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ambrosia artemisiifolia* (), *Clematis terniflora* (), *Kummerowia striata* (Low), *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lolium pratense* (High/Low), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low)
Global: Invasive/Exotic Plants: *Clematis terniflora* (), *Kummerowia striata* (Low), *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lolium pratense* (High/Low), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (9-Dec-2010). This is a ruderal community and represents vegetation resulting from succession following anthropogenic disturbance of an area. It is not a conservation priority for its own sake and does not receive a conservation rank.

CLASSIFICATION

Status: Standard

Global Similar Associations:

- *Andropogon virginicus var. virginicus* Ruderal Grassland (CEGL004044)
- *Paspalum notatum* Ruderal Grassland (CEGL004700)
- *Schizachyrium scoparium - Andropogon (gyrans, ternarius, virginicus)* Grassland (CEGL007707)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Alabama (3), Mississippi (4) and Tennessee (1) between M410 and M415 and in the vicinity of M305, M310, M302 and M405.

Global Range: This community may range throughout most of the southeastern United States; it is documented in Alabama, Mississippi and Tennessee.

Nations: US

States/Provinces: AL, MS, TN

TNC Ecoregions: 43:C, 44:C

USFS Ecoregions (1994/95): 222Eg:CCC, 231Ba:CCC, 231Be:CCC

Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.135, NATR.146, NATR.609, NATR.635, NATR.649.

Local Description Authors: M.J. Russo

Global Description Authors: C.W. Nordman

References: Nordman et al. 2011, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Johnson Grass Grassland

***Sorghum halepense* Ruderal Grassland**
Johnson Grass Ruderal Grassland
Identifier: CEGL004108

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Herbaceous Ruderal Vegetation (A3321)
Association	Ruderal Johnson Grass Grassland

ELEMENT CONCEPT

Global Summary: This association includes the edges of fields, roadsides, and disturbed or formerly cultivated areas dominated by *Sorghum halepense*. It is common as small patches in agricultural landscapes in the southern United States.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This Johnson grass herbaceous vegetation was sampled at four locations in the park. Sites flat alluvial terraces as well as gentle slopes and ridges with southern aspects. Soils are well-drained loam, silt, and silty clay. The unvegetated surface is made up of litter/duff and bare soil. Evidence of disturbance includes past agriculture (old fields) and the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (90-100% cover) herbaceous layer is heavily dominated by the *Sorghum halepense* (exotic). Other herbs that may be present at lower cover include mostly other exotic species but native species occur as well, such as *Andropogon virginicus, Campsis radicans, Cynodon dactylon, Cyperus esculentus, Dichondra carolinensis, Eleusine indica, Phleum pratense, Solanum carolinense*, and many others.
Global Vegetation: This association includes herbaceous vegetation heavily dominated by *Sorghum halepense* which is a tall-growing, robust and weedy non-native grass. Other non-native grasses, such as *Phleum pratense, Lolium arundinaceum, Setaria parviflora*, and *Digitaria ischaemum* may be present at lower cover values. *Andropogon* spp., *Cyperus* spp., and *Carex cherokeensis*, are other (native) graminoids which may be present. Forbs include *Melothria pendula, Commelina communis, Cocculus carolinus, Erechtites hieraciifolia, Lactuca floridana, Rumex* sp., *Diodia virginiana, Trifolium pratense, Solanum carolinense*, and *Chamaesyce maculata (= Euphorbia maculata)*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Sorghum halepense*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Sorghum halepense*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Allium vineale* (Medium/Insignificant), *Cruciata pedemontana* (), *Cynodon dactylon* (Medium/Low), *Eleusine indica* (), *Lonicera japonica* (High/Medium), *Paspalum notatum* (Insignificant), *Paspalum urvillei* (), *Pennisetum glaucum* (), *Phleum pratense* (Medium), *Rumex crispus* (Low/Insignificant), *Sorghum halepense* (High/Medium), *Trifolium pratense* (Low/Insignificant), *Verbena brasiliensis* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (14-Feb-2005). *Sorghum halepense* is an exotic grass, which can dominate areas without control.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (3) and Tennessee (1) in the vicinity of M80, M85, M240, and M440.
Global Range: This association is presumably widespread in agricultural regions of the southeastern U.S.
Nations: US
States/Provinces: MS, TN
TNC Ecoregions: 43:C, 44:C
USFS Ecoregions (1994/95): 222Eg:CCC, 231Bh:CCC, 231Bi:CCC, 231Bk:CCC
Federal Lands: NPS (Mammoth Cave?, Natchez Trace, Vicksburg)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.109, NATR.309, NATR.582, NATR.640.
Local Description Authors: M.J. Russo
Global Description Authors: C.W. Nordman
References: Holm et al. 1977, Lea et al. 2013, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Ruderal Chinese Privet Upland Shrubland

***Ligustrum sinense* Ruderal Upland Shrubland**
Chinese Privet Ruderal Upland Shrubland
Identifier: CEGL003807

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Exotic Shrubland Alliance (A4084)
Association	Ruderal Chinese Privet Upland Shrubland

ELEMENT CONCEPT

Global Summary: This shrubland association comprises upland and wetland areas heavily infested with the exotic *Ligustrum sinense* to the exclusion of canopy trees.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This invasive Chinese privet upland shrubland was sampled at four locations in the park. Sites are flat to gently sloping terrain with moderately well-drained silty clay soil. The unvegetated surface is dominated by litter/duff or bare soil. Evidence of disturbance includes powerline right-of-way, wind damage, possible flooding or ponding, and the presence of exotic plants.
Global Environment: This community exists in disturbed bottomlands and uplands, usually highly fragmented, where they can establish and exclude almost all native species.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: This community is defined by the dense (70-90% cover) tall-shrub layer (2-5 m tall) and sparse to dense (30-80%) short-shrub layer (0.5-2 m) of the invasive exotic *Ligustrum sinense*. Some stands may also contain a sparse (10-20%) tree layer (5-15 m) that can include *Magnolia grandiflora, Platanus occidentalis, Prunus serotina*, and *Quercus pagoda*. Herbs and vines are sparse.
Global Vegetation: This community is usually a monoculture of *Ligustrum sinense*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

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

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ligustrum sinense*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Perilla frutescens* (Low), *Sorghum halepense* (High/Medium), *Triadica sebifera* (High)
Global: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (1-Dec-1997).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The four sampled sites are in Mississippi.
Global Range: This invasive community is found throughout the southeastern United States from Virginia to Florida and west to Arkansas and Louisiana.
Nations: US
States/Provinces: AL, AR, FL, GA, LA, MS, NC?, SC, TN
TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 52:C, 53:C
USFS Ecoregions (1994/95): 221:C, 222E:CC, 231Aa:CCC, 231Ba:CCC, 231Bi:CCC, 231Cc:CCC, 231Ga:CCC, 231Gc:CCC, 232Bb:CCC, 232Bd:CCC, 234A:CC, M231:C
Federal Lands: DOD (Fort Benning); NPS (Chickamauga-Chattanooga?, Little River Canyon, Natchez Trace, Ninety Six, Stones River)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.372, NATR.545, NATR.551, NATR.573.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: Nordman 2004a, Nordman et al. 2011, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, White and Govus 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Kudzu Vineland

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

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Exotic Ruderal Vine-Shrubland (A4082)
Association	Ruderal Kudzu Vineland

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This invasive kudzu vineland was sampled at two locations in the park. One site is a moderate southeast-facing midslope, the other a steep, southwest-facing eroded lower slope. Soils are well-drained clay loam and moderately well-drained silt loam, respectively. The unvegetated surface at the latter site is dominated by bare soil with some litter/duff. Evidence of disturbance includes the dominance of an exotic plant species.
Global Environment: The association occupies a variety of sites throughout most physiographic provinces in the southeastern U.S., with examples ranging in size from less than one hectare to 5-10 hectares or more. It occurs on disturbed sites, including abandoned town sites and mine lands and on landslides. It chokes out existing vegetation. Edges of examples of this vegetation may consist of small to large trees in the process of being overwhelmed by kudzu. In West Virginia, *Pueraria montana var. lobata* may be limited in its ability to spread due to relatively cold climate.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: This community is dominated by a near monoculture (80-100% cover) of the invasive exotic vine *Pueraria montana var. lobata* which tends to smother any other vegetation in the area. A few scattered herbs may include *Conyza canadensis, Erechtites hieraciifolia*, and others.
Global Vegetation: This vine-dominated vegetation is dominated by *Pueraria montana var. lobata*, a fast-growing vine native to Asia.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Liana	*Pueraria montana* var. *lobata*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Pueraria montana* var. *lobata*
Global: *Pueraria montana* var. *lobata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Pueraria montana* var. *lobata* ()
Global: Invasive/Exotic Plants: *Pueraria montana* var. *lobata* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

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

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: *Pueraria montana var. lobata*, native to Asia, was introduced into the United States in 1885, primarily as an ornamental and as a potential source for cattle forage. More than 2 million acres of forest land in Alabama, Georgia, Mississippi, Tennessee, North Carolina, and South Carolina are estimated to be infested with kudzu.
Global Similar Associations:
- *Wisteria sinensis* Ruderal Vine-Shrubland (CEGL008568)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M35 and M40 and between M325 and M330.
Global Range: This vegetation is known to occur in the southeastern United States from central Kentucky, Virginia, and Maryland, south through Tennessee, North Carolina, South Carolina, Georgia, and Alabama to Florida and west through Mississippi and Louisiana to eastern Texas, Arkansas, and Oklahoma (Edwards 1982).
Nations: US
States/Provinces: AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV
TNC Ecoregions: 38:C, 39:C, 40:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 56:C, 57:C, 59:C, 61:C
USFS Ecoregions (1994/95): 221Db:CCC, 221Hc:CCC, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 231Ba:CCC, 231Bh:CCC, 231Ca:CCC, 231Cd:CCC, 232Bd:CCC, 232Bm:CCC, 234:C, M221Aa:CCC, M221Ab:CCC, M221Ca:CCP, M221Cb:CCC, M221Cc:CCP, M221Ce:CCP, M221Db:CCP, M221Dc:CCP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: BIA (Eastern Band of Cherokee); DOD (Fort Benning); NPS (Appalachian Trail [Central Appalachians], Appalachian Trail [Southern Blue Ridge], C&O Canal, Chickamauga-Chattanooga?, Cumberland Gap, Mammoth Cave?, Natchez Trace, New River Gorge, Vicksburg); TVA (Tellico); USFS (Bankhead, Cherokee, Daniel Boone, George Washington, Jefferson, Oconee?, Ouachita, Ouachita (Coastal Plain), Ouachita (Mountains), Ozark, Talladega, Talladega (Oakmulgee), Talladega (Talladega))

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.163, NATR.596.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley, mod. S.C. Gawler
References: CAP pers. comm. 1998, Coxe 2009, Edwards 1982, Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2006, Hoagland 1998b, Hoagland 2000, Lea et al. 2013, Nordman et al. 2011, Pyne et al. 2010, Remo 1999, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst et al. 2007, White 2006

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Wisteria Vineland

***Wisteria sinensis* Ruderal Vine-Shrubland**
Chinese Wisteria Ruderal Vine-Shrubland
Identifier: CEGL008568

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Exotic Ruderal Vine-Shrubland (A4082)
Association	Ruderal Wisteria Vineland

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

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

VEGETATION DESCRIPTION

Global Vegetation: The vegetation is dominated by *Wisteria sinensis* or *Wisteria floribunda*, or most often hybrids of the two exotic vines native to Asia (Trusty et al. 2007). *Wisteria sinensis* and *Wisteria floribunda* were introduced as ornamental vines in the southern United States in the 19th century. These are not nearly as invasive as *Pueraria montana var. lobata*, but in forests that have been disturbed by windstorm or other severe disturbances, these vines can colonize the canopy and spread to adjacent trees. In areas like this, where control has not taken place, they can colonize more than 1 hectare. All existing vegetation is eventually choked out, leaving mounds of dying or dead trees overtopped by layers of *Wisteria sinensis* or *Wisteria floribunda*, or most often hybrids of the two exotic vines.

MOST ABUNDANT SPECIES

Global

Stratum	Lifeform	Species
Herb (field)	Liana	*Wisteria floribunda*, *Wisteria sinensis*

CHARACTERISTIC SPECIES

Global: *Wisteria floribunda*, *Wisteria sinensis*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Wisteria floribunda* (Medium), *Wisteria sinensis* (Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (15-May-2002). This vegetation is dominated by exotic species, is of anthropogenic origin, and is thus not a conservation priority.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Eight populations were sampled in Alabama, Florida, Georgia, North Carolina, and South Caroline. Analyses of nuclear and chloroplast genomes amplified segments revealed that 24 of 25 collections were identified as hybrids of *Wisteria floribunda* and *Wisteria sinensis*. Plant traits are not indicative of this. From this research there is indication that this long introduced and bred group of plants are well-hybridized, which imparts hybrid vigor. Still, there is certainly some value to photograph representative plants using traditional keys for identification as well as stating the case for hybridization (Trusty et al. 2007).
Global Similar Associations:
- *Pueraria montana var. lobata* Ruderal Vine-Shrubland (CEGL003882)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Global Range: This vegetation is known to occur in Delaware, North Carolina, South Carolina, Georgia, Florida, and Alabama but most likely occurs throughout the southeastern U.S.
Nations: US
States/Provinces: AL, AR, DE, FL, GA, LA?, MS?, NC, SC, TN?, VA
TNC Ecoregions: 38:P, 39:P, 40:C, 42:C, 50:C, 52:C, 61:C
USFS Ecoregions (1994/95): 221Db:CCC, 231Ae:CCC, 231Cc:CCC, 231Cf:CCC
Federal Lands: NPS (Guilford Courthouse, Little River Canyon, Natchez Trace, Ninety Six)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: R. White, mod. C.W. Nordman
References: Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Trusty et al. 2007, White and Govus 2003, White and Pyne 2003

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Groundsel-tree Shrubland

***Baccharis halimifolia* Ruderal Shrubland**
Groundsel-tree Ruderal Shrubland
Identifier: CEGL004657

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Ruderal Native Shrubland (A3322)
Association	Ruderal Groundsel-tree Shrubland

ELEMENT CONCEPT

Global Summary: As currently described, this vegetation includes successional shrublands dominated by *Baccharis halimifolia* on saturated soils both in the interior Coastal Plain of Louisiana and Arkansas and along the Gulf Coast of Texas. Coastal settings include shrublands dominated by *Baccharis halimifolia* that invade old fields and saline and non-saline prairies in the absence of fire. In these settings, *Spartina spartinae, Andropogon virginicus, Andropogon glomeratus, Setaria parviflora (= Setaria geniculata)*, and *Solidago sempervirens* are often present in the herb stratum. With periodic fire, this association will revert to *Spartina spartinae* Grassland (CEGL004608). Apparently, this association also includes vegetation of the interior Coastal Plain occurring in disturbed settings on saturated soils.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This successional groundsel-tree shrubland was sampled at five locations in the park. Sites are flat to gentle midslopes and ridges with well- to moderately well-drained silt, silt loam, and silty clay soils. The unvegetated surface is dominated by either litter/duff or bare soil. Evidence of disturbance includes grazing/browsing and the presence of exotic plants.
Global Environment: This vegetation occurs on saturated saline and non-saline soils. It appears to occur on spoil banks at Jean Lafitte National Park.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderately dense (60-70% cover) tall-shrub lay (2-5 m tall) and sparse (20-30%) short-shrub (0.5-1 m) layers are strongly dominated by *Baccharis halimifolia*; addition species may include *Pinus taeda, Rubus argutus, Sambucus canadensis*, and *Ulmus americana*. Common and/or abundant species in the herbaceous layer (30-70%) include *Andropogon glomeratus, Andropogon virginicus, Eupatorium capillifolium, Schizachyrium scoparium*, and *Solidago canadensis*.
Global Vegetation: Coastal settings include shrublands dominated by *Baccharis halimifolia* that invade old fields and saline and non-saline prairies in the absence of fire. In these settings, *Spartina spartinae, Andropogon virginicus, Andropogon glomeratus, Setaria parviflora (= Setaria geniculata)*, and *Solidago sempervirens* are often present in the herb stratum.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Baccharis halimifolia*
Herb (field)	Flowering forb	*Eupatorium capillifolium*, *Solidago canadensis*
Herb (field)	Graminoid	*Andropogon glomeratus*, *Andropogon virginicus*, *Schizachyrium scoparium*

Global

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

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Baccharis halimifolia*
Global: *Baccharis halimifolia*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Paspalum urvillei* (), *Rosa multiflora* (Medium/Low), *Triadica sebifera* (High), *Verbena brasiliensis* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (12-Jun-2001). This is a successional community within grasslands of the Gulf Coastal Prairie. It likely existed in fire-protected patches, in a mosaic within the coastal prairie grassland matrix. As a result of fire suppression, it is thought to be much more widespread in today's landscape.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Along the coast of Texas, similar vegetation occurring in tidal situations is classified as the natural type *Iva frutescens ssp. frutescens - Baccharis halimifolia / Spartina spartinae* Saline Shrubland (CEGL004616).
Global Similar Associations:
- *Iva frutescens ssp. frutescens - Baccharis halimifolia / Spartina spartinae* Saline Shrubland (CEGL004616)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The five sampled sites are in Mississippi between M90 and M100 and in the vicinity of M100 and M105.
Global Range: This association is found in Arkansas, Louisiana, Mississippi, and Texas.
Nations: US
States/Provinces: AR, LA, MS, TX
TNC Ecoregions: 31:C, 39:C, 40:C, 41:C, 42:C, 43:C
USFS Ecoregions (1994/95): 231Bi:CCC, 231Fb:CCC, 232Eb:CPP, 255Dc:CCC
Federal Lands: NPS (Jean Lafitte, Natchez Trace); USFWS (Anahuac, Aransas, Big Boggy, Brazoria, Matagorda Island, McFaddin, San Bernard)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.303, NATR.305, NATR.578, NATR.583, NATR.587.
Local Description Authors: M.J. Russo
Global Description Authors: Southeastern Ecology Group
References: Nordman et al. 2011, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Blackberry - Greenbrier Shrub Thicket

***Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia)* Ruderal Shrubland**
(Sawtooth Blackberry, Southern Dewberry) - (Cat Greenbrier, Roundleaf Greenbrier) Ruderal Shrubland
Identifier: CEGL004732

USNVC CLASSIFICATION

Division	Southeastern North American Grassland & Shrubland (2.B.2.Ne)
Macrogroup	Southeastern Ruderal Grassland & Shrubland (M307)
Group	Southeastern Ruderal Grassland & Shrubland (G583)
Alliance	Eastern Ruderal Native Shrubland (A3322)
Association	Ruderal Blackberry - Greenbrier Shrub Thicket

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

Global Environment: This community can exist in both lowlands and uplands that have been cleared but have not been further disturbed by continued mowing or plowing for 3-5 years.

VEGETATION DESCRIPTION

Global Vegetation: Stands of this association are dominated by blackberries/dewberries (*Rubus argutus, Rubus trivialis*) and by greenbrier species (*Smilax glauca, Smilax rotundifolia*). In parts of the range, other *Rubus* species may be components (e.g., *Rubus allegheniensis* in the northern and eastern parts of the range). They also contain a great variety of tree saplings and other woody species (e.g., *Quercus* spp., *Liquidambar styraciflua, Acer rubrum, Rhus copallinum*). Some herbs in central Tennessee examples may include *Solidago* spp., Asteraceae spp., *Helianthus* spp., *Hypericum* spp., *Potentilla simplex*; grasses may include *Andropogon* spp., *Dichanthelium* spp., *Panicum* spp., *Schizachyrium scoparium, Lolium* spp., and *Sorghastrum nutans*. Communities that are surrounded by relatively intact ecosystems will tend to have more native species. Those surrounded by old fields or fragmented by development tend to have *Lonicera japonica* and/or *Rosa multiflora* as a codominant vine overtopping much of the blackberry and greenbrier.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Rubus argutus*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Liana	*Rosa multiflora*, *Rubus allegheniensis*, *Rubus argutus*, *Rubus trivialis*, *Smilax glauca*, *Smilax rotundifolia*
Herb (field)	Liana	*Lonicera japonica*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Rubus argutus*
Global: *Rubus allegheniensis*, *Rubus argutus*, *Rubus trivialis*, *Smilax glauca*, *Smilax rotundifolia*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Symphyotrichum georgianum* (G3); **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium), *Rosa multiflora* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

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

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

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

ELEMENT DISTRIBUTION

Global Range: This ruderal successional vegetation could be found throughout the upper southern United States.
Nations: US
States/Provinces: AL?, GA, KY, MS, NC, SC, TN, VA
TNC Ecoregions: 43:C, 44:C, 50:C, 51:C, 52:C, 56:C
USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 222Eb:CCC, 222Ed:CCC, 231Aa:CCC, 231Ae:CCC, 232Ce:CCC, M221Dd:CCC
Federal Lands: BIA (Eastern Band of Cherokee); DOD (Arnold); NPS (Appalachian Trail [Southern Blue Ridge], Big South Fork, Blue Ridge Parkway, Chattahoochee River, Chickamauga-Chattanooga?, Cowpens, Cumberland Gap, Kings Mountain, Mammoth Cave?, Natchez Trace, Ninety Six, Obed River, Stones River); USFS (Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tuskegee?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: M.J. Russo, mod. R. White and M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman 2004a, Peet et al. unpubl. data, Pyne et al. 2010, Schmalzer and DeSelm 1982, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a, White 2004, White 2006, White and Govus 2003, White and Govus 2005

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M061. Eastern North American Cool Temperate Seep

G182. Central Interior Seepage Fen

Highland Rim Parnassia Seepage Fen

***Carex lurida - Carex leptalea - Parnassia grandifolia - Juncus brachycephalus - (Xyris tennesseensis)* Seepage Fen**
Shallow Sedge - Bristly-stalked Sedge - Largeleaf Grass-of-Parnassus - Small-head Rush - (Tennessee Yellow-eyed-grass) Seepage Fen
Identifier: CEGL004161

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Cool Temperate Seep (M061)
Group	Central Interior Seepage Fen (G182)
Alliance	Southern Interior Circumneutral Seepage Fen (A3390)
Association	Highland Rim Parnassia Seepage Fen

ELEMENT CONCEPT

Global Summary: This seepage fen is found in the United States in the Highland Rim region of middle Tennessee, southeastern Kentucky, and southern Ohio. Examples occur in calcareous seepage on flat to sloping areas associated with streams. Soils contain a thin organic layer over limestone gravel, over a less permeable layer of more solid rock. The vegetation is dominated by herbaceous plants. Characteristic species include *Carex atlantica, Carex lurida, Carex leptalea ssp. harperi, Parnassia grandifolia, Juncus brachycephalus, Rudbeckia fulgida (var. umbrosa* in Tennessee occurrences, *var. speciosa* in the Kentucky occurrence), *Cardamine bulbosa, Impatiens capensis, Juncus coriaceus, Juncus effusus, Lobelia puberula, Lobelia cardinalis, Oxypolis rigidior, Phlox glaberrima, Rhynchospora capitellata, Scirpus atrovirens, Scirpus cyperinus, Solidago patula var. patula*, and *Thelypteris palustris var. pubescens*. Woody species include *Alnus serrulata, Salix humilis, Salix caroliniana, Cornus amomum*, and *Acer rubrum*, which may invade the herbaceous seep. In the Western Highland Rim of Tennessee (Lewis, Cheatham, and Williamson counties), *Xyris tennesseensis* is endemic to this community and occurs in 50% or more of its occurrences. Ohio examples lack *Parnassia grandifolia* but are included here.

ENVIRONMENTAL DESCRIPTION

Global Environment: Examples occur in calcareous seepage on lower slopes associated with streams. Soils contain a thin organic layer over limestone gravel, over a less permeable layer of more solid rock. The geology is mapped as the Fort Payne Formation, which is highly variable at a local scale. The gravels with which this seepage vegetation is associated may represent an unnamed fine-scale subunit within the Fort Payne.

VEGETATION DESCRIPTION

Global Vegetation: The vegetation is dominated by herbaceous plants. Characteristic species include *Carex atlantica, Carex lurida, Carex leptalea ssp. harperi, Parnassia grandifolia, Juncus brachycephalus, Rudbeckia fulgida (var. umbrosa* in Tennessee occurrences, *var. speciosa* in the Kentucky occurrence), *Conoclinium coelestinum (= Eupatorium coelestinum), Cardamine bulbosa, Impatiens capensis, Juncus coriaceus, Juncus effusus, Liparis loeselii, Lobelia puberula, Lobelia cardinalis, Mimulus* sp., *Oxypolis rigidior, Phlox glaberrima, Rhynchospora capitellata, Scirpus atrovirens, Scirpus cyperinus, Solidago patula var. patula*, and *Thelypteris palustris var. pubescens*. Woody species include *Alnus serrulata, Salix humilis, Salix caroliniana, Cornus amomum*, and *Acer rubrum*, which may invade the herbaceous seep. Ohio examples lack *Parnassia grandifolia*, and may contain *Carex crawei, Carex cryptolepis, Platanthera clavellata, Helenium autumnale, Packera aurea (= Senecio aureus), Juncus dudleyi, Pedicularis lanceolata*, and *Pycnanthemum tenuifolium*.

CHARACTERISTIC SPECIES

Global: *Carex leptalea* ssp. *harperi*, *Carex lurida*, *Parnassia grandifolia*, *Xyris tennesseensis*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Parnassia grandifolia* (G3), *Xyris tennesseensis* (G2)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G1 (22-Aug-1997). This saturated herbaceous association is restricted in range, fragile and vulnerable to threats at different scales, and highly specific in its habitat preference. It is primarily known from calcareous seepage on lower slopes associated with streams in the Western Highland Rim of Tennessee (Lewis, Cheatham, and Williamson counties). Only about ten occurrences in these three counties are known; all are small in size and vulnerable. Occurrences in Kentucky and Ohio are rare and limited in extent. Woody species may invade the herbaceous seep. Threats include overgrazing, damage from off-road vehicles, removal of timber upslope and associated erosion, succession of woody species, and permanent loss of water due to local hydrologic changes.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This community is represented by about ten occurrences in three counties in the Western Highland Rim of Tennessee; all are small in size and vulnerable. A single site in Clinton County, Kentucky (in the Eastern Karst Plain 222Eb), appears to belong to this community, and is tentatively placed here, along with examples in southern Ohio which apparently lack *Parnassia*. This community is closely related to *(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea* Seepage Fen (CEGL002404) of Arkansas and Missouri.
Global Similar Associations:
- *(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea* Seepage Fen (CEGL002404)
- *Alnus serrulata* Southern Interior Seepage Shrubland (CEGL007059)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This association is present in the vicinity of the Meriwether Lewis Site, Lewis County, TN, but no plot data were collected. Therefore, no local description can be provided at this time.
Global Range: This seepage fen is found in the United States in the Highland Rim region of middle Tennessee and southeastern Kentucky, and related areas of southern Ohio.
Nations: US
States/Provinces: KY, OH, TN
TNC Ecoregions: 44:C
USFS Ecoregions (1994/95): 222Ea:CC?, 222Eb:CCC, 222Eg:CCC, 222Fd:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: None.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Evans 1991, Evans et al. 2009, Kral 1983, Minney 2000, Nordman et al. 2011, ONHD unpubl. data, Pyne 1994, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M069. Eastern North American Marsh, Wet Meadow & Shrubland

G125. Eastern North American Freshwater Marsh

Pickerelweed Marsh

***Pontederia cordata - Peltandra virginica* Marsh**
Pickerelweed - Green Arrow-arum Marsh
Identifier: CEGL004291

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Marsh, Wet Meadow & Shrubland (M069)
Group	Eastern North American Freshwater Marsh (G125)
Alliance	Green Arrow-arum - Pickerelweed Rivershore & Lakeshore (A3669)
Association	Pickerelweed Marsh

ELEMENT CONCEPT

Global Summary: This type includes very wet or partially submerged forb vegetation of rivershores and lakeshores, and sometimes of artificial ponds, lakes, and impoundments. Examples are typically dominated by some combination of *Pontederia cordata* and *Peltandra virginica.* Associates may include *Nuphar advena, Glyceria striata, Schoenoplectus tabernaemontani (= Scirpus validus), Schoenoplectus americanus (= Scirpus americanus)*, and *Sagittaria latifolia*. On the Natchez Trace Parkway of Mississippi, the herbaceous layer is overwhelmingly dominated by *Peltandra virginica*; additional herbs may include *Hibiscus moscheutos, Panicum virgatum, Polygonum convolvulus, Polygonum pensylvanicum*, and vines of *Ampelopsis arborea* and *Apios americana*. In addition, there may be scattered shrubs, including *Cephalanthus occidentalis, Rubus argutus*, and *Sambucus canadensis*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This green arrow-arum flooded herbaceous vegetation was sampled at two locations in the park. Sites are located along the edges of a lake and reservoir that are variable flooded depending on water height. Soils are very poorly drained muck. The unvegetated surface is made up of nearly equal amounts of litter/duff, bare soil, rock (riprap), and standing water. Evidence of disturbance includes fluctuations in water levels and the presence of exotic plants.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (80% cover) herbaceous layer is overwhelmingly dominated by *Peltandra virginica*; additional herbs may include *Hibiscus moscheutos, Panicum virgatum, Polygonum convolvulus, Polygonum pensylvanicum*, and vines of *Ampelopsis arborea* and *Apios americana*. In addition, there may be scattered shrubs, including *Cephalanthus occidentalis, Rubus argutus*, and *Sambucus canadensis*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Peltandra virginica*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Hibiscus moscheutos*, *Peltandra virginica*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Invasive/Exotic Plants**: *Lonicera japonica* (High/Medium), *Paspalum dilatatum* (), *Polygonum convolvulus* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (1-Feb-2016)

CLASSIFICATION

Status: Nonstandard
Classification Confidence: 3 - Weak

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M110 and M115.
Nations: US
States/Provinces: AL?, AR, KY, MS, SC, TN, VA
TNC Ecoregions: 38:P, 42:C, 43:C, 44:C, 48:?, 49:?, 52:C, 57:P, 58:P, 59:C
USFS Ecoregions (1994/95): 221Bd:CCP, 222Ch:CCC, 222Db:CCC, 231Be:CCC, 231Bl:CCC, 232:P, 234An:CCC, M212Ea:CCP, M212Eb:CCP, M221Ac:CCC, M221Ad:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.504, NATR.511.
Local Description Authors: M.J. Russo
Global Description Authors:
References: Coulling 2002, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Fleming 2002b, Fleming and Patterson 2003, Fleming and Patterson 2011a, Fleming et al. 2001, Fleming pers. comm., Lee et al. 1998, McCoy and Fleming 2000, Nordman et al. 2011, TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G167. Eastern North American Shrub Swamp

Southeastern Alder Swamp

***Alnus serrulata* Southeastern Shrub Swamp**
Hazel Alder Southeastern Shrub Swamp
Identifier: CEGL008474

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Marsh, Wet Meadow & Shrubland (M069)
Group	Eastern North American Shrub Swamp (G167)
Alliance	Lakeshore & Depression Alder - Willow Swamp (A3685)
Association	Southeastern Alder Swamp

ELEMENT CONCEPT

Global Summary: This alder swamp is found in the upper southeastern United States, most probably from Kentucky south to central Alabama and Georgia, and west to Mississippi and Arkansas. These shrublands are found on muck overlying mineral soils, at the edges of forested swamps, or in other related seasonally flooded situations, including depressions in floodplains and the backwaters of lakes and beaver ponds. Hydrologic alteration of systems (e.g., creation of impoundments by the agency of humans and/or beaver) may expand habitat for this association. The vegetation is dominated by tall shrubs, and is characterized by some combination of *Alnus serrulata, Viburnum* spp., *Cornus* spp., and *Salix* spp. In addition, saplings of *Acer rubrum* are typical. Other shrubs present may include *Cephalanthus occidentalis, Decodon verticillatus*, and *Ilex verticillata*. Herbaceous associates include *Osmunda regalis, Thelypteris palustris, Galium* spp., *Typha latifolia, Peltandra virginica*, and *Carex* spp. Tree species such as *Acer rubrum* and *Juglans nigra* may exist on the fringes of such an association, occasionally overshadowing parts of the association.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This alder swamp shrubland was sampled at six locations in the park. Sites are temporarily to permanently flooded and saturated alluvial flats and floodplains. Soils are poorly to very poorly drained clay loam, silty clay, and muck. The unvegetated surface is a variable mix of litter/duff, bare soil, and standing water. Evidence of disturbance includes roads/trails, flooding, and the presence of exotic plants.
Global Environment: These shrublands are found on muck overlying mineral soils, at the edges of forested swamps, or in other related seasonally flooded situations, including depressions in floodplains and the backwaters of lakes and beaver ponds. Hydrologic alteration of systems (e.g., creation of impoundments by the agency of humans and/or beaver) may expand habitat for this association.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse to very dense (20-90% cover) tall-shrub (2-10 m) and short-shrub (0.5-2 m) layers are dominated by *Alnus serrulata*; additional species may include *Acer rubrum, Cephalanthus occidentalis, Fraxinus pennsylvanica, Salix nigra, Sambucus canadensis*, and *Toxicodendron vernix*. In addition, there may be a sparse (5-20%) emergent tree layer (10-35 m). Common and/or abundant species in the herbaceous layer (30-100%) include *Amphicarpaea bracteata, Apios americana, Boehmeria cylindrica, Impatiens capensis, Leersia lenticularis, Polygonum sagittatum*, and *Solidago altissima*.
Global Vegetation: Stands of this vegetation are dominated by tall shrubs and are characterized by some combination of *Alnus serrulata, Viburnum* spp., *Cornus* spp., and *Salix* spp. In addition, saplings of *Acer rubrum* are typical. Other shrubs present may include *Cephalanthus occidentalis, Decodon verticillatus*, and *Ilex verticillata*. Herbaceous associates include *Osmunda regalis, Thelypteris palustris, Boehmeria cylindrica, Polygonum sagittatum, Commelina virginica, Galium* spp., *Lycopus* spp., *Typha latifolia, Peltandra virginica, Mikania scandens*, and *Carex* spp. (e.g., *Carex crinita, Carex atlantica*). Tree species such as *Acer rubrum* and *Juglans nigra* may exist on the fringes of such an association, occasionally overshadowing parts of it. The exotic *Murdannia keisak (= Aneilema keisak)* may also be present.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Alnus serrulata*
Herb (field)	Liana	*Amphicarpaea bracteata*, *Apios americana*
Herb (field)	Flowering forb	*Boehmeria cylindrica*, *Impatiens capensis*
Herb (field)	Graminoid	*Leersia lenticularis*

Global

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Alnus serrulata*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Alnus serrulata*, *Amphicarpaea bracteata*, *Impatiens capensis*, *Leersia lenticularis*
Global: *Alnus serrulata*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium)
Global: Invasive/Exotic Plants: *Murdannia keisak* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (15-Oct-2002). This association occurs in a variety of seasonally flooded habitats in the upper southeastern United States. This includes the edges of forested swamps, depressions in floodplains, and the backwaters of lakes and beaver ponds. Hydrologic alteration of systems (e.g., creation of impoundments by the agency of humans and/or beaver) may expand habitat for this association. This is not a rare or imperiled vegetation type, even though its occurrence is very poorly documented.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: The range of this type may abut the range of *Alnus serrulata / Calamagrostis canadensis* Shrub Swamp (CEGL005082) in the vicinity of the Ohio River; the distinction there is obscure. Occurrences on the edges of impoundments would be assumed to be of lower quality than those in more hydrologically natural situations.
Global Similar Associations:
- *Alnus serrulata / Calamagrostis canadensis* Shrub Swamp (CEGL005082)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (3) and Tennessee (2) between M140 and M145, M390 and M395, and in the vicinity of M370, M375, M405, and M440.
Global Range: This smooth alder swamp is found in the upper southeastern United States, most probably from Kentucky south to central Alabama and Georgia and west to Mississippi and Arkansas.
Nations: US
States/Provinces: AL, AR, GA, KY, MS, NC, TN
TNC Ecoregions: 40:C, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Eg:CCC, 222En:CCC, 222Eo:CCC, 231Aa:CCC, 231Ab:CCC, 231Bd:CCC, 231Be:CCC, 231Bg:CCC, 231C:CP, 231D:CP, 234A:CC, M221Dd:CCC
Federal Lands: BIA (Eastern Band of Cherokee); DOD (Fort Benning); NPS (Big South Fork, Buffalo River, Chattahoochee River, Chickamauga-Chattanooga?, Horseshoe Bend, Mammoth Cave?, Natchez Trace); USFS (Daniel Boone, Holly Springs, Oconee, Ouachita, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tuskegee?)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.111, NATR.150, NATR.209, NATR.249, NATR.259, NATR.502.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Pyne et al. 2010, Schafale 2012, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Floodplain Canebrake

***Arundinaria gigantea ssp. gigantea* Shrub Swamp**
Giant Cane Shrub Swamp
Identifier: CEGL003836

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Marsh, Wet Meadow & Shrubland (M069)
Group	Eastern North American Shrub Swamp (G167)
Alliance	Canebrake Floodplain (A0795)
Association	Floodplain Canebrake

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

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

VEGETATION DESCRIPTION

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

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Arundinaria gigantea*

Global

Stratum	Lifeform	Species
Tall shrub/sapling	Bamboo tree	*Arundinaria gigantea*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Arundinaria gigantea*
Global: *Arundinaria gigantea*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2? (15-Feb-1999). Stands of this vegetation type were historically widespread, but now are rare or occupy very little acreage. It is thought to be maintained by frequent fire and may have historically resulted from aboriginal agriculture and burning. Dense, monospecific stands of *Arundinaria gigantea ssp. gigantea* were historically found in bottomland sites throughout the southeastern United States. Today, this vegetation exists as small remnants, and high-quality examples are extremely rare.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This is a general placeholder, covering a broad geographic range, and several associations may ultimately be recognized. Dense, monospecific stands of *Arundinaria gigantea ssp. gigantea* were historically found in bottomland sites in the southeastern United States. Today, high-quality examples are extremely rare, if not absent. Historical accounts refer to both "pure" stands of cane without an overstory of trees (cane shrublands) and areas with variable overstory closure (woodlands or forests) but with a dense understory dominated by cane as "canebrakes." As currently described, this association refers only to the former, cane shrublands.

ELEMENT DISTRIBUTION

Global Range: This association was widespread historically but now occupies very little acreage. It may be found along rivers and streamsides in Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and possibly Virginia (?).
Nations: US
States/Provinces: AL, AR, FL?, GA, IL, KY, LA, MO, MS, NC, OK, SC, TN, TX, VA?, WV
TNC Ecoregions: 31:P, 32:P, 38:C, 39:C, 40:C, 41:P, 42:C, 43:P, 44:C, 50:C, 51:C, 52:C, 53:P, 56:C, 57:P, 59:C
USFS Ecoregions (1994/95): 221Ha:CC?, 221Hc:CCP, 221Hd:CCP, 221He:CC?, 221Ja:CCC, 221Jb:CCP, 221Jc:CCP, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 222Ca:CCP, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CCP, 222Di:CCP, 222Dj:CCP, 222Ea:CCC, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ef:CCP, 222Eg:CCP, 222Eh:CCC, 222Ei:CCP, 222Ej:CC?, 222Ek:CCP, 222El:CCP, 222Em:CCP, 222En:CC?, 222Eo:CC?, 222Fa:CCC, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Ff:CC?, 231Aa:CCP, 231Ab:CCC, 231Ac:CCP, 231Ad:CCP, 231Ae:CCP, 231Af:CCP, 231Ag:CC?, 231Ah:CC?, 231Ai:CCP, 231Am:CC?, 231An:CC?, 231Ao:CCP, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 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:CCP, 231Dc:CCP, 231Dd:CCP, 231De:CCP, 231Ea:CCP, 231Eb:CCP, 231Ec:CCC, 231Ed:CCC, 231Ee:CCP, 231Ej:CCP, 231Ek:CCP, 231Em:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 234Aa:CCC, 234Ab:CC?, 234Ac:CCP, 234Ad:CCP, 234Ae:CCC, 234Af:CCP, 234Ag:CCC, 234Ah:CC?, 234Ai:CCC, 234Aj:CC?, 234Ak:CC?, 234Al:CCP, 234Am:CCC, 234An:CCC, 255Da:PPP, 255Db:PPP, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: BIA (Eastern Band of Cherokee); NPS (Abe Lincoln Birthplace?, Blue Ridge Parkway?, Buffalo River, Chickamauga-Chattanooga?, Cowpens, Great Smoky Mountains, Horseshoe Bend, Natchez Trace, Ninety Six, Ozark Riverways?); USFS (Cherokee?, Mark Twain, Ouachita (Coastal Plain)?, Ouachita (Mountains)?, Ouachita?, Ozark, St. Francis); USFWS (Little River, San Bernard?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: K.D. Patterson, mod. D. Faber-Langendoen, mod. J. Teague
References: Barden 1997, Blair 1938, CAP pers. comm. 1998, Campbell 1980, Campbell 1989b, Chastain et al. 2006, Davidson 1950, Flores 1984, Foti et al. 1994, Heineke 1987, Hoagland 1997, Hoagland 1998c, Hoagland 2000, Hughes 1966, McClain pers. comm., McInteer 1952, Meanley 1972, Mohr 1901, Nelson 2010, Nigh pers. comm., Nuttall 1821, Peet et al. unpubl. data, Platt and Brantley 1992, Platt and Brantley 1997, Schafale 1998b, Schafale 2002, Schafale 2012, Schotz pers. comm., Smeins et al. 1992, Southeastern Ecology Working Group n.d., TDNH unpubl. data, West 1934, White 2004, White and Govus 2003, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southern Buttonbush Pond

***Cephalanthus occidentalis / Carex* spp. - *Lemna* spp. Southern Shrub Swamp**
Common Buttonbush / Sedge species - Duckweed species Southern Shrub Swamp
Identifier: CEGL002191

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Marsh, Wet Meadow & Shrubland (M069)
Group	Eastern North American Shrub Swamp (G167)
Alliance	Buttonbush - Swamp-loosestrife Shrub Swamp (A3670)
Association	Southern Buttonbush Pond

ELEMENT CONCEPT

Global Summary: This buttonbush shrubland occurs widely throughout the southeastern United States. Stands occupy shallow water depressions, oxbow ponds, beaver ponds, and backwater sloughs of stream and river floodplains. It also occurs in upland pond depressions. Inundation is usually continuous throughout the year, but these sites can become dry in mid or late summer or during periods of prolonged drought. In floodplain situations, soils are deep (1 m or more) consisting of peat or muck over alluvial parent material. *Cephalanthus occidentalis* comprises nearly 90% of the shrub layer in waters 1-2 m deep. Other shrubs commonly encountered may include *Cornus* sp. (*Cornus foemina (= Cornus stricta)* or *Cornus amomum* to the south and *Cornus sericea (= Cornus stolonifera)* to the north) and *Salix* spp. Sedges, including *Carex stipata, Carex stricta, Carex lurida*, and *Carex intumescens*, are the dominant herbaceous species present, although *Hibiscus* spp. can also form dense stands in shallower water. *Lemna* spp. and *Leersia oryzoides* are also common plants in this natural community. *Populus heterophylla* and *Nyssa biflora* or *Nyssa aquatica* may also occur within their range. Floristic characteristics that distinguish this type from more northern types are needed. This may occur as a long-persistent successional stage. This community can result from natural or artificial disturbance of hydrology.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This buttonbush shrubland was sampled twice in the park. Sites are permanently flooded bottomlands with very poorly drained muck soils. The unvegetated surface is dominated by standing water with some litter/duff and wood. Formation of these wetland is likely a result of beaver activity.
Global Environment: Stands occupy shallow water depressions, oxbow ponds, upland pond depressions, beaver ponds, and backwater sloughs of stream and river floodplains. Inundation is usually continuous throughout the year, but these sites can become dry in mid or late summer or during periods of prolonged drought. In floodplain situations, soils are deep (one meter or more) consisting of peat or muck over alluvial parent material (Nelson 1985, Lauver et al. 1999). Key environmental factors which favor the establishment and maintenance of this community include nearly continuous inundation from 1-2 m in depth (Voigt and Mohlenbrock 1964).

Soils can be mineral or organic but are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (Mitsch and Gosselink 1993). Soil associations listed are those types in Illinois which could support this community. Soils are deep (100 cm [40 inches] or more) consisting of peat or muck over alluvial parent material (Nelson 1985). They include Lawson - Sawmill - Darwin, Haymond - Petrolia - Karnak, Martinsville - Sciotoville, Alford - Wellston, Hosmer - Zanesville - Berks, Grantsburg - Zanesville - Wellston, Houghton - Palms - Muskego| fine-fine/silty-coarse-silty (some evic-coprogenous), mixed montmorillonitic, mesic; Cumulic Hapludolls, Cumulic Haplaquolls, Typic Hapladalfs, Aquic Fragiudalfs, Ultic Hapludalfs, Typic Fragiudalfs, Typic Dystrochrepts, Terrice Medisaprists, Typic Medisaprists, Limnic Medisaprists; Alfisols, Mollisols, Inceptisols, Entisols (Fehrenbacher et al. 1982). The geologic substrate is Paleozoic rock deeply buried by alluvium.

Vegetative diversity and density are highly variable in response to the depth and duration of flooding. This community is characterized by continuous (or nearly so) flooding to depths ranging from 1-2 m (Voigt and Mohlenbrock 1964). As water levels approach 2 m, large areas of open water may occur.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The moderate to very dense (60-90% cover) tall-shrub (2-5 m) is dominated by *Cephalanthus occidentalis*; additional shrubs may include *Acer rubrum, Cornus amomum, Salix nigra, Sambucus canadensis*, and *Taxodium distichum*. There is also a sparse (10%) emergent tree layer (5-20 m) that includes *Acer rubrum, Liquidambar styraciflua, Salix nigra*, and/or *Taxodium distichum*. The herbaceous layer (5-20%) includes *Juncus effusus, Justicia ovata, Panicum rigidulum, Polygonum densiflorum, Polygonum punctatum*, and *Saururus cernuus*. *Brunnichia ovata* is the dominant vine (10-20%).
Global Vegetation: *Cephalanthus occidentalis* comprises nearly 90% of the shrub layer in waters 1-2 m deep (Voigt and Mohlenbrock 1964). Other shrubs commonly encountered include *Cornus amomum* to the south and *Cornus sericea (= Cornus stolonifera)* to the north and *Salix* spp. Sedges are the dominant herbaceous species present, including *Carex stipata, Carex stricta, Carex lurida*, and *Carex intumescens*, although *Hibiscus* spp. can also form dense stands in shallower water. *Lemna* spp. and *Leersia oryzoides* are also common plants in this natural community. *Populus heterophylla* and *Nyssa biflora* may also occur within their range (TNC 1995a). In the Columbia Bottomlands of Texas, common associates include *Salix nigra, Forestiera acuminata, Echinodorus berteroi (= Echinodorus rostrata), Sagittaria* sp., and floating aquatics such as *Pistia stratiotes, Limnobium spongia,*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Azolla caroliniana, and *Spirodela polyrrhiza*. In the Upper East Gulf Coastal Plain, some associated herbs (e.g., at Shiloh National Military Park) include *Leersia oryzoides, Polygonum* spp., and *Saururus cernuus*.

This community expresses differences in physiognomy and vegetative density/diversity in response to substrate aggradation and water regime. Some trees which are the first to appear in this community are *Nyssa aquatica* and *Populus heterophylla*. With considerable light reaching the water, constituents of the shrub layer increase in size and number until a group of tree seedlings assume dominance.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*
Herb (field)	Flowering forb	*Polygonum punctatum*, *Saururus cernuus*
Herb (field)	Graminoid	*Juncus effusus*, *Panicum rigidulum*

Global

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous tree	*Cephalanthus occidentalis*
Emergent tree	Broad-leaved deciduous tree	*Nyssa aquatica*, *Populus heterophylla*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cephalanthus occidentalis*, *Polygonum densiflorum*, *Polygonum punctatum*, *Salix nigra*, *Saururus cernuus*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Leitneria floridana* (G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (3-Oct-1996). This type is widespread with many occurrences suspected across its range. However, many sites have also been drained for conversion to cropland. A number of remaining examples of this community are protected, but even these can be threatened by accelerated siltation resulting from excessive soil erosion and channelization in adjacent areas.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This community can be highly dynamic from one season to the next, and species composition and density are wholly dependent on water regime (Niering 1985). Primary identifying characteristics include the near absence of trees and dominance of buttonbush (at least 25% coverage). Floristic characteristics that distinguish this type from more northern types are needed. Stands of buttonbush with widely scattered *Taxodium* (<10%?, <20% cover?) should be placed in this type.
Global Similar Associations:

- *Cephalanthus occidentalis - (Leucothoe racemosa) / Carex joorii* Shrub Swamp (CEGL004075)
- *Cephalanthus occidentalis - Decodon verticillatus* Shrub Swamp (CEGL006069)
- *Cephalanthus occidentalis / Carex* spp. Northern Shrub Swamp (CEGL002190)
- *Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos* Wet Shrubland (CEGL004742)
- *Taxodium distichum - (Nyssa aquatica) / Forestiera acuminata - Planera aquatica* Floodplain Forest (CEGL002421)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M155 and M160 and between M185 and M190.
Global Range: This buttonbush shrubland type occurs widely throughout the southeastern United States, ranging from southern Ohio west to Kansas, south to Texas and east to North Carolina. This community also occurs in Delaware and possibly in New Jersey and Pennsylvania.
Nations: US
States/Provinces: AL, AR, DE?, GA, IL, IN, KS:SU, KY, LA, MO, MS, NC, OH, OK, SC, TN, TX:S4, WV
TNC Ecoregions: 31:C, 32:C, 37:C, 38:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 49:C, 50:C, 52:P, 53:P, 56:C, 57:?, 62:C
USFS Ecoregions (1994/95): 221E:CC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Ab:CCC, 222Ad:CCC, 222Ag:CCC, 222Ah:CCC, 222Am:CCC, 222An:CCC, 222Aq:CCC, 222Cg:CCC, 222D:CC, 222Eb:CCC, 222Ej:CCP, 222En:CCC, 222Eo:CCC, 222F:CP, 222G:CC, 231A:CP, 231Bg:CCC, 231Cd:CCP, 231Ce:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Ac:CCC, 234A:CC, 255Db:CCC, M221Cd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Fort Benning); NPS (Chattahoochee River, Natchez Trace, Shiloh); USFS (Angelina, Bankhead?, Daniel Boone, Davy Crockett, Kisatchie?, Land Between the Lakes?, Ouachita, Ouachita (Coastal Plain)?, Ouachita (Mountains), Ozark, Sabine, Sam Houston?, Shawnee, Talladega?, Tuskegee?, Wayne); USFWS (Reelfoot, San Bernard)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.185, NATR.531.

Local Description Authors: M.J. Russo

Global Description Authors: M. Guetersloh, mod. D. Faber-Langendoen and E. Largay

References: Benyus 1989, Blair 1938, Coulling 2002, Cowardin et al. 1979, Coxe 2009, Dennis 1988, Diamond 1993, Duck and Fletcher 1945, Duncan and Duncan 1988, Evans 1991, Evans et al. 2009, Ewel and Odum 1984b, Faircloth 1971, Fehrenbacher et al. 1982, Hoagland 2000, Homoya et al. 1988, Illinois Nature Preserve Commission 1973, Küchler 1964, LNHP 2009, Lauver et al. 1999, McCoy 1958, Mitsch and Gosselink 1993, Mohlenbrock 1959, Nelson 1985, Nelson 2010, Niering 1985, Nordman et al. 2011, ONHD unpubl. data, Roe 1998, Schafale 2012, Schafale and Weakley 1990, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, Walton et al. 2001, Wharton 1989, White and Anderson 1970, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M880. Eastern North American Wet Shoreline Vegetation

G755. Eastern North American Riverine Wetland Vegetation

Water-willow Rocky Bar and Shore

***Justicia americana* Riverbed Vegetation**
American Water-willow Riverbed Vegetation
Identifier: CEGL004286

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Wet Shoreline Vegetation (M880)
Group	Eastern North American Riverine Wetland Vegetation (G755)
Alliance	Water-willow Riverscour (A1657)
Association	Water-willow Rocky Bar and Shore

ELEMENT CONCEPT

Global Summary: This widespread association is found primarily in the Piedmont, Central Appalachians, Cumberland Plateau, Interior Low Plateau, Ozarks, Ouachita Mountains, and adjacent provinces. Stands occur on the shoals or bars of rocky streams and riverbeds, where they are subject to frequent high-energy floods. Slopes range from level to moderate but are typically gentle. The substrate is a variable mixture of sand, gravel and cobbles, often with deposits of silt and muck. Rooting occurs in the interstices between cobbles and boulders. *Justicia americana* is the characteristic dominant. *Saururus cernuus* is often present and may be codominant. Other herbaceous species that may be present include *Bidens* spp., *Cyperus* spp., *Diodia teres, Elodea* sp., *Eleocharis* spp., *Equisetum arvense, Gratiola brevifolia, Leersia oryzoides, Leersia virginica, Lemna minor, Orontium aquaticum, Physostegia virginiana, Podostemum ceratophyllum, Polygonum caespitosum var. longisetum, Scirpus* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Xyris difformis var. difformis*. Exotics include *Lythrum salicaria* and *Lysimachia vulgaris*; where present, these are sparse. Some stands have low cover by scattered flood-suppressed trees or an overhanging canopy. Trees in plots include *Acer saccharinum, Betula nigra, Carpinus caroliniana, Fraxinus pennsylvanica*, and *Platanus occidentalis*. Scattered shrub seedlings of *Salix nigra, Salix caroliniana, Betula nigra, Cephalanthus occidentalis, Acer saccharinum*, or *Platanus occidentalis* may also be present. This association provides habitat in some portions of its range for globally rare dragonflies and herbs.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This water-willow herbaceous community was sampled once in the park. The site is a semipermanently flooded river bar. The unvegetated surface is made up entirely of standing water. No evidence of disturbance was reported.

Global Environment: This association occurs on the shoals or bars of rocky streams and riverbeds, on bedrock, boulders, cobble, gravel, and sands. They are subject to frequent high-energy floods, and are entirely submerged by most flood events. During extreme low water periods, the substrate can be exposed, showing a varied mixture of sand, gravel and cobbles, often with deposits of silt and muck. Rooting occurs in the interstices between cobbles and boulders. Stands commonly occur on the edge of the river and at the heads and tails of islands and may sometimes occur on deposition bars in the middle of the river. Substrate pH is circumneutral (mean = 6.0) in four samples. Slopes range from level to moderate but are typically gentle. Elevations of West Virginia stands range from 73 to at least 654 m; the type occurs at lower elevations in the Piedmont and Coastal Plain.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The dense (80% cover) herbaceous layer is dominated almost exclusively by *Justicia americana*; the only other species reported to occur are *Carpinus caroliniana* (scattered trees, 5-10 m tall), *Ceratophyllum demersum*, and *Saururus cernuus*.

Global Vegetation: *Justicia americana* is the dominant (and sometimes the only) species, forming lawnlike stands in shallow reaches of rivers. Cover by *Justicia americana* ranges from 40 to 85%. *Saururus cernuus* is often present and may be codominant. Other herbaceous species may be present but rarely achieve more than 2% cover; they include *Bidens* spp., *Cyperus* spp., *Diodia teres, Elodea* sp., *Eleocharis* spp., *Equisetum arvense, Gratiola brevifolia, Leersia oryzoides, Leersia virginica, Lemna minor, Orontium aquaticum, Physostegia virginiana, Podostemum ceratophyllum, Polygonum caespitosum var. longisetum, Scirpus* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Xyris difformis var. difformis*. Exotics include *Lythrum salicaria* and *Lysimachia vulgaris*; they have not been observed in abundance in this community, possibly due to intolerance of high-energy flooding. In some areas, *Justicia* usually grows in nearly pure patches, so that few other species are associated with it. *Cuscuta gronovii, Mimulus ringens, Polygonum* spp., *Rumex* spp., and *Salix interior* can also occur (Anderson 1982). Some stands have low cover by scattered flood-suppressed trees or an overhanging canopy. Trees in plots include *Acer saccharinum, Betula nigra, Carpinus caroliniana, Fraxinus pennsylvanica*, and *Platanus occidentalis*. Scattered shrub seedlings of *Salix nigra, Salix caroliniana, Betula nigra, Cephalanthus occidentalis, Acer saccharinum*, or *Platanus occidentalis* may also be present. In the Cumberland Plateau of Alabama, *Justicia americana* is present in dense patches with some interspersion of other species, including *Pilea pumila, Boehmeria*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

cylindrica, Eclipta prostrata (= Eclipta alba), Juncus coriaceus, Mikania scandens, Ludwigia palustris, Leersia sp., and *Bidens* sp. Schmalzer and DeSelm (1982) discuss *Orontium aquaticum* growing along streambanks or in shallow riffles "along or with" *Justicia americana* in the Obed River in the Cumberland Plateau of Tennessee. In 29 plots sampled in the Potomac River watershed (Piedmont, Blue Ridge and Ridge and Valley provinces), *Justicia* was overwhelmingly dominant (50-75% mean cover), and no associated species occurred in more than 48% of the plots. Vascular plant species richness in sampled plots is low (typically 6-14 taxa).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Justicia americana*

Global

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Justicia americana*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ceratophyllum demersum*, *Justicia americana*
Global: *Justicia americana*, *Leersia oryzoides*, *Leersia virginica*, *Orontium aquaticum*, *Polygonum amphibium*, *Saururus cernuus*, *Schoenoplectus pungens*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Marshallia trinervia* (G3), *Ptilimnium nodosum* (G2), *Sagittaria secundifolia* (G1); **Invasive/Exotic Plants**: *Lysimachia vulgaris* (), *Lythrum salicaria* (High), *Polygonum caespitosum* var. *longisetum* (); **Other Plants**: *Boehmeria cylindrica* (G5)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (2-Oct-2012). The range of this type is huge, and a more careful analysis might turn up differences based on associated species that warrant splitting the type, but we may not have sufficiently detailed data rangewide to do so.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: In Ohio this type often forms pure patches, but consistent identification may require a simple cutoff rule, such as at least 50% cover of *Justicia* (Anderson 1982). However, Anderson (1996) no longer recognizes this type.
Global Similar Associations:
- *Hymenocallis coronaria - Justicia americana* Riverbed Vegetation (CEGL004285)
- *Justicia americana - Peltandra virginica* Tidal Marsh (CEGL006579) occurs in freshwater tidal habitats.
- *Peltandra virginica - Saururus cernuus - Boehmeria cylindrica / Climacium americanum* Marsh (CEGL007696)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Tennessee in the vicinity of M430.
Global Range: This type is found primarily in the Piedmont, Interior Low Plateau, Cumberland Plateau, Ozarks, Ouachita Mountains, Central Appalachians, and adjacent provinces. It ranges from Alabama, Georgia and the Carolinas west to Arkansas and Oklahoma and north to Ohio, New York, and New Jersey, with possible outliers north to southern Quebec.
Nations: US
States/Provinces: AL, AR, GA, KY, MD:S5, NC, NJ, NY, OH:S4, OK, PA:S4, SC?, TN, VA:S4, WV
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 45:C, 48:C, 49:C, 50:C, 51:C, 52:C, 59:C, 60:C, 61:C
USFS Ecoregions (1994/95): 212Fa:CCC, 212Fb:CCC, 212Fc:CCC, 212Fd:CCC, 212Ga:CCC, 212Gb:CCC, 221Am:CCC, 221Ba:CCC, 221Bd:CCC, 221Da:CCC, 221Db:CCC, 221Ea:CCP, 221Ec:CCC, 221Ed:CCP, 221Ef:CCP, 221Fa:CCC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Dg:CCC, 222Eb:CCC, 222Eg:CCC, 222Ej:CCP, 222En:CCC, 222Eo:CCC, 222Ha:CCC, 231Af:CCC, 231B:CC, 231Cc:CCC, 231Cd:CCC, 231D:CC, M221Aa:CCC, M221Ac:CCC, M221Ad:CCC, M221Bb:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Ca:CCC, M221Cb:CCC, M221Cd:CCC, M221Da:CCC, M221Dc:CCC, M222A:CC, M231A:CC
Federal Lands: NPS (Appalachian Trail [Central Appalachians], Big South Fork, Buffalo River, C&O Canal, Chickasaw NRA, Delaware Water Gap, Gauley River, George Washington Parkway, Harpers Ferry, Little River Canyon, Mammoth Cave, Manassas, Natchez Trace, New River Gorge, Obed River, Stones River, Upper Delaware); USFS (Bankhead, Cherokee, Daniel Boone, Nantahala, Oconee?, Ouachita, Ouachita (Mountains), Ozark, Pisgah, Sumter (Mountains)?, Sumter (Piedmont)?, Sumter?, Uwharrie, Wayne)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.121.

Local Description Authors: M.J. Russo

Global Description Authors: A.S. Weakley, mod. D. Faber-Langendoen and S.C. Gawler

References: Allard 1990, Anderson 1982, Anderson 1996, Edinger et al. 2002, Fike 1999, Fleming 2007, Fleming and Patterson 2011a, Fleming and Taverna 2006, Fleming et al. 2001, Harrison 2004, Harrison 2011, Hoagland 1997, Hoagland 2000, Lea 2000, Lea 2004, Major et al. 1999, McCoy 1958, Nelson 1986, Nordman 2004a, Nordman et al. 2011, ONHD unpubl. data, Palmer-Ball et al. 1988, Peet et al. unpubl. data, Penfound 1953, Perles et al. 2004, Perles et al. 2007, Perles et al. 2008, Pyne et al. 2010, Salas et al. 2010c, Schafale 1998b, Schafale 2002, Schafale 2012, Schafale and Weakley 1990, Schmalzer and DeSelm 1982, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC and WPC 2004, Vanderhorst 2001b, Vanderhorst et al. 2007, Vanderhorst et al. 2010, Walton and Anderson 1997, Zimmerman 2011r, Zimmerman et al. 2012

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Black Willow Riverbank Shrubland

***Salix nigra* Wet Shrubland**
Black Willow Wet Shrubland
Identifier: CEGL003901

USNVC CLASSIFICATION

Division (2.C.4.Nd)	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland
Macrogroup	Eastern North American Wet Shoreline Vegetation (M880)
Group	Eastern North American Riverine Wetland Vegetation (G755)
Alliance	Black Willow Riverwash Scrub (A0948)
Association	Black Willow Riverbank Shrubland

ELEMENT CONCEPT

Global Summary: This broadly defined type represents vegetation dominated by scrubby forms of *Salix nigra* across the southeastern and northeastern United States, and possibly into Canada. Stature and closure may vary depending on disturbance. Additional types may be developed as more information becomes available.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This black willow shrubland was sampled at three locations in the park. Sites are seasonally/temporarily flooded and saturated bottomlands and floodplains with somewhat to very poorly drained muck or silty clay soil. The unvegetated surface is dominated by either standing water (100%) or litter/duff with some wood and bare soil. Evidence of disturbance includes roads/bridge, flooding, and the presence of exotic plants.
Global Environment: Temporarily flooded riverbank vegetation.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The structure of these shrublands is highly variable. There is often a sparse (10-30% cover) emergent tree canopy, 5-35+ m tall, and sparse (10-30%) subcanopy (5-15 m). There is also a sparse to moderate (10-30%) tall-shrub (2-5 m). Regardless of stratum, *Salix nigra* dominates. Additional canopy species can include *Acer negundo, Liquidambar styraciflua, Platanus occidentalis*, and *Ulmus americana*, which can also occur in the shrub layer along with *Diospyros virginiana, Liriodendron tulipifera, Quercus lyrata, Sambucus canadensis, Ulmus alata*, and *Ulmus americana*. The herbaceous layer (30-90%) may be dominated by *Juncus coriaceus, Juncus effusus, Justicia ovata, Lespedeza cuneata* (exotic), *Microstegium vimineum* (invasive exotic), *Polygonum punctatum, Saururus cernuus*, and/or *Scirpus cyperinus*.
Global Vegetation: Alluvial shrubland dominated by scrubby *Salix nigra*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Salix nigra*
Herb (field)	Flowering forb	*Polygonum punctatum*, *Saururus cernuus*
Herb (field)	Graminoid	*Juncus coriaceus*, *Juncus effusus*, *Scirpus cyperinus*

Global

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous tree	*Salix nigra*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Juncus effusus*, *Salix nigra*, *Saururus cernuus*, *Scirpus cyperinus*
Global: *Salix nigra*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Lespedeza cuneata* (Medium), *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Microstegium vimineum* (High/Medium), *Ranunculus sardous* (), *Triadica sebifera* (High)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (19-Sep-2001).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This type conceptually includes communities formerly treated as woodlands [see the archived *Salix nigra* Woodland (CEGL003731)].
Global Similar Associations:
- *Populus deltoides - Salix nigra - Acer saccharinum* Floodplain Forest (CEGL002018)
- *Salix nigra - Betula nigra / Schoenoplectus pungens* Riverscour Shrubland (CEGL006463)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This type was sampled at sites in Mississippi (2) and Tennessee (1) in the vicinity of M70, M135, and M325.
Global Range: This is a potentially wide-ranging association found throughout the southeastern and eastern United States, and possibly into Canada. This broadly defined association is found from the Ozarks and Interior Low Plateau, south to the West and East Gulf coastal plains and Florida Peninsula, east to the Atlantic Coastal Plain (excluding the Southern Blue Ridge) and north into the Central Appalachians and Northern Piedmont.
Nations: CA?, US
States/Provinces: AL, AR, FL, GA, IL?, KY, LA, MD, MS, NC, OH, OK, ON?, SC, TN, TX, WV:S2
TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 55:P, 56:C, 57:C, 59:C
USFS Ecoregions (1994/95): 221Ec:C??, 221Ed:C??, 221Ef:C??, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 222Eg:CCC, 231Bg:CCC, 231Bi:CCC, 231Ca:CCC, 231Cd:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232:C, M221Aa:CCP, M221Ab:CCP, M221Ac:CCC, M221Ad:CCC, M221Bb:CCC, M221Bf:CCC, M221Da:CCC, M221Dc:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Fort Benning); NPS (Chattahoochee River, Chickamauga-Chattanooga?, Natchez Trace); USFS (Bankhead, Cherokee?, Oconee?, Ouachita (Coastal Plain)?, Ouachita (Mountains)?, Ouachita?, Ozark?); USFWS (Eufaula)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.518, NATR.535, NATR.603.
Local Description Authors: M.J. Russo
Global Description Authors: E. Largay
References: ALNHP 2002, Allard 1990, Baalman 1965, Blair 1938, Blair and Hubbell 1938, Cowardin et al. 1979, Fleming et al. 2001, Harrison 2004, Harrison 2011, Hefley 1937, Hoagland 2000, Johnson 1984, Kelting and Penfound 1950, McCoy 1958, Nordman et al. 2011, ONHD unpubl. data, Penfound 1953, Penfound 1961, Penfound 1965, Petranka and Holland 1980, Schafale and Weakley 1990, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Thompson 1996, WVNHP unpubl. data b, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G756. Eastern North American Wet Shoreline Vegetation

Smartweed - Cutgrass Beaver Pond

***Polygonum (hydropiperoides, punctatum) - Leersia* spp. Shoreline Wet Meadow**
(Swamp Smartweed, Dotted Smartweed) - Cutgrass species Shoreline Wet Meadow
Identifier: CEGL004290

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Wet Shoreline Vegetation (M880)
Group	Eastern North American Wet Shoreline Vegetation (G756)
Alliance	Eastern Knotweed Palustrine Vegetation (A1881)
Association	Smartweed - Cutgrass Beaver Pond

ELEMENT CONCEPT

Global Summary: This association incorporates vegetation of beaver ponds and other semipermanent impoundments in the Piedmont, South Atlantic Coastal Plain, Upper East Gulf Coastal Plain, scattered localities in the Blue Ridge, and possibly other adjacent provinces. Stands of this vegetation are dominated by some combination of *Polygonum punctatum, Polygonum hydropiperoides, Leersia lenticularis, Leersia oryzoides*, and/or *Leersia virginica*. Other herbaceous species present include *Saururus cernuus, Proserpinaca* sp., *Bidens aristosa (= Bidens polylepis)*, and *Xanthium strumarium*. Scattered individuals of *Cephalanthus occidentalis* and *Acer saccharinum* may be present. A Piedmont North Carolina example contains *Impatiens capensis, Boehmeria cylindrica*, and the exotic *Murdannia keisak*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This wetland herbaceous community was sampled once in the park. The site is an impounded bottomland with very poorly drained muck soil. The unvegetated surface is dominated by litter/duff with some standing water. No evidence of disturbance was reported.
Global Environment: This association incorporates vegetation of beaver ponds and other semipermanent impoundments.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The herbaceous layer (100% cover) is dominated by floating aquatic *Lemna minor, Mikania scandens*, and *Polygonum hydropiperoides*.
Global Vegetation: Stands of this vegetation are dominated by some combination of *Polygonum punctatum, Polygonum hydropiperoides, Leersia lenticularis, Leersia oryzoides*, and/or *Leersia virginica*. Other herbaceous species which may be present include *Polygonum densiflorum, Saururus cernuus, Proserpinaca* sp., *Sparganium americanum, Typha latifolia, Scirpus cyperinus, Lobelia cardinalis, Onoclea sensibilis, Penthorum sedoides, Boehmeria cylindrica, Sambucus canadensis, Bidens aristosa (= Bidens polylepis)*, and *Xanthium strumarium*. Scattered individuals of *Cephalanthus occidentalis* and *Acer saccharinum* or other woody plants may be present. Examples which have become dried-out (through drought and/or beaver dam failure) may exhibit greater dominance by *Leersia* rather than *Polygonum*. The combination of *Polygonum punctatum - Leersia virginica* was first noted, but the combination of *Polygonum hydropiperoides* and *Leersia lenticularis* has also been observed in the Oconee National Forest. At Ocmulgee National Monument near Macon, Georgia, *Leersia oryzoides* was the sole dominant at the time of sampling.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Liana	*Mikania scandens*
Herb (field)	Flowering forb	*Polygonum hydropiperoides*
Floating aquatic	Aquatic herb	*Lemna minor*

Global

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Polygonum hydropiperoides*, *Polygonum punctatum*
Herb (field)	Graminoid	*Leersia lenticularis*, *Leersia virginica*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Lemna minor*, *Mikania scandens*, *Polygonum hydropiperoides*
Global: *Leersia lenticularis*, *Leersia virginica*, *Polygonum hydropiperoides*, *Polygonum punctatum*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Murdannia keisak* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (21-Dec-2000). This association is found in the Coastal Plain and Interior from Tennessee and Alabama to the Carolinas. The full extent of its distribution is not known. This is not a rare community type, but it is threatened by filling of wetlands.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This association is documented from a beaver pond in the floodplain of Owl Creek, Shiloh National Battlefield, Tennessee, on Collins silt loam; it is also documented on Bailey Island in the ACE Basin (C. Aulbach-Smith pers. comm.). It has also been seen in the Bankhead National Forest and Horseshoe Bend National Military Park, Alabama, and the Oconee National Forest, Georgia.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi in the vicinity of M85.
Global Range: This association is found in the Coastal Plain, Ridge and Valley, and other interior provinces from Tennessee and Alabama to the Carolinas. The full extent of its distribution is not known.
Nations: US
States/Provinces: AL, GA, KY?, LA, MS, NC, NJ, PA, SC, TN
TNC Ecoregions: 42:?, 43:C, 44:P, 49:C, 50:C, 51:P, 52:C, 53:C, 56:C, 57:P, 62:C
USFS Ecoregions (1994/95): 221Ea:CCC, 221Ha:CCC, 221Hc:CCC, 221Hd:CC?, 221He:CCC, 222Ce:CCP, 222Cf:CCP, 222Cg:CCC, 222Eb:CCC, 222Eg:CCP, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 231Aa:CCC, 231Ab:CCC, 231Ae:CCP, 231Af:CCP, 231Ao:CCC, 231Bc:CC?, 231Bd:CC?, 231Be:CC?, 231Bi:CCC, 231Cc:CCC, 231Cd:CCC, 232Ac:CCC, 232Bl:CCC, 232Bq:CCC, M221Cd:CCC
Federal Lands: DOD (Fort Benning); NPS (Chickamauga-Chattanooga, Friendship Hill, Great Smoky Mountains, Horseshoe Bend, Jean Lafitte, Kennesaw Mountain, Morristown, Natchez Trace, Ocmulgee, Shiloh); USFS (Bankhead, Daniel Boone?, Oconee, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?); USFWS (Supawna Meadows)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.319.
Local Description Authors: M.J. Russo
Global Description Authors: M. Andreu and M. Tukman, mod. H. Summer
References: Aulbach-Smith pers. comm., Ehrenfeld 1977, Gallyoun et al. 1996, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Perles et al. 2006b, Schafale 2012, Schotz pers. comm., Sneddon et al. 2008, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Smartweed Pond

***Polygonum amphibium* - *(Polygonum hydropiperoides)* Shoreline Wet Meadow**
Water Knotweed - (Swamp Smartweed) Shoreline Wet Meadow
Identifier: CEGL004699

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Wet Shoreline Vegetation (M880)
Group	Eastern North American Wet Shoreline Vegetation (G756)
Alliance	Eastern Knotweed Palustrine Vegetation (A1881)
Association	Smartweed Pond

ELEMENT CONCEPT

Global Summary: This association includes vegetation of wet depressions, lakes, and ponds dominated by *Polygonum amphibium* and/or *Polygonum hydropiperoides*. Its distribution is potentially very widespread.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This wetland herbaceous community was sampled once in the park. The sites are a permanently flooded, beaver-impounded bottomland and a seasonally flooded floodplain. Soils are very poorly drained silt loam or silty clay. The unvegetated surface is dominated by standing water or bare soil with some litter/duff and wood. Evidence of disturbance includes past beaver activity, flooding, and the presence of exotic plants.
Global Environment: Vegetation of wet depressions, lakes, and ponds.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The herbaceous layer (50% cover) is dominated by *Juncus effusus, Leersia oryzoides*, and *Polygonum hydropiperoides*. In addition, scattered (20%) shrubs (2-5 m) of *Cephalanthus occidentalis* occur.
Global Vegetation: This vegetation is apparently dominated by *Polygonum amphibium* and/or *Polygonum hydropiperoides*. More details are needed on the floristic composition of this community throughout its range.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*
Herb (field)	Flowering forb	*Polygonum hydropiperoides*
Herb (field)	Graminoid	*Juncus effusus*, *Leersia oryzoides*

Global

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Polygonum amphibium*, *Polygonum hydropiperoides*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Juncus effusus*, *Leersia oryzoides*, *Polygonum hydropiperoides*
Global: *Polygonum amphibium*, *Polygonum hydropiperoides*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (3-Oct-2001). This is apparently a wide-ranging early-successional vegetation type.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This concept was originally based on data from Oklahoma (Hoagland and Collins 1997, Hoagland 2000).
Global Similar Associations:
- *Polygonum amphibium* Aquatic Vegetation [Placeholder] (CEGL002002) of the western United States.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi between M225 and M230.
Global Range: The full range of this vaguely defined element has not been determined. It was described from Oklahoma, and is presumed to occur elsewhere in the southeastern United States.
Nations: US
States/Provinces: GA?, KY, MS, OK, TN?
TNC Ecoregions: 27:C, 28:P, 32:C, 33:C, 37:C, 38:?, 39:?, 42:C, 43:C, 44:C, 50:?
USFS Ecoregions (1994/95): 221Ha:CCP, 221Hc:CCC, 221He:CCP, 222A:C?, 222Db:CCC, 222En:CCC, 222Eo:CCC, 231Ba:CCC, 234An:CCP, 251E:CC, 251F:CC, 255A:CC, 311A:CC, 315B:PP, 315C:PP, 331B:CC, 331I:C?, 332E:CC, M222A:??, M231A:??
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.383.
Local Description Authors: M.J. Russo
Global Description Authors: K.D. Patterson
References: Hoagland 2000, Hoagland and Collins 1997, Nordman et al. 2011, Penfound 1953, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Smartweed - Savanna Panicgrass Southern Flooded Marsh

***Polygonum* spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow**
Smartweed species - Savanna Panicgrass Shoreline Wet Meadow
Identifier: CEGL008555

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern North American Wet Shoreline Vegetation (M880)
Group	Eastern North American Wet Shoreline Vegetation (G756)
Alliance	Eastern Knotweed Palustrine Vegetation (A1881)
Association	Smartweed - Savanna Panicgrass Southern Flooded Marsh

ELEMENT CONCEPT

Global Summary: This association is documented from an herbaceous slough of the Alabama River at Haines Island in Monroe County, Alabama. It is a seasonally or perhaps semipermanently flooded herbaceous marsh with some beaver activity. There are very sparse widely scattered trees of *Taxodium distichum* and *Salix nigra*, and shrubs of *Cephalanthus occidentalis, Salix nigra, Acer saccharinum*, and *Populus deltoides*. The dominant plants are all herbaceous, most dominant are *Polygonum* spp. and *Phanopyrum gymnocarpon*; near dominant taxa (in decreasing order) include *Sagittaria latifolia, Glottidium vesicarium, Lycopus* spp., *Alternanthera philoxeroides, Mimulus* sp., *Saururus cernuus, Cyperus* sp., *Bidens* sp., *Boehmeria cylindrica, Triadenum walteri, Polygonum punctatum, Strophostyles helvula, Ludwigia decurrens*, and *Ludwigia* sp. This association is expected to occur elsewhere in open bottomland sloughs in the Coastal Plain within the range of *Phanopyrum gymnocarpon*, from North Carolina to northern Florida, Arkansas, and southeastern Texas. This association is distinguished from others in the same alliance by the codominance of *Phanopyrum gymnocarpon* with *Polygonum* spp.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This savanna panicgrass wetland community was sampled twice in the park. The site is a permanently flooded, beaver-impounded basin with very poorly drained muck soil. The unvegetated surface is made up entirely of standing water. No evidence of disturbance was reported.
Global Environment: This association is documented from an herbaceous slough of the Alabama River at Haines Island in Monroe County, Alabama. It is a seasonally or perhaps semipermanently flooded herbaceous marsh with some beaver activity. This association is expected to occur elsewhere in open bottomland sloughs in the Coastal Plain within the range of *Phanopyrum gymnocarpon*, from North Carolina to northern Florida, Arkansas, and southeastern Texas. It could be in open sloughs in a floodplain of a brownwater river forested with *Taxodium distichum, Salix nigra, Acer saccharinum*, and/or *Populus deltoides*. This type could occur in large or small rivers.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The herbaceous layer (100% cover) is dominated by *Phanopyrum gymnocarpon*; additional herbs include *Apios americana, Boehmeria cylindrica, Mikania scandens, Panicum rigidulum, Polygonum lapathifolium, Polygonum punctatum*, and *Saururus cernuus*. Scattered shrubs (1-2 m) include *Baccharis halimifolia, Cephalanthus occidentalis, Liquidambar styraciflua, Nyssa aquatica, Salix nigra, Toxicodendron radicans*, and *Ulmus americana*.
Global Vegetation: There are very sparse, widely scattered trees of *Taxodium distichum* and *Salix nigra*, and shrubs of *Cephalanthus occidentalis, Salix nigra, Acer saccharinum*, and *Populus deltoides*. The dominant plants are all herbaceous, most dominant are *Polygonum* spp. and *Phanopyrum gymnocarpon*; near dominant taxa (in decreasing order) include *Sagittaria latifolia, Glottidium vesicarium, Lycopus* spp., *Alternanthera philoxeroides, Mimulus* sp., *Saururus cernuus, Cyperus* sp., *Bidens* sp., *Boehmeria cylindrica, Triadenum walteri, Polygonum punctatum, Strophostyles helvula, Ludwigia decurrens*, and *Ludwigia* sp. Other herbaceous species include *Commelina virginica, Lobelia cardinalis, Pluchea* sp., *Eichhornia crassipes*, and *Echinochloa* sp.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Polygonum lapathifolium*, *Polygonum punctatum*
Herb (field)	Graminoid	*Phanopyrum gymnocarpon*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Phanopyrum gymnocarpon*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Phanopyrum gymnocarpon*, *Polygonum lapathifolium*
Global: *Phanopyrum gymnocarpon*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (3-Oct-2001). This association probably occurs in open sloughs in the floodplain of other Coastal Plain rivers.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi in the vicinity of M20 and M135.
Global Range: This association is documented from an herbaceous slough of the Alabama River at Haines Island in Monroe County, Alabama.
Nations: US
States/Provinces: AL, FL?, GA, LA?, MS, NC?, SC, TX?
TNC Ecoregions: 43:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 231Bg:CCC, 232Bd:CCC, 232Bs:CCC, 232Cb:CCC
Federal Lands: DOD (Claiborne Lake); NPS (Natchez Trace); USFS (Francis Marion)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.170, NATR.519.
Local Description Authors: M.J. Russo
Global Description Authors: C.W. Nordman, mod. M. Pyne
References: Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M303. Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland

G557. Southeastern Ruderal Marsh, Wet Meadow & Shrubland

Common Rush Marsh

***Juncus effusus* Marsh**
Common Rush Marsh
Identifier: CEGL004112

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland (M303)
Group	Southeastern Ruderal Marsh, Wet Meadow & Shrubland (G557)
Alliance	Southern Ruderal Marsh (A3412)
Association	Common Rush Marsh

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

Natchez Trace Parkway Environment: This common rush freshwater marsh vegetation was sampled at two locations in the park. Sites are intermittently to permanently flooded bottomland channel beds with very poorly drained muck soil. The unvegetated surface is dominated by litter/duff with some standing water. Evidence of disturbance includes the presence of exotic plants.
Global Environment: This is a seasonally (to temporarily) flooded marsh vegetation type; it may occur in natural or artificial ponds, including beaver-enhanced ponds, artificial waterways (wet ditches), and disturbed wet fields.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (90% cover) herbaceous layer dominated by *Juncus effusus* defines this community. Additional herbs made include *Alternanthera philoxeroides* (exotic), *Hydrolea uniflora, Polygonum hydropiperoides, Saccharum giganteum*, and *Scirpus cyperinus*. In addition, there may be a very sparse (5-10%) emergent shrub layer (1-5 m) of *Baccharis halimifolia, Fraxinus pennsylvanica, Liquidambar styraciflua, Pinus taeda*, and *Platanus occidentalis*.
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, Carex* spp., *Cyperus* spp., other *Juncus* 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*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Juncus effusus*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Juncus effusus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Juncus effusus*
Global: *Juncus effusus*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Alternanthera philoxeroides* (Medium), *Lonicera japonica* (High/Medium), *Myriophyllum spicatum* (High)
Global: Vulnerable Plants: *Pycnanthemum beadlei* (G2G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CONSERVATION STATUS RANK

Global Rank & Reasons: G5 (28-Mar-2001). This is a broadly defined, widely distributed, and reasonably secure vegetation type.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: A new association is likely to be split from CEGL004112 to represent northeastern expressions of the community as new data become available.

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

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Mississippi between M105 and M110 and in the vicinity of M215.
Global Range: The range of this broadly defined association has not been fully described. It is confirmed as occurring in the Northern Appalachians south through 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, AR, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA:SU, VT, WV:S5
TNC Ecoregions: 38:C, 39:C, 40:C, 42:C, 43:C, 44:C, 50:P, 51:C, 52:C, 53:P, 56:P, 57:P, 58:P, 59:C
USFS Ecoregions (1994/95): 222Eb:CCC, 231Bg:CCC, 231Bi:CCC, 231Ca:CPP, 231Cd:CPP, 231Db:CCC, 232Ce:PPP, M221Ab:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: BIA (Eastern Band of Cherokee); DOD (Arnold, Fort Benning); NPS (Appalachian Trail [Lower New England], Blue Ridge Parkway, Carl Sandburg Home, Chattahoochee River, Chickamauga-Chattanooga?, Cumberland Island?, Great Smoky Mountains, Mammoth Cave?, Natchez Trace); USFS (Bankhead, Cherokee?, Nantahala, Oconee?, Pisgah, Talladega, Talladega (Oakmulgee), Talladega (Talladega)?); USFWS (Patuxent)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.181, NATR.527.
Local Description Authors: M.J. Russo
Global Description Authors: Southeastern Ecology Group
References: Allard 1990, Fleming and Patterson 2011a, Fleming et al. 2001, Fleming pers. comm., Hillestad et al. 1975, Hoagland 1998c, Hoagland 2000, McCoy and Fleming 2000, Nordman et al. 2011, Peet et al. unpubl. data, Pyne et al. 2010, Schafale 2012, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a, WVNHP unpubl. data b, Wharton 1978, White 2003, Wichmann 2009

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Highland Rim Pond (Woolgrass Bulrush - Threeway Sedge Type)

***Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum)* Marsh**
Woolgrass - Redtop Panicgrass - Short-bristle Horned Beaksedge - (Threeway Sedge) Marsh
Identifier: CEGL004719

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland (M303)
Group	Southeastern Ruderal Marsh, Wet Meadow & Shrubland (G557)
Alliance	Southern Ruderal Marsh (A3412)
Association	Highland Rim Pond (Woolgrass Bulrush - Threeway Sedge Type)

ELEMENT CONCEPT

Global Summary: This association is a component of emergent zones in upland depression ponds of the Interior Low Plateau of Kentucky, Tennessee, and possibly Indiana, as well as in the Upper East Gulf Coastal Plain and Piedmont ecoregions of Alabama. Stands may have a pronounced seasonal fluctuation in water level, becoming saturated to ponded in the winter and often drying completely in the summer. The vegetation is typically dominated by patches or zones of *Scirpus cyperinus*, possibly with thick mats of *Dulichium arundinaceum*. In addition to these, various *Carex* spp., *Juncus coriaceus, Juncus effusus, Osmunda regalis var. spectabilis, Panicum rigidulum, Rhynchospora* spp., and scattered *Itea virginica* and *Cephalanthus occidentalis* are often found. Floristics and gradient expression vary with context and management. Some examples may have additional small trees and shrubs, such as *Acer rubrum var. trilobum, Alnus serrulata, Hibiscus moscheutos, Liquidambar styraciflua, Nyssa biflora, Pinus taeda, Quercus phellos*, and *Rosa palustris* scattered within. On drier ground (either surrounding the pond center or scattered about on hummocks), *Scirpus cyperinus* may share dominance with *Panicum rigidulum var. elongatum* and *Rhynchospora corniculata*. Some other herbaceous species which are present may include *Andropogon virginicus, Carex bullata, Carex gigantea, Carex lurida, Calamagrostis coarctata, Dichanthelium dichotomum var. dichotomum, Dichanthelium longiligulatum, Dichanthelium scoparium, Eleocharis* sp., *Leersia hexandra, Ludwigia alternifolia, Ludwigia leptocarpa, Ludwigia palustris, Lycopus* sp., *Proserpinaca pectinata, Rhexia mariana, Rhynchospora chalarocephala, Rhynchospora corniculata, Rhynchospora glomerata, Rhynchospora perplexa, Saccharum baldwinii, Triadenum virginicum, Xyris laxifolia var. iridifolia*, and *Xyris smalliana*. The vegetation may consist of monospecific clumps of the component species, which are present around the pond margin, or scattered on hummocks within. Zones or areas of deeper water may support floating aquatics, including *Nymphaea odorata* and *Utricularia gibba*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This redtop panicgrass herbaceous community was sampled once in the park. The site is a semipermanently flooded depression with very poorly drained muck soil. The unvegetated surface is made up entirely of standing water. No evidence of disturbance was reported.
Global Environment: This association is a component of emergent zones in upland depression ponds of the Interior Low Plateau of Kentucky, Tennessee, and possibly Indiana, and in the Upper East Gulf Coastal Plain and Piedmont ecoregions of Alabama (where it is documented from a beaver pond on the Talladega National Forest and a temporarily flooded swale at Horseshoe Bend National Military Park). It may have a pronounced seasonal fluctuation in water level, becoming saturated to ponded in the winter and often drying completely in the summer.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (100% cover) herbaceous layer is dominated almost exclusively by *Panicum rigidulum*; the only other species reported to occur are *Boehmeria cylindrica, Carex frankii, Carex lurida, Eleocharis ovata*, and *Paspalum floridanum*.
Global Vegetation: The vegetation is typically dominated by patches or zones of *Scirpus cyperinus*, possibly with thick mats of *Dulichium arundinaceum*. In addition to these, various *Carex* spp., *Juncus coriaceus, Juncus effusus, Osmunda regalis var. spectabilis, Panicum rigidulum, Rhynchospora* spp., and scattered *Itea virginica* and *Cephalanthus occidentalis* are often found. Floristics and gradient expression vary with context and management. Some examples (Interior Low Plateau of Tennessee) may have additional small trees and shrubs, such as *Hibiscus moscheutos, Liquidambar styraciflua, Quercus phellos*, and *Rosa palustris* scattered within. The Upper East Gulf Coastal Plain (Alabama) example has *Nyssa biflora, Alnus serrulata, Itea virginica, Liquidambar styraciflua, Pinus taeda* and *Acer rubrum var. trilobum* as scattered woody plants. *Scirpus cyperinus* may share dominance with *Panicum rigidulum var. elongatum* and *Rhynchospora corniculata* on drier ground surrounding the pond center, or scattered about on hummocks. Zones or areas of deeper water may support floating aquatics, including *Nymphaea odorata* and *Utricularia gibba*. In more open examples (Tennessee), some other species present may include *Xyris laxifolia var. iridifolia, Carex bullata, Carex gigantea, Carex lurida, Calamagrostis coarctata, Leersia hexandra, Rhynchospora corniculata, Rhynchospora glomerata, Rhynchospora perplexa, Andropogon virginicus, Dichanthelium scoparium, Dichanthelium dichotomum var. ramulosum, Dichanthelium longiligulatum, Saccharum baldwinii*, and *Proserpinaca pectinata*. Some additional herbaceous species seen in the Alabama occurrence include *Eleocharis* sp., *Ludwigia alternifolia, Ludwigia leptocarpa, Ludwigia palustris, Lycopus* sp., *Rhexia mariana, Rhynchospora chalarocephala, Triadenum virginicum*, and *Xyris smalliana*. The vegetation may consist of monospecific clumps of the component species, which are present around the pond margin, or scattered clumps in examples with less clear zonation.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Panicum rigidulum*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Dulichium arundinaceum*, *Panicum rigidulum* var. *elongatum*, *Rhynchospora corniculata*, *Scirpus cyperinus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Carex frankii*, *Carex lurida*, *Eleocharis ovata*, *Panicum rigidulum*
Global: *Dulichium arundinaceum*, *Panicum rigidulum* var. *elongatum*, *Rhynchospora corniculata*, *Scirpus cyperinus*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (20-Dec-2000). This seasonally flooded herbaceous association is found in the emergent zones of ponds in the Interior Low Plateau (Kentucky, Tennessee, and possibly Indiana), and in the Upper East Gulf Coastal Plain of Alabama. The total number of occurrences is not known. Many examples have been altered or destroyed, for example converted to farm ponds or affected by erosion from adjoining agricultural lands. Only a few extensive, high-quality examples remain. Remaining unprotected examples are vulnerable to damage from off-road vehicles, local hydrologic changes (ditching and draining), and land-use change (including housing development). Some examples are in areas of extensive human population growth, and the best hope for conservation is on public lands (e.g., natural areas, wildlife areas, military bases).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: This community provides important breeding habitat for amphibians. Originally described from the Eastern Highland Rim of Coffee and DeKalb counties, Tennessee. On Arnold Air Force Base, Coffee County, Tennessee, an example is known from a depression pond located on the former airfield. Mingo Pond, in Franklin County, Tennessee, is presumed to be an exemplary occurrence of this type. This type includes a sample from Talladega National Forest Survey (Oakmulgee Ranger District; 231Bc) August 2000 Survey (sample: 715 Beaver Ponds #1 and Pondville Butterfly Site #1).

In Indiana see *Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus* Marsh (CEGL002413), a semipermanently flooded community of deeper sinkhole ponds; however, there is a pond that might fit the description of this type, though it has increased in woody cover somewhat in recent years, and would take some management to revert and fit the type, as it once did (M. Homoya pers. comm. 2000).

Global Similar Associations:
- *Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus* Marsh (CEGL002413)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Colbert County, Alabama.
Global Range: This herbaceous pond vegetation is found in the Interior Low Plateau region of the United States (Kentucky, Tennessee, and possibly Indiana), and in the Upper East Gulf Coastal Plain and Piedmont ecoregions of Alabama.
Nations: US
States/Provinces: AL, IN, KY, TN
TNC Ecoregions: 43:C, 44:C, 52:C
USFS Ecoregions (1994/95): 222Eb:CCC, 231Ab:CCC, 231Bc:CCC, 231Be:CCC
Federal Lands: DOD (Arnold); NPS (Horseshoe Bend, Natchez Trace); USFS (Talladega, Talladega (Oakmulgee))

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.100.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne, mod. H. Summer
References: Ellis and Chester 1989, Homoya et al. 1988, Homoya pers. comm., NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Russo 1997, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Southern Woolgrass Marsh

***Scirpus cyperinus* Southern Ruderal Marsh**
Woolgrass Southern Ruderal Marsh
Identifier: CEGL003866

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland (M303)
Group	Southeastern Ruderal Marsh, Wet Meadow & Shrubland (G557)
Alliance	Southern Ruderal Marsh (A3412)
Association	Ruderal Southern Woolgrass Marsh

ELEMENT CONCEPT

Global Summary: This association is a ruderal type, consisting of *Scirpus cyperinus* as an essentially monospecific stand, especially in artificial wetlands, such as borrow pits or ponds. The water table is at or above the soil surface for at least part of the growing season. The dominant species, *Scirpus cyperinus*, often forms dense, almost monotypic stands. *Carex* spp. and *Schoenoplectus* spp. (= *Scirpus* spp.) are often found in this community. Other co-occurring species of this association are not fully known. It is a widespread type. At Fort Benning, Georgia, *Scirpus cyperinus* occurs with *Saccharum giganteum, Juncus* sp., and occasional *Alnus serrulata* and *Nyssa biflora* in beaver ponds and other hydrologically enhanced areas. In the Interior Low Plateau of Tennessee, *Scirpus cyperinus* is commonly found with *Typha latifolia* in roadside ditches and on the margins of ponds and reservoirs.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This woolgrass herbaceous community is distributed throughout the park, occupying former beaver impoundments, depressions, and stream channels. These sites are semipermanently flooded wetlands with very poorly drained muck soil. The unvegetated surface is made up entirely of standing water. No evidence of disturbance was observed.
Global Environment: At Fort Benning, Georgia, this is found in beaver ponds and other hydrologically enhanced areas. In the Interior Low Plateau of Tennessee, *Scirpus cyperinus* is commonly found with *Typha latifolia* in roadside ditches and on the margins of ponds and reservoirs. In the Francis Marion National Forest (South Carolina), *Scirpus cyperinus* sometimes dominates open depressions within or adjacent to the Santee River floodplain and larger stream floodplains, and can also dominate deeper borrow pits (Glitzenstein and Streng 2004).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: Species diversity and dominance of particular taxa are highly variable among sites. Tree and shrub layers are sparse (5-20% cover), whereas the herbaceous component is dense (80-100% cover). Sites are dominated exclusively or by a combination of *Typha latifolia, Scirpus cyperinus, Leersia oryzoides, Phyla nodiflora*, and *Ludwigia palustris*. Other species reported to occur are *Boehmeria cylindrica, Pilea pumila, Carex lurida, Eleocharis ovata*, and *Mikania scandens*.
Global Vegetation: Stands of this association consist of *Scirpus cyperinus* as an essentially monospecific stand. *Saccharum* spp., *Carex* spp., and *Schoenoplectus* spp. (= *Scirpus* spp.) are often found in this community, especially on the margins. Other co-occurring species of this association are not fully understood. In the Interior Low Plateau of Tennessee, *Scirpus cyperinus* is commonly found with *Typha latifolia*. In addition, *Juncus effusus* and an occasional *Alnus serrulata* are also present.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Ludwigia palustris*, *Phyla nodiflora*
Herb (field)	Graminoid	*Leersia oryzoides*, *Scirpus cyperinus*, *Typha latifolia*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Scirpus cyperinus*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Leersia oryzoides*, *Ludwigia palustris*, *Phyla nodiflora*, *Scirpus cyperinus*, *Typha latifolia*
Global: *Scirpus cyperinus*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (18-Feb-2015). This is a wide-ranging type that can be found in naturally occurring as well as artificial wetlands.

CLASSIFICATION

Status: Standard

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Classification Confidence: 2 - Moderate
Global Comments: This community may be at least a minor component of many Southeastern wetland systems, but little work has been done to determine its range and component species. The variability of this association across its range and its relation to related types in this alliance are not fully understood. At Arnold Air Force Base, Coffee and Franklin counties, Tennessee, this vegetation is related to that found scattered along the border of Woods Reservoir. This appears to be a component of a mosaic of communities which form bands from the edge of the reservoir to the surrounding forest. The band found at the reservoir's edge is dominated by *Scirpus cyperinus* and *Typha latifolia* [see CEGL004150 for the *Typha latifolia*-dominated phase]. *Juncus* sp., grasses, and an occasional *Alnus serrulata* are also present. The *Scirpus cyperinus* grows in dense clumps throughout the outer band. Similarly, at Fort Benning, Georgia, this community forms bands at the outer edge of hydrologically enhanced areas. On Fort Benning *Scirpus cyperinus* is found in conjunction with *Saccharum giganteum, Juncus* sp., and occasional *Alnus serrulata* and *Nyssa biflora*.
Global Similar Associations:
- *Scirpus cyperinus* Wet Meadow (CEGL006349)
- *Typha latifolia* Southern Ruderal Marsh (CEGL004150)

ELEMENT DISTRIBUTION

Global Range: This vegetation is possible throughout the southeastern United States.
Nations: US
States/Provinces: AL, AR, FL?, GA, KY, LA?, MS?, NC?, SC, TN
TNC Ecoregions: 38:C, 39:C, 40:C, 42:C, 43:C, 44:C, 50:P, 52:C, 53:C, 56:P, 57:C, 59:P
USFS Ecoregions (1994/95): 221H:PP, 221J:PP, 222Cf:CCP, 222Cg:CCP, 222Eb:CCC, 222Eg:CCP, 222Eh:CCP, 231A:PP, 232B:CC, 232C:CP, 232D:CP, 234A:PP, M221:P
Federal Lands: DOD (Fort Benning); NPS (Big South Fork, Chattahoochee River, Chickamauga-Chattanooga?, Kennesaw Mountain, Natchez Trace); USFS (Francis Marion, Oconee?, Talladega (Oakmulgee)?, Talladega (Talladega)?, Talladega?, Tuskegee?)

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: M. Pyne
References: Allard 1990, Glitzenstein and Streng 2004, Schafale 2012, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Chinese Privet Wet Shrubland

***Ligustrum sinense* Ruderal Wet Shrubland**
Chinese Privet Ruderal Wet Shrubland
Identifier: CEGL003837

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland (M303)
Group	Southeastern Ruderal Marsh, Wet Meadow & Shrubland (G557)
Alliance	Southern Exotic Species Shrub Wetland (A3409)
Association	Ruderal Chinese Privet Wet Shrubland

ELEMENT CONCEPT

Global Summary: This association comprises wetland bottomlands heavily infested with the exotic *Ligustrum sinense*.

MOST ABUNDANT SPECIES

Global

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

CHARACTERISTIC SPECIES

Global: *Ligustrum sinense*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (8-Aug-2000). This shrubland represents vegetation dominated by an invasive exotic and thus does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong

ELEMENT DISTRIBUTION

Global Range: This vegetation is possible throughout the southeastern United States.
Nations: US
States/Provinces: AL, AR, FL, GA, LA, MS, NC, SC, TN
TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 221:C, 222E:CC, 231Ga:CCC, 231Gc:CCC, 232:C, 234A:CC, M221Dd:CCC, M231:C
Federal Lands: BIA (Eastern Band of Cherokee); NPS (Chickamauga-Chattanooga?, Natchez Trace, Stones River); USFS (Ouachita (Mountains)?, Ouachita?)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: A.S. Weakley
References: Nordman 2004a, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Grapevine - Peppervine - Trumpet Creeper Wet Thicket

***Vitis rotundifolia - Ampelopsis arborea - Campsis radicans* Ruderal Wet Vine-Shrubland**
Muscadine - Peppervine - Trumpet Creeper Ruderal Wet Vine-Shrubland
Identifier: CEGL004620

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (2.C.4.Nd)
Macrogroup	Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland (M303)
Group	Southeastern Ruderal Marsh, Wet Meadow & Shrubland (G557)
Alliance	Coastal Plain Floodplain Vine-Shrubland (A4151)
Association	Grapevine - Peppervine - Trumpet Creeper Thicket

ELEMENT CONCEPT

Global Summary: This association includes vine-dominated vegetation that develops following clearcut logging, blowdowns, and possibly other disturbance in wetlands. This vine-shrubland is dominated by *Vitis rotundifolia, Ampelopsis arborea*, and *Campsis radicans*. Other species that are present in the vine/liana stratum include *Parthenocissus quinquefolia, Toxicodendron radicans ssp. radicans, Bignonia capreolata, Smilax rotundifolia, Berchemia scandens*, and likely others. There may exist a limited canopy of *Liquidambar styraciflua, Ulmus americana, Quercus* spp., *Celtis laevigata, Salix* spp., and likely other species. Often the weight of the vine coverage will break the stems of woody species before they attain 5 m in height. A limited shrub stratum that contains canopy species as well as *Arundinaria gigantea, Ilex decidua, Lindera benzoin, Morella cerifera (= Myrica cerifera)*, and others may be present. *Carex abscondita, Arisaema dracontium, Eupatorium capillifolium, Boehmeria cylindrica, Cryptotaenia canadensis, Carex retroflexa, Carex lupulina, Polygonum* spp., *Cyperus* spp., and other species are present in the sparse herbaceous layer.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This dense herbaceous vegetation was sampled once in the park. The site is a intermittently flooded, unforested bottomland with somewhat poorly drained silty clay soil. There is no unvegetated surface and no report of disturbance.
Global Environment: This association develops on seasonally and temporarily flooded sites where the canopy and subcanopy layers have been removed by disturbance, including clearcut logging, blowdowns, and possibly other kinds of disturbance.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The closed (100% cover) herbaceous layer is dominated by *Commelina virginica, Trachelospermum difforme*, and *Vernonia gigantea*. In addition, there is a sparse (10%) short-shrub layer of *Cephalanthus occidentalis* and *Salix nigra*.
Global Vegetation: This vine-shrubland is dominated by *Vitis rotundifolia, Ampelopsis arborea*, and *Campsis radicans*. Other species that are present in the vine/liana stratum include *Parthenocissus quinquefolia, Toxicodendron radicans ssp. radicans, Bignonia capreolata, Smilax rotundifolia, Berchemia scandens*, and likely others. There may exist a limited canopy of *Liquidambar styraciflua, Ulmus americana, Quercus* spp., *Celtis laevigata, Salix* spp., and likely other species. A limited shrub stratum that contains canopy species, as well as *Arundinaria gigantea, Ilex decidua, Lindera benzoin, Morella cerifera (= Myrica cerifera)*, and others, may be present. *Carex abscondita, Arisaema dracontium, Eupatorium capillifolium, Boehmeria cylindrica, Cryptotaenia canadensis, Carex retroflexa, Carex lupulina, Polygonum* spp., *Cyperus* spp., and other species are present in the sparse herbaceous layer. The exotic vine *Lonicera japonica*, the exotic shrub *Ligustrum sinense*, and the exotic herb *Murdannia keisak* may be present in occurrences of this vine-shrubland. Penfound (1964b) cites an example at Lake Texoma (Oklahoma) dominated by *Ampelopsis arborea, Smilax bona-nox*, and *Rubus trivialis*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Liana	*Ampelopsis arborea*, *Campsis radicans*, *Vitis rotundifolia*
Herb (field)	Flowering forb	*Commelina virginica*, *Trachelospermum difforme*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Liana	*Ampelopsis arborea*, *Campsis radicans*, *Vitis rotundifolia*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ampelopsis arborea*, *Campsis radicans*, *Vitis rotundifolia*
Global: *Ampelopsis arborea*, *Campsis radicans*, *Vitis rotundifolia*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Other Plants: *Vernonia gigantea* (G5)
Global: Invasive/Exotic Plants: *Ligustrum sinense* (High/Medium), *Lonicera japonica* (High/Medium), *Murdannia keisak* (Medium/Low)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (11-May-1998). This vegetation likely is readily restorable by time or management. Examples are created through various kinds of natural or anthropogenic disturbance (TNC 1998b).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: On Congaree Swamp National Monument, South Carolina, many examples of this vegetation were apparently caused by intense wind disturbance events associated with Hurricane Hugo in September 1989 (TNC 1998b).

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The sampled site is in Mississippi near M81.
Global Range: This successional association could be found anywhere in the southeastern United States from Virginia to Texas, in the coastal plain or adjacent ecoregions.
Nations: US
States/Provinces: AL, AR, FL?, GA, LA, MS, NC?, OK, SC, TN, TX?
TNC Ecoregions: 32:C, 40:P, 41:?, 42:C, 43:C, 44:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 231Bi:CCC, 232Bs:CCC, 232Ce:CCC, 234Aa:CCC, 234Ac:CCC, 234Ag:CCC, 234An:CCC, 255Ag:CCC
Federal Lands: DOE (Savannah River Site); NPS (Congaree Swamp, Cumberland Island, Natchez Trace); USFWS (White River NWR)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.311.
Local Description Authors: M.J. Russo
Global Description Authors: S. Landaal
References: Hoagland 2000, Nordman et al. 2011, Peet et al. unpubl. data, Penfound 1967, Penfound et al. 1964b, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh

G188. Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh

Giant Cutgrass Slough Marsh

***Zizaniopsis miliacea* Coastal Plain Slough Marsh**
Giant Cutgrass Coastal Plain Slough Marsh
Identifier: CEGL004139

USNVC CLASSIFICATION

Division	Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland (2.C.4.Ne)
Macrogroup	Atlantic & Gulf Coastal Plain Wet Prairie & Marsh (M067)
Group	Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh (G188)
Alliance	Southeastern Floodplain Marsh (A3404)
Association	Giant Cutgrass Slough Marsh

ELEMENT CONCEPT

Global Summary: Temperate vegetation of marshes and sloughs dominated by *Zizaniopsis miliacea*, often consisting of essentially monospecific stands. This broadly defined type may be divided as more information becomes available. This is primarily a community of the Coastal Plain, but an occurrence is reported from the Piedmont of South Carolina.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This southern wild rice wetland was sampled once in the park. The site is a seasonally flooded impounded reservoir with very poorly drained muck soil. The unvegetated surface is entirely standing water (100% cover). The site is a man-made impoundment; no other evidence of disturbance was reported.
Global Environment: This association encompasses temperate vegetation of marshes and sloughs; it is primarily a community of the Coastal Plain, but an occurrence is reported from the Piedmont of South Carolina (B. Pittman pers. comm.).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: This herbaceous vegetation is a monoculture (90% cover) of *Zizaniopsis miliacea*. No other species were reported.
Global Vegetation: This vegetation is dominated by *Zizaniopsis miliacea*, often consisting of essentially monospecific stands.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Zizaniopsis miliacea*

Global

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Zizaniopsis miliacea*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Zizaniopsis miliacea*
Global: *Zizaniopsis miliacea*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (10-Dec-1998). This is a broadly defined wetland association and, as such, is wide-ranging. As more information becomes available, it may be split into several types. The degree of uncertainty in the rank reflects the need for further inventory to assess the taxonomic relationship of this type and as yet undescribed types. This type remains poorly documented and further research is needed to clarify these data gaps. The ecological integrity of many wetland communities is threatened by hydrological modifications and the alteration of surrounding upland landscapes.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Bert Pittman (pers. comm.) reports an area in the Piedmont (Charlotte Belt Subsection) of South Carolina which is about 1000 acres in extent, with 10 to 20% of it ("several hundred" acres) in marsh dominated by *Zizaniopsis miliacea* with "other aquatic vegetation present." Based on his Piedmont experience this seems "very unusual" to him. Without additional floristic information, this apparent occurrence will be accommodated here for the present. One large stand of this vegetation is found in a marsh at Fort Benning, Georgia (Upper East Gulf Coastal Plain).
Global Similar Associations:
- *Zizaniopsis miliacea* Rocky Riverbed Vegetation (CEGL004140)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Mississippi in the vicinity of M110.
Global Range: Vegetation of marshes and sloughs dominated by *Zizaniopsis miliacea* is reported as ranging from the Atlantic Coastal Plain of possibly the Carolinas south to Florida and into the Upper East Gulf Coastal Plain and west to Texas into the Upper West Gulf Coastal Plain. It extends north in the interior at least to northwestern Tennessee, and is also reported from the Piedmont of South Carolina (Charlotte Belt Subsection).
Nations: US
States/Provinces: AL, FL, GA, LA, MS, NC, SC, TN, TX
TNC Ecoregions: 31:C, 40:C, 41:P, 42:C, 43:C, 52:C, 53:P, 56:C, 57:P
USFS Ecoregions (1994/95): 231Ae:CCC, 231Bi:CCC, 231Ed:C??, 231El:C??, 231Fa:CPP, 231Fb:CPP, 232Bs:CC?, 232Cg:CC?, 232E:CC, 232Fa:CP?, 232Fc:CP?, 234Aa:CCP, 234An:CCC, 255Ca:C??, 255Da:CCP, 255Db:CCC, 255Dc:CCP
Federal Lands: DOD (Fort Benning); NPS (Jean Lafitte, Natchez Trace); USFS (Davy Crockett); USFWS (Anahuac?, Brazoria?, McFaddin?, Reelfoot)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.597.
Local Description Authors: M.J. Russo
Global Description Authors: Southeastern Ecology Group
References: Nordman et al. 2011, Pittman pers. comm., Schafale 2012, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

5. AQUATIC VEGETATION

5.B.2. Temperate & Boreal Freshwater Aquatic Vegetation

5.B.2.Na. North American Freshwater Aquatic Vegetation

M108. Eastern North American Freshwater Aquatic Vegetation

G114. Eastern North American Freshwater Aquatic Vegetation

Coastal Plain Riverine Floating Mat

***Hydrocotyle ranunculoides* - *(Sacciolepis striata)* Floating Aquatic Vegetation**
Floating Marsh-pennywort - (American Cupscale) Floating Aquatic Vegetation
Identifier: CEGL004305

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	Eastern North American Freshwater Aquatic Vegetation (M108)
Group	Eastern North American Freshwater Aquatic Vegetation (G114)
Alliance	Water-lily - Pond-lily Marsh (A4064)
Association	Coastal Plain Riverine Floating Mat

ELEMENT CONCEPT

Global Summary: This community occurs on the quiet edges and backwaters of blackwater and possibly brownwater Coastal Plain rivers, where it forms floating mats over shallow to deep water. Vegetation is dominated by *Hydrocotyle ranunculoides*. *Sacciolepis striata* sometimes dominates later in the growing season. *Alternanthera philoxeroides* often invades this community. When this occurs, *Hydrocotyle* tends to dominate in the early spring and *Alternanthera* in the later spring and summer.

ENVIRONMENTAL DESCRIPTION

Global Environment: This association occurs along the quiet edges and backwaters of Coastal Plain rivers, floating on shallow to deep water.

VEGETATION DESCRIPTION

Global Vegetation: Vegetation is a dense floating mat dominated by *Hydrocotyle ranunculoides*, at least in the early growing season. *Sacciolepis striata* sometimes overgrows the *Hydrocotyle* late in the growing season. *Alternanthera philoxeroides* often invades this community. When this occurs, *Hydrocotyle* tends to dominate in the early spring and *Alternanthera* in the later spring and summer. Occasional other plants may root in the mats, including *Acmella oppositifolia var. repens (= Acmella repens), Polygonum punctatum (= Persicaria punctata)* or other *Polygonum* spp. (= *Persicaria* spp.), and *Bidens* sp. Epiphytic algae are often abundant on the submerged stems at the edges of mats. Patches may be only a few square meters, but range to 10 m or more wide and are often 5 m wide and many tens of meters long.
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (16-Jan-2009). This community is seldom reported, creating uncertainty about its abundance. Numerous patches on a small number of rivers limited total area are known; however, the full extent of its range is uncertain.

CLASSIFICATION

Status: Nonstandard
Classification Confidence: 2 - Moderate
Global Comments: In North Carolina, this community is distinctive as it is the only riverine floating mat other than those dominated by the exotic *Alternanthera philoxeroides*. Its circumscription farther south is unclear, and it may grade into the more diverse floating vegetation of Florida. It has been reported (2015) from Mississippi.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Global Range: This association occurs in North Carolina, South Carolina, is likely in Georgia, is reported from Mississippi, and is probably found in the other Gulf Coast states.
Nations: US
States/Provinces: AL?, FL?, GA?, MS, NC, SC
TNC Ecoregions: 43:C, 53:C, 57:C
USFS Ecoregions (1994/95): 232Bb:CCC, 232Bt:CCC
Federal Lands: NPS (Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR AA 0057.
Local Description Authors:
Global Description Authors: M.P. Schafale
References: Schafale 2012, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

American Lotus Aquatic Wetland

***Nelumbo lutea* Aquatic Vegetation**
American Lotus Aquatic Vegetation
Identifier: CEGL004323

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	Eastern North American Freshwater Aquatic Vegetation (M108)
Group	Eastern North American Freshwater Aquatic Vegetation (G114)
Alliance	Water-lily - Pond-lily Marsh (A4064)
Association	American Lotus Aquatic Wetland

ELEMENT CONCEPT

Global Summary: The American lotus type occurs in natural wetlands or artificial impoundments across the eastern United States and southern Ontario. Stands are essentially monospecific *Nelumbo lutea* communities. This association may be divided as more information becomes available. In Wisconsin, this type is located primarily in the backwaters and impoundments of the Mississippi River and along the deep marshes of the lower Wolf River system. In the Central Appalachians this association includes mixed or monospecific *Nelumbo lutea* communities of natural wetlands or artificial impoundments, sometimes with scattered *Cephalanthus occidentalis*. Other floating-leaved aquatic plant species, such as *Nuphar advena* and *Nymphaea odorata*, may be present, as may emergent species such as *Schoenoplectus tabernaemontani (= Scirpus tabernaemontani), Pontederia cordata, Juncus effusus, Typha latifolia, Eichhornia crassipes* (alien), *Hydrocotyle* spp., and floating aquatics, such as *Salvinia minima, Spirodela* spp., *Lemna* spp., and *Azolla caroliniana*. The hydrology of this association is highly variable; the hydrologic placement is debatable.

ENVIRONMENTAL DESCRIPTION

Global Environment: Stands are found in natural wetlands or artificial impoundments. In Wisconsin, this type is located primarily in the backwaters and impoundments of the Mississippi River and along the deep marshes of the lower Wolf River system (E. Epstein pers. comm. 2003). The hydrology of this association in the Central Appalachian region is highly variable; thus, the hydrologic placement is debatable (Central Appalachian Ecoregional Planning Team pers. comm. 1998).

VEGETATION DESCRIPTION

Global Vegetation: Stands are essentially monospecific *Nelumbo lutea* communities. This association may be divided as more information becomes available. In the Central Appalachian region, mixed or monospecific *Nelumbo lutea* communities of natural wetlands or artificial impoundments sometimes contain scattered *Cephalanthus occidentalis*. Other floating-leaved aquatic plant species, such as *Nuphar advena* and *Nymphaea odorata*, may be present, as may emergent species such as *Schoenoplectus tabernaemontani (= Scirpus tabernaemontani), Pontederia cordata, Juncus effusus, Typha latifolia, Eichhornia crassipes* (alien), *Hydrocotyle* spp., and floating aquatics, such as *Salvinia minima, Spirodela* spp., *Lemna* spp., and *Azolla caroliniana* (Central Appalachian Ecoregional Planning Team pers. comm. 1998).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Nelumbo lutea*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Nelumbo lutea*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (15-Oct-2002). Although natural stands may be relatively rare, this type may also occur in cultural impoundments. The dominant species in stands of this vegetation is widespread across the eastern 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

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: It is unclear whether natural stands (ponds) can be separated from ruderal stands (cultural impoundments that are invaded by *Nelumbo lutea*), complicating the classification and the assessment of the rarity of this type. This type is relatively uncommon in Wisconsin, but several of the occurrences are quite large (hundreds of acres) and reasonably well protected (E. Epstein pers. comm. 2003).

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Global Range: This type is found locally across many parts of the eastern/southeastern United States, from Kentucky and Virginia northeast to Ontario and Wisconsin, south to Texas, and east to Georgia.
Nations: CA, US
States/Provinces: AL, AR, GA, IA, IL?, IN, KY, LA, MI, MO?, MS, NC, NE:S1?, OK, ON, SC, TN, TX, VA:SU
TNC Ecoregions: 31:C, 32:P, 36:C, 37:P, 38:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 46:C, 48:C, 51:?, 52:P, 53:C, 56:P, 57:P, 58:?, 59:C
USFS Ecoregions (1994/95): 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 222Ch:CCC, 222Db:CCC, 222Ka:CCC, 222Kb:CCC, 222Ke:CCC, 222Kf:CCC, 222Kh:CCC, 222Lb:CCC, 222Lc:CCC, 222Ld:CCC, 222Le:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232:C, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 251Df:CCC, 255Dc:CCC, M221Ad:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Fort Benning); NPS (Effigy Mounds, Mississippi, Natchez Trace); USFS (Kisatchie, Ouachita, Ouachita (Coastal Plain)?, Ouachita (Mountains), Ozark); USFWS (Aransas?, Big Lake, Brazoria, Eufaula, McFaddin, Reelfoot)

ELEMENT SOURCES

Local Description Authors:
Global Description Authors: A.S. Weakley
References: ALNHP 2002, Allard 1990, Blair 1938, Blair and Hubbell 1938, CAP pers. comm. 1998, Chapman et al. 1989, Coulling 2002, Epstein pers. comm., Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2001, Fleming et al. 2007b, Hoagland 2000, Homoya et al. 1988, Hop et al. 2005, INAI n.d., LNHP 2009, Lee et al. 1998, McAlister and McAlister 1995, Nelson 1985, Nelson 2010, Penfound 1953, Rolfsmeier and Steinauer 2010, Schafale 2012, Schafale and Weakley 1990, Schotz pers. comm., Smith 1996a, Southeastern Ecology Working Group n.d., TDNH unpubl. data, VDNH 2003, White and Madany 1978

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Water-lily Aquatic Wetland

***Nuphar advena* - *Nymphaea odorata* Aquatic Vegetation**
Broadleaf Pond-lily - American White Water-lily Aquatic Vegetation
Identifier: CEGL002386

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	Eastern North American Freshwater Aquatic Vegetation (M108)
Group	Eastern North American Freshwater Aquatic Vegetation (G114)
Alliance	Water-lily - Pond-lily Marsh (A4064)
Association	Water-lily Aquatic Wetland

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 advena (= Nuphar lutea ssp. advena)* and *Nymphaea odorata* are dominants, either in combination together, or each singly. Other species present include *Brasenia schreberi*, various *Potamogeton* and *Stuckenia* spp., *Eleocharis robbinsii* and other *Eleocharis* spp., *Polygonum amphibium, Polygonum amphibium var. emersum (= Polygonum coccineum), Sparganium americanum, Lemna* spp., *Spirodela polyrrhiza, Typha latifolia*, and *Saururus cernuus*. Submerged aquatics more common in the southern part of the range include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This water-lily aquatic wetland community was sampled once in the park. The site is a permanently flooded depression with very poorly drained muck soil. The unvegetated surface is made up entirely of standing water. The site is a man-made impoundment; no other evidence of disturbance was reported.
Global Environment: This community occupies shallow-water depressions, oxbow ponds, sluggish streams, and backwater sloughs of river floodplains, ponds (natural and artificial), and small lakes. In pools and slow-flowing stretches of river, at Obed River (TN), *Nuphar advena* is rooted in sandy substrate (Schmalzer and DeSelm 1982).

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The surface of the pond is dominated almost exclusively (70% cover) by the aquatic plant *Nuphar advena*. The site also contains a small amount of *Hibiscus moscheutos, Lemna* sp., and a scattering of *Taxodium distichum*.
Global Vegetation: This community is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar advena (= Nuphar lutea ssp. advena)* and *Nymphaea odorata* are dominants, either in combination together, or each singly. Other species present include *Brasenia schreberi*, various *Potamogeton* and *Stuckenia* spp., *Eleocharis robbinsii* and other *Eleocharis* spp., *Polygonum amphibium, Polygonum amphibium var. emersum (= Polygonum coccineum), Sparganium americanum, Lemna* spp., *Spirodela polyrrhiza, Typha latifolia*, and *Saururus cernuus* (Anderson 1982, G. Fleming pers. comm.). 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 advena*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Nuphar advena*

Global

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Nuphar advena*, *Nymphaea odorata*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Nuphar advena*
Global: *Nuphar advena*, *Nymphaea odorata*
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (15-Oct-2002). 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.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: Can occur in mostly natural ponded wetlands as well as artifactual ones such as borrow pits. On the Conecuh National Forest (Alabama), vegetation of this association occurs in Gum Pond and Open Pond as a mix of *Nymphaea odorata* and *Nuphar advena*.
Global Similar Associations:
- *Equisetum fluviatile - (Eleocharis palustris)* Marsh (CEGL005258)
- *Nuphar advena* Tidal Marsh (CEGL004472)
- *Nuphar polysepala* Aquatic Vegetation (CEGL002001)
- Semipermanent Impoundment (CEPS006581)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Tishomingo County, Mississippi.
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, AR, CT, DE, FL, GA, IA:SU, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH:S4S5, NJ:S4, NY, OH, OK, ON, PA:S4, RI, SC, TN, TX, VA:SU, VT, WI, WV
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:C, 61:C, 62:C, 63:C
USFS Ecoregions (1994/95): 212Aa:CCC, 212Ba:CCC, 212Bb:CCC, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Db:CCP, 212Dc:CCC, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Hb:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Ka:CPP, 221Aa:CCP, 221Ab:CCC, 221Ah:CCC, 221Ai:CCC, 221Al:CCC, 221Am:CCC, 221Bd:CCP, 221Da:CCC, 221Db:CCC, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221Fa:CCC, 221Hc: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, 222L:CC, 231Bc:CCC, 231Bd:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bf:CCC, 232C:CC, 232D:CC, 232Eb:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M212Af:CCC, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M212Ea:CCP, M212Eb:CCP, 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, Appalachian Trail [Lower New England], Appalachian Trail [Northern Appalachians], C&O Canal, Carl Sandburg Home, Cuyahoga Valley, Effigy Mounds, George Washington Parkway, Indiana Dunes, Jean Lafitte, Minute Man, Natchez Trace, Obed River, Ozark Riverways, Saint Croix, Saint-Gaudens, Shiloh); USFS (Angelina, Chequamegon, Chequamegon-Nicolet, Conecuh, Davy Crockett, Kisatchie, Nicolet, Ocala, Ozark, Sabine, Sam Houston?, Talladega, Talladega (Oakmulgee), Talladega (Talladega)); USFWS (Back Bay, Erie, Great Swamp, Monomoy, Patuxent, Reelfoot)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.107.
Local Description Authors: M.J. Russo
Global Description Authors: D. Faber-Langendoen, mod. C.W. Nordman, S.C. Gawler, M. Pyne
References: Ambrose 1990a, Anderson 1982, Breden et al. 2001, Chapman et al. 1989, Chastain et al. 2006, Clancy 1996, Coxe 2009, Edinger et al. 2002, Eichelberger 2011a, FNAI 1990, Faber-Langendoen 2001, Fike 1999, Fleming 2007, Fleming and Coulling 2001, Fleming and Patterson 2011a, Fleming et al. 2001, Foti et al. 1994, Gawler 2002, Gawler and Bowman 2012, Gawler and Cutko 2010, Gawler et al. 2005, Harrison 2004, Harrison 2011, Hoagland 2000, Homoya et al. 1988, Hop et al. 2005, Hop et al. 2009, INAI n.d., LNHP 2009, Lubinski et al. 2003, MNNHP 1993, Metzler and Barrett 2006, Midwestern Ecology Working Group n.d., NAP pers. comm. 1998, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1985, Nelson 2010, Nordman et al. 2011, ONHD unpubl. data, Peet et al. unpubl. data, Penfound 1953, Rawinski 1984a, Schafale 2012, Schafale and Weakley 1990, Schmalzer and DeSelm 1982, Schotz pers. comm., Smith 1996a, Sperduto and Nichols 2004, Swain and Kearsley 2001, TDNH unpubl. data, TNHS unpubl. data, Thompson and Jenkins 1992, Thompson and Sorenson 2000, WNHI unpubl. data, White 2003, White and Madany 1978, Zanoni et al. 1979, Zimmerman et al. 2012

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Pondweed - Hornwort - Waterweed Submerged Aquatic Vegetation

***Potamogeton* spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation**
Pondweed species - Hornwort species - Waterweed species Aquatic Vegetation
Identifier: CEGL004725

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	Eastern North American Freshwater Aquatic Vegetation (M108)
Group	Eastern North American Freshwater Aquatic Vegetation (G114)
Alliance	Pondweed - Hornwort - Waterweed Aquatic Vegetation (A4066)
Association	Pondweed - Hornwort - Waterweed Submersed Aquatic Vegetation

ELEMENT CONCEPT

Global Summary: This broadly defined type represents vegetation dominated by various floating-leaved and submerged aquatic species (including *Potamogeton* spp., *Ceratophyllum* spp., *Utricularia* spp., and *Elodea* spp.) from the Cumberlands across to the Atlantic and Gulf coastal plains. Individual stands are typically species-poor and may be dominated by a single species, this leading to any number of apparent dominance types. Until the patterns are better understood, these are all grouped together here.

ENVIRONMENTAL DESCRIPTION

Global Environment: This community type is found in shallow to relatively deep (1 m) freshwater basins, marshes, or bays that remain flooded in all but the driest years. Species composition varies with substrate, water depth, water chemistry, turbidity, water temperatures and other factors, but these are poorly understood.

VEGETATION DESCRIPTION

Global Vegetation: This association represents submerged aquatic vegetation in the southeastern U.S. Hydrophytes dominate the vegetation, forming 50-80% cover. Composition is variable, but typical plants include *Ceratophyllum demersum, Elodea canadensis, Elodea nuttallii, Heteranthera dubia, Justicia americana, Najas gracillima, Podostemum ceratophyllum, Potamogeton crispus, Potamogeton diversifolius, Potamogeton foliosus, Potamogeton nodosus, Stuckenia pectinata (= Potamogeton pectinatus), Utricularia* spp., and *Vallisneria americana*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Submerged aquatic	Aquatic herb	*Ceratophyllum demersum*, *Elodea canadensis*, *Elodea nuttallii*, *Podostemum ceratophyllum*, *Potamogeton diversifolius*, *Potamogeton foliosus*

Global

Stratum	Lifeform	Species
Submerged aquatic	Aquatic herb	*Elodea canadensis*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Ceratophyllum demersum*, *Elodea canadensis*, *Podostemum ceratophyllum*, *Potamogeton diversifolius*
Global: *Ceratophyllum demersum*, *Elodea canadensis*, *Heteranthera dubia*, *Najas gracillima*, *Potamogeton crispus*, *Potamogeton diversifolius*, *Potamogeton foliosus*, *Potamogeton nodosus*, *Vallisneria americana*

OTHER NOTEWORTHY SPECIES

Global: Invasive/Exotic Plants: *Potamogeton crispus* (Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (19-Sep-2001).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: Additional types may be developed as more information becomes available. *Vallisneria americana* may be present, and in some cases this would overlap with *Vallisneria americana* Aquatic Vegetation (CEGL002284).
Global Similar Associations:

- *Ceratophyllum demersum - Stuckenia pectinata* Aquatic Vegetation (CEGL004528) west of the Mississippi River.
- *Vallisneria americana* Aquatic Vegetation (CEGL002284)

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Global Range: This aquatic vegetation is found in the southeastern United States, from West Virginia and Tennessee south into Georgia and Mississippi.
Nations: US
States/Provinces: AL, GA, MS, NC, SC, TN, WV
TNC Ecoregions: 42:C, 43:P, 44:P, 50:C, 52:P, 56:C, 57:P
USFS Ecoregions (1994/95): 231A:CP, 232Ce:CCC, 234An:CCC, M221Cb:CCC
Federal Lands: DOD (Fort Benning); NPS (Natchez Trace, New River Gorge); USFS (Oconee?); USFWS (Reelfoot)

ELEMENT SOURCES

Local Description Authors: C.W. Nordman
Global Description Authors: Southeastern Ecology Group, mod. S.C. Gawler
References: Aulbach-Smith pers. comm., Guthrie 1989, Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., Suiter 1995, TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

M401. North American Temperate Ruderal Aquatic Vegetation

G595. Eastern North American Ruderal Aquatic Vegetation

Ruderal Alligator-weed Aquatic Vegetation

***Alternanthera philoxeroides* Ruderal Aquatic Vegetation**
Alligator-weed Ruderal Aquatic Vegetation
Identifier: CEGL003858

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	North American Temperate Ruderal Aquatic Vegetation (M401)
Group	Eastern North American Ruderal Aquatic Vegetation (G595)
Alliance	Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation (A4219)
Association	Ruderal Alligator-weed Aquatic Vegetation

ELEMENT CONCEPT

Global Summary: This vegetation occurs in the upper reaches of artificial impoundments, as well as in slow-moving water of streams in the Coastal Plain, and is dominated by monospecific stands of *Alternanthera philoxeroides*, an exotic species.

ENVIRONMENTAL DESCRIPTION

Global Environment: This vegetation occurs in shallow water on the flat to gently sloping margins of the upper reaches of artificial impoundments, as well as in slow-moving water of streams in the Coastal Plain.

VEGETATION DESCRIPTION

Global Vegetation: This vegetation consists of monospecific stands of *Alternanthera philoxeroides*, an exotic emergent aquatic herbaceous forb.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Alternanthera philoxeroides*

Global

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Alternanthera philoxeroides*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Alternanthera philoxeroides*
Global: *Alternanthera philoxeroides*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Alternanthera philoxeroides* (Medium)
Global: Invasive/Exotic Plants: *Alternanthera philoxeroides* (Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (29-Jul-2002). This exotic vegetation is widespread in the southeastern United States, particularly in artificial impoundments.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: This association is present along the Mississippi portion of the Natchez Trace Parkway, but no plot data were collected. Therefore, no local description can be provided at this time.
Global Range: This exotic vegetation is currently known from the Atlantic and Gulf coastal plains from North Carolina south to Florida and west to at least Mississippi. It may extend further west into Texas and north to Kentucky. It could at least potentially occur throughout the southeastern United States, particularly in artificial impoundments or slow-moving streams.
Nations: US
States/Provinces: AL, GA, KY?, LA, MS, NC, SC, TN
TNC Ecoregions: 31:C, 43:C, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 232A:CC, 232B:CC, 232C:CC, 232D:CC, 232Eb:CCC
Federal Lands: DOD (Fort Benning); NPS (Jean Lafitte, Natchez Trace, Shiloh)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: None.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Nordman et al. 2011, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Ruderal Water-hyacinth Aquatic Vegetation

***Eichhornia crassipes* Southeast Temperate Ruderal Aquatic Vegetation**
Common Water-hyacinth Southeast Temperate Ruderal Aquatic Vegetation
Identifier: CEGL007671

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	North American Temperate Ruderal Aquatic Vegetation (M401)
Group	Eastern North American Ruderal Aquatic Vegetation (G595)
Alliance	Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation (A4219)
Association	Ruderal Water-hyacinth Aquatic Vegetation

ELEMENT CONCEPT

Global Summary: This association includes floating or rooted aquatic vegetation dominated by *Eichhornia crassipes*; stands are often essentially monospecific. Other species may include *Paspalidium geminatum, Lemna* spp., *Azolla caroliniana, Pistia stratiotes, Spirodela polyrrhiza, Salvinia minima (= Salvinia auriculata)*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This water-hyacinth aquatic vegetation was sampled at three locations in the park. Sites are permanently flooded and include a cove/inlet of and permanently flooded slough at the upper reaches of Ross Barnett Reservoir, and a slackwater bend in Pearl River. Soils are very poorly drained muck. The unvegetated surface is entirely standing water. Evidence of disturbance includes the presence of exotic plants.
Global Environment: These essentially monospecific mats of floating or rooted aquatic vegetation dominated by *Eichhornia crassipes* are found in disturbed marshes.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The very dense (90-100% cover) herbaceous layer is dominated by exotic *Eichhornia crassipes* alone or with *Cabomba caroliniana*; additional herbs include *Alternanthera philoxeroides* (exotic), *Nelumbo lutea, Nymphaea odorata*, and *Polygonum* spp.
Global Vegetation: Stands of this association are often essentially monospecific floating or rooted aquatic vegetation dominated by *Eichhornia crassipes*. Other species may include *Paspalidium geminatum, Lemna* spp., *Azolla caroliniana, Pistia stratiotes, Spirodela polyrrhiza*, and *Salvinia minima (= Salvinia auriculata)*.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Cabomba caroliniana*, *Eichhornia crassipes*

Global

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Eichhornia crassipes*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Cabomba caroliniana*, *Eichhornia crassipes*
Global: *Eichhornia crassipes*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Alternanthera philoxeroides* (Medium), *Eichhornia crassipes* (High), *Myriophyllum spicatum* (High)
Global: Invasive/Exotic Plants: *Eichhornia crassipes* (High), *Salvinia minima* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (13-Jan-1998). This vegetation type is dominated by a species native to South America; it is exotic in North America and the Caribbean.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Usually floating but becoming rooted with lowered water table. Not certain if correctly placed here. Reported from South Carolina by C. Aulbach-Smith (pers. comm. 2001). The species does overwinter in South Carolina in numerous counties in the Coastal Plain from Orangeburg County to the coast. Reported from Lake Whitney at Cumberland Island National Seashore, Georgia (in National Park Service correspondence dated 1998); it is not known how persistent it is or will become there.
Global Similar Associations:
- *Bidens laevis - Hydrocotyle ranunculoides* Floating Marsh (CEGL007076)
- *Oxycaryum cubense - Salvinia molesta* Exotic Floating Mat (CEGL007075)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The three sampled sites are in Mississippi between M120 and M125 and in the vicinity of M110 and M120.
Global Range: This association is found in the southeastern United States and adjacent Mexico.
Nations: MX, US
States/Provinces: AL, FL, GA, LA, MS, NC?, SC, TX
TNC Ecoregions: 29:C, 31:C, 32:P, 40:C, 41:C, 42:C, 43:C, 53:P, 54:C, 55:C, 56:P, 57:P
USFS Ecoregions (1994/95): 231Bi:CCC, 231Bj:CCC, 231Ea:CCC, 231Ec:CCC, 231Ed:CCC, 231Ef:CCC, 231Eg:CCC, 231Eh:CCC, 231Ei:CCC, 231Ej:CCC, 231Fa:CCC, 231Fb:CCC, 232Ba:CCC, 232Bb:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCC, 232Bj:CCC, 232Bs:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Ce:CCC, 232Cf:CCC, 232Da:CCC, 232Db:CCC, 232Dc:CCC, 232Ea:CCC, 232Eb:CCC, 232Fa:CCC, 232Fb:CCC, 232Fc:CCC, 232Fd:CCC, 232Fe:CCC, 232Ga:CCC, 232Gb:CCC, 232Gc:CCC, 232Gd:CCC, 234Aa:CCC, 234Ad:CCC, 234Af:CCC, 234Ah:CCC, 234Ai:CCC, 234Ak:CCC, 234Al:CCC, 234An:CCC, 255Ba:CCC, 255Ca:CCC, 255Cc:CCC, 255Cd:CCC, 255Ce:CCC, 255Cf:CCC, 255Da:CCC, 255Db:CCC, 255Dc:CCC, 315D:CC, 411A:CC, M411A:CC
Federal Lands: NPS (Cumberland Island?, Jean Lafitte, Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.182, NATR.187, NATR.509.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: Areces-Mallea et al. 1999, Aulbach-Smith pers. comm., Borhidi 1991, Ciferri 1936, Dansereau 1966, FNA Editorial Committee 2002a, Hillestad et al. 1975, NatureServe n.d., Nordman et al. 2011, Samek and Moncada 1971, Southeastern Ecology Working Group n.d.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Floating Primrose-willow Aquatic Marsh

***Ludwigia peploides* Aquatic Vegetation**
Floating Primrose-willow Aquatic Vegetation
Identifier: CEGL007835

USNVC CLASSIFICATION

Division	North American Freshwater Aquatic Vegetation (5.B.2.Na)
Macrogroup	North American Temperate Ruderal Aquatic Vegetation (M401)
Group	Eastern North American Ruderal Aquatic Vegetation (G595)
Alliance	Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation (A4219)
Association	Floating Primrose-willow Aquatic Marsh

ELEMENT CONCEPT

Global Summary: These floating or stranded mats of *Ludwigia peploides* (including *ssp. glabrescens* and/or *ssp. peploides*) occur in shallow water of flats in slow-moving streams, shallow lakes, natural and artificial impoundments. Some common associates include *Ammannia* spp., *Callitriche* spp., *Hydrolea quadrivalvis, Lycopus* spp., *Proserpinaca* spp., *Veronica* spp., and other mat-forming obligate wetland species. Oklahoma associates include *Cephalanthus occidentalis, Hibiscus laevis, Nelumbo lutea, Polygonum hydropiperoides*, and *Sagittaria latifolia*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This aquatic vegetation was sampled once in the park. The site is a semipermanently flooded depression with very poorly drained muck soil. The unvegetated surface is entirely standing water. Evidence of disturbance includes changes to the hydrology and the presence of exotic plants.
Global Environment: This vegetation occurs in shallow water of flats in slow-moving streams, shallow lakes, natural and artificial impoundments.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The herbaceous layer (70% cover) is dominated by *Sagittaria latifolia* along with lesser amounts of *Ludwigia peploides* (exotic) and *Ceratophyllum demersum*.
Global Vegetation: This association is primarily dominated by *Ludwigia peploides* (including *ssp. glabrescens* and/or *ssp. peploides*). Some common associates include *Ammannia* spp., *Callitriche* spp., *Hydrolea quadrivalvis, Lycopus* spp., *Proserpinaca* spp., *Veronica* spp., and other mat-forming, obligate wetland species. Oklahoma associates include *Cephalanthus occidentalis, Hibiscus laevis, Nelumbo lutea, Polygonum hydropiperoides*, and *Sagittaria latifolia* (Hoagland 2000).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Sagittaria latifolia*
Floating aquatic	Aquatic herb	*Ludwigia peploides*

Global

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb	*Ludwigia peploides* ssp. *glabrescens*, *Ludwigia peploides* ssp. *peploides*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Sagittaria latifolia*
Global: *Ludwigia peploides* ssp. *glabrescens*, *Ludwigia peploides* ssp. *peploides*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Invasive/Exotic Plants: *Ludwigia peploides* ()
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (14-Dec-1998).

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The sampled site is located in Alabama on the north side of the parkway at the bottom of road embankment just west of Maid Road Bridge and northeast of the Maid Road turnoff.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global Range: This vegetation would be expected to occur in the Coastal Plain and adjacent interior provinces from possibly Georgia south and west to Texas, in the Upper Coastal Plain at least to Kentucky, in the Central Basin of Tennessee, and west to eastern and central Oklahoma. The nominal species is recorded from some states to the north to this projected range, but its occurrence there may be sporadic or of limited extent. It is found in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas, and possibly Arkansas (?).
Nations: US
States/Provinces: AL, AR, FL, GA, KY, LA, MS, OK, TN, TX, WV
TNC Ecoregions: 31:P, 32:C, 38:C, 39:C, 40:C, 41:P, 42:C, 43:P, 44:C, 52:P, 53:C, 56:C, 57:C
USFS Ecoregions (1994/95): 222C:CP, 222E:CC, 231A:PP, 231B:PP, 231E:PP, 232B:CC, 232C:CC, 232D:CC, 232E:CP, 232F:CP, 234An:CCC, 255A:CC
Federal Lands: NPS (Natchez Trace, Stones River); USFS (Delta, Oconee?); USFWS (Reelfoot)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.147.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Blair 1938, Hoagland 2000, Nordman 2004a, Nordman et al. 2011, Penfound 1953, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Weakley 2002

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

6. OPEN ROCK VEGETATION

6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation

6.B.1.Na. Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation

M111. Eastern North American Cliff & Rock Vegetation

G840. Appalachian Cliff & Rock Vegetation

Appalachian Wet Limestone Cliff
***Cystopteris bulbifera - (Asplenium rhizophyllum)* Cliff Sparse Vegetation**
Bulblet Bladderfern - (Walking Fern) Cliff Sparse Vegetation
Identifier: CEGL004394

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation (6.B.1.Na)
Macrogroup	Eastern North American Cliff & Rock Vegetation (M111)
Group	Appalachian Cliff & Rock Vegetation (G840)
Alliance	Central Appalachian Circumneutral Fern Cliff (A2076)
Association	Appalachian Wet Limestone Cliff

ELEMENT CONCEPT

Global Summary: This broadly defined type represents sparse vegetation on calcareous rocks and cliff exposures ranging from Kentucky to Virginia and south to Georgia. Examples have substantial cover of bare rock and bryophytes, along with scattered vascular plants. Dominant species may be *Cystopteris bulbifera* and *Asplenium rhizophyllum*. An example from the Chattahoochee National Forest contains *Heuchera villosa, Adiantum pedatum, Asplenium rhizophyllum, Carex platyphylla, Cystopteris protrusa, Hepatica nobilis var. acuta, Laportea canadensis*, and *Solidago flexicaulis*. Additional species at a similar site in Great Smoky Mountains National Park included *Sedum ternatum, Physocarpus opulifolius, Pellaea atropurpurea*, and *Packera obovata*. Additional types may be developed as more information becomes available.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This sparse vegetation association was sampled only once in the park. The site is a west-facing, vertical cliff near the base of a steep slope overlooking a small tributary of the Swan River. The soil is wet to moist silt, whereas the unvegetated surface is dominated by exposed bedrock and bare soil. Some exotic species are present.
Global Environment: This vegetation is found on calcareous cliffs in the Southern Blue Ridge and adjacent ecoregions, from Kentucky to Virginia and south to Georgia.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse (30% cover) short-shrub and herbaceous layers are dominated by *Hydrangea cinerea* and the invasive *Microstegium vimineum*, with a lesser abundance of *Impatiens capensis, Cystopteris bulbifera, Asplenium rhizophyllum, Pilea pumila, Symphyotrichum lateriflorum*, and *Toxicodendron radicans*. The nonvascular layer is represented by roughly 10% cover. In addition, the community supports the Tennessee state-rare *Stellaria fontinalis*.
Global Vegetation: Vegetation assigned here from Chattahoochee National Forest (NatureServe Ecology unpubl. data) contains substantial cover by bare rock and bryophytes, along with scattered vascular plants, including *Heuchera villosa, Adiantum pedatum, Asplenium rhizophyllum, Carex platyphylla, Cystopteris protrusa, Hepatica nobilis var. acuta, Laportea canadensis*, and *Solidago flexicaulis*. Another example from Great Smoky Mountains National Park contains *Sedum ternatum, Physocarpus opulifolius, Pellaea atropurpurea*, and *Packera obovata*. Additional types may be developed as more information becomes available.

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Hydrangea cinerea*
Herb (field)	Liana	*Toxicodendron radicans*
Herb (field)	Flowering forb	*Impatiens capensis*
Herb (field)	Graminoid	*Microstegium vimineum*
Herb (field)	Fern (Spore-bearing forb)	*Cystopteris bulbifera*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Ulmus rubra*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Hydrangea arborescens*, *Physocarpus opulifolius*
Herb (field)	Flowering forb	*Heuchera villosa*
Herb (field)	Succulent forb	*Sedum ternatum*
Herb (field)	Fern (Spore-bearing forb)	*Cystopteris bulbifera*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Asplenium rhizophyllum*, *Cystopteris bulbifera*, *Heuchera villosa*, *Hydrangea cinerea*, *Stellaria fontinalis*
Global: *Cystopteris bulbifera*, *Physocarpus opulifolius*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: **Vulnerable Plants**: *Stellaria fontinalis* (G3, TN state-rare); **Invasive/Exotic Plants**: *Microstegium vimineum* (High/Medium)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (8-Jan-2007).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Global Comments: This broadly defined type is being geographically subdivided into an eastern type and an Ozarkian placeholder, which is being split off. In Missouri, and perhaps elsewhere in the Interior Highlands region of the Midwest, this vegetation is synonymous with Limestone - Dolostone Midwest Moist Cliff Vegetation (CEGL002292)]; so it is not tracked there. Further Midwest/Southeast review is needed. Vegetation has been assigned here from Chattahoochee National Forest (Chattooga Ranger District, 231Ab33). In Virginia this vegetation is embedded in forested habitat and occurrences may be too small to target as a distinct association.
Global Similar Associations:
- Limestone - Dolostone Midwest Moist Cliff Vegetation (CEGL002292)

ELEMENT DISTRIBUTION

Global Range: This generally defined alkaline cliff type is found in the southeastern United States, from Kentucky to Virginia and south to Georgia. It is not known from North Carolina.
Nations: US
States/Provinces: GA, KY, TN, VA?, WV?
TNC Ecoregions: 44:C, 50:C, 51:C, 52:C
USFS Ecoregions (1994/95): 221:C, 222Eg:CCC, 231Ab:CCC, M221Dd:CCC
Federal Lands: NPS (Great Smoky Mountains, Natchez Trace); USFS (Chattahoochee, Chattahoochee (Piedmont), Chattahoochee (Southern Blue Ridge))

ELEMENT SOURCES

Local Description Authors: A. Schotz
Global Description Authors: A.S. Weakley
References: Allard 1990, NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Cumberland Plateau Rockhouse

***Heuchera parviflora var. parviflora - Trichomanes boschianum - Thalictrum mirabile - (Ageratina luciae-brauniae, Solidago albopilosa)* Cliff Vegetation**

Little-flower Alumroot - Appalachian Bristle Fern - Little Mountain Meadowrue - (Lucy Braun's Snakeroot, Rockhouse Goldenrod) Cliff Vegetation

Identifier: CEGL004301

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation (6.B.1.Na)
Macrogroup	Eastern North American Cliff & Rock Vegetation (M111)
Group	Appalachian Cliff & Rock Vegetation (G840)
Alliance	Appalachian Seepage Cliff (A3915)
Association	Cumberland Plateau Rockhouse

ELEMENT CONCEPT

Global Summary: This association includes sparse to moderately dense vegetation of heavily shaded sandstone overhangs and ledges in portions of the Cumberland Plateau. These areas include rockhouses, where seasonal waterfalls and strongly overhanging erosion features provide moist conditions, and also include other large rock overhangs of sufficient size to create similar microclimates. Vegetation is variable in composition and cover, but generally includes mats of nonvascular plants (mosses, liverworts, and fern gametophytes) requiring high and nearly constant humidity, specialized herbs, such as *Heuchera parviflora var. parviflora, Vittaria appalachiana, Thalictrum mirabile, Ageratina luciae-brauniae, Solidago albopilosa*, and scattered woody vines and shrubs, such as *Toxicodendron radicans, Parthenocissus quinquefolia*, and *Decumaria barbara*. *Heuchera parviflora var. parviflora* is the most constant indicator. Some noteworthy mosses in these habitats include *Syrrhopodon texanus* and *Diphyscium cumberlandianum*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This rockhouse nonvascular community was sampled twice in the park. The sites are cave openings that remain damp and shaded. The unvegetated surface is dominated by exposed bedrock and bare soil. No evidence of disturbance was reported.

Global Environment: Sparse to moderately dense vegetation of sandstone rockhouses in portions of the Cumberland Plateau, where seasonal waterfalls and strongly overhanging erosion features called rockhouses provide moist conditions.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: The sparse (20-30% cover) herbaceous layer is dominated by *Trichomanes boschianum* and *Vittaria appalachiana*. The more prominent nonvascular layer is dominated by mosses *Anomodon rostratus, Atrichum* sp., *Fissidens ravenelii, Syrrhopodon texanus*, liverworts *Dumortiera hirsuta* and *Pellia appalachiana*, and lichen *Flakea papillata*. In addition, the community supports Mississippi state-rare *Trichomanes boschianum*.

Global Vegetation: Vegetation is variable in composition and cover, but generally includes mats of nonvascular plants (mosses, liverworts, and fern gametophytes) requiring high and nearly constant humidity, specialized herbs, such as *Heuchera parviflora var. parviflora, Vittaria appalachiana, Thalictrum mirabile* (generally rooted on the rockhouse floor), *Ageratina luciae-brauniae, Solidago albopilosa*, and scattered woody vines and shrubs, such as *Toxicodendron radicans, Parthenocissus quinquefolia*, and *Decumaria barbara*. *Heuchera parviflora var. parviflora* is the most constant indicator. Endemics, such as *Ageratina luciae-brauniae* and *Solidago albopilosa*, are associated with the floors of the rockhouses in portions of the association's distribution, and often dominate the vegetative cover. The endemics *Minuartia cumberlandensis* and *Silene rotundifolia* sometimes occupy the floor but are more characteristic of somewhat drier sandstone exposures. *Thalictrum mirabile* is also endemic to this community but is more characteristic of seepages on the rockhouse walls. Scattered shrubs and tree seedlings often root in crevices, and include *Kalmia latifolia, Hydrangea quercifolia, Hydrangea arborescens, Clethra acuminata, Acer rubrum, Hamamelis virginiana*, and *Ilex opaca var. opaca*. Woody vines are often conspicuous, rooted either in crevices, in developed soil mats, or outside the rockhouse proper, and characteristically include *Parthenocissus quinquefolia, Toxicodendron radicans*, and (in southern portions of the association's distribution) *Decumaria barbara*. Other herbs are recruited from adjacent areas, but often include *Arisaema triphyllum, Eurybia divaricata (= Aster divaricatus), Athyrium filix-femina ssp. asplenioides, Medeola virginiana, Mitchella repens, Osmunda cinnamomea, Osmunda regalis var. spectabilis, Polystichum acrostichoides, Selaginella apoda, Tiarella cordifolia, Viola blanda*, and *Viola x primulifolia*. Composition tends to be very variable from rockhouse to rockhouse, depending on the mixture of microhabitats there, the geographic location of the rockhouse, and accidents of colonization and persistence. Some noteworthy mosses in these habitats include *Syrrhopodon texanus* and *Diphyscium cumberlandianum* (D. Taylor pers. comm.).

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Herb (field)	Liana	*Vittaria appalachiana*
Herb (field)	Flowering forb	*Trichomanes boschianum*

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Global

Stratum	Lifeform	Species
Herb (field)	Flowering forb	*Heuchera parviflora* var. *parviflora*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Trichomanes boschianum*, *Vittaria appalachiana*

OTHER NOTEWORTHY SPECIES

Natchez Trace Parkway: Vulnerable Plants: *Trichomanes boschianum* (G4, MS state-rare)
Global: Vulnerable Plants: *Ageratina luciae-brauniae* (G3), *Cheilolejeunea evansii* (G1G2), *Hymenophyllum tayloriae* (G2), *Minuartia cumberlandensis* (G3), *Radula sullivantii* (G3), *Solidago albopilosa* (G2), *Tetrodontium brownianum* (G3G4); **Other Plants**: *Huperzia porophila* (G4), *Silene rotundifolia* (G4), *Thalictrum mirabile* (G4?Q), *Trichomanes boschianum* (G4), *Trichomanes intricatum* (G4G5), *Vittaria appalachiana* (G4)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2 (10-Jun-2000). This community is naturally rare and geographically restricted to portions of the Cumberland Plateau of eastern Kentucky, eastern Tennessee, and northern Alabama, where it is associated with seasonal waterfalls and strongly overhanging erosion features called rockhouses. There are many hundreds of rockhouses across the range of this association, and many are on federal lands, but occurrences represent little acreage, and most occurrences are threatened by trampling and degradation caused by heavy recreational use and by looting of associated archeological resources. Related vegetation in the Upper East Gulf Coastal Plain (e.g., Natchez Trace Parkway, Tishomingo County, Mississippi) may represent an undescribed association.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Global Comments: Other rockhouse vegetation, not covered in this concept, occurs in western Kentucky associated with Pennsylvanian sandstone. *Dodecatheon frenchii* is indicative of this western Kentucky association. Sandstone rockhouses in the Bankhead National Forest are provisionally placed here. This association differs from *Vittaria appalachiana - Heuchera parviflora var. parviflora - Houstonia serpyllifolia / Plagiochila* spp. Cliff Vegetation (CEGL004302) in having Cumberland Plateau endemics (*Thalictrum mirabile, Solidago albopilosa, Ageratina luciae-brauniae, Minuartia cumberlandensis, Silene rotundifolia*), in lacking some associates of Blue Ridge spray cliffs, and by occurring in sandstone rockhouses with usually seasonal waterfalls or seepage (as opposed to metamorphic rock cliffs with usually permanent waterfall spray).
Global Similar Associations:
- *Asplenium montanum - Heuchera parviflora var. parviflora - Silene rotundifolia* Cliff Sparse Vegetation (CEGL004392) a drier type.
- *Vittaria appalachiana - Heuchera parviflora var. parviflora - Houstonia serpyllifolia / Plagiochila* spp. Cliff Vegetation (CEGL004302)

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The two sampled sites are in Tishomingo County, Mississippi.
Global Range: This association is distributed through the Cumberland Plateau from Kentucky south through Tennessee to northern Alabama. Possible occurrences in Mississippi (e.g., Tishomingo County, on the Natchez Trace Parkway) may represent an undescribed association.
Nations: US
States/Provinces: AL, KY, MS, TN
TNC Ecoregions: 43:C, 50:C
USFS Ecoregions (1994/95): 221Hc:CCC, 221He:CCC, 222Eo:CCC, 231Be:CCC, 231Cc:CCC, 231Cd:CCC
Federal Lands: NPS (Big South Fork, Little River Canyon, Natchez Trace, Obed River, Russell Cave); USFS (Bankhead, Daniel Boone)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.137, NATR.138.
Local Description Authors: M.J. Russo
Global Description Authors: A.S. Weakley
References: Evans 1991, Evans et al. 2009, Farrar 1998, NatureServe Ecology - Southeastern U.S. unpubl. data, Nordman et al. 2011, Peet et al. unpubl. data, Schmalzer and DeSelm 1982, Schotz et al. 2006, Schotz et al. 2008, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1985, Walck et al. 1996

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

G841. Central Midwest-Interior Cliff & Rock Vegetation

Highland Rim Limestone Cliff/Talus Seep

***Hydrangea arborescens / Impatiens (capensis, pallida) - Heuchera villosa* Cliff Shrubland**
Wild Hydrangea / (Jewelweed, Pale Touch-me-not) - Hairy Alumroot Cliff Shrubland
Identifier: CEGL004708

USNVC CLASSIFICATION

Division	Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation (6.B.1.Na)
Macrogroup	Eastern North American Cliff & Rock Vegetation (M111)
Group	Central Midwest-Interior Cliff & Rock Vegetation (G841)
Alliance	Ozarkian Circumneutral Seepage Cliff (A2073)
Association	Highland Rim Limestone Cliff/Talus Seep

ELEMENT CONCEPT

Global Summary: This association includes forb-dominated seepage vegetation from low to moderate elevations (about 305-400 m [1000-1300 feet]) in the Interior Low Plateau, Highland Rim Section. Examples are found on saturated, sloping to concave to near-vertical exposures of gray calcareous mudstones and/or siltstones of the Fort Payne Formation, as well as on other calcareous substrates, and on the walls of sinkholes which develop in the St. Louis Limestone at Mammoth Cave National Park, Kentucky. These exposures vary greatly in size, from about 10 to perhaps 50 square meters. The seeps occur where blocky limestones with vertical fissures and joints overlie more flatly bedded strata. Herbs observed include *Impatiens capensis, Impatiens pallida, Heuchera villosa, Saxifraga virginiensis, Dodecatheon meadia, Cardamine diphylla, Polymnia canadensis*, and *Thaspium pinnatifidum* (*sensu lato*). They are primarily herbaceous systems but may be ringed by shrubs. *Hydrangea arborescens* is invariably present and often dominant in this marginal shrub zone; other shrubs present include *Staphylea trifolia* and *Hypericum prolificum*. Sheltered areas under rock overhangs or boulders may harbor thallose liverworts and various mosses, including *Mnium* sp. This distinctive vegetation is maintained by seepage from the siltstones; this seepage and the steep irregular topography do not allow trees to take hold and dominate the community. In a sparsely vegetated variant on near-vertical, gently concave exposures of gray siltstone talus of the Fort Payne, *Polymnia canadensis* and *Heuchera villosa* dominate; also present in this variant are *Pellaea atropurpurea, Monarda fistulosa*, and *Packera obovata (= Senecio obovatus)*.

ENVIRONMENTAL DESCRIPTION

Natchez Trace Parkway Environment: This hydrangea / alumroot sparse shrubland was sampled once in the park. The site is an east-facing, vertical to nearly vertical limestone ledge overlooking a small tributary of Buffalo River. The soil is well-drained silt and the unvegetated surface is nearly entirely exposed bedrock. No evidence of disturbance was reported.
Global Environment: This association includes forb-dominated seepage vegetation from low to moderate elevations (about 300-400 m [1000-1300 feet]) in the Interior Low Plateau, Highland Rim Section. Examples are found on saturated, sloping to concave to near-vertical exposures of gray calcareous mudstones and/or siltstones of the Fort Payne Formation, as well as on other calcareous substrates, as in sinkholes which develop in the St. Louis Limestone at Mammoth Cave National Park, Kentucky. These exposures vary greatly in size, from about 10 to perhaps 50 square meters.

VEGETATION DESCRIPTION

Natchez Trace Parkway Vegetation: *Hydrangea arborescens* forms a sparse (5% cover) shrub layer while *Heuchera villosa* dominates the sparse (30%) herbaceous layer; other species include *Aquilegia canadensis, Asplenium rhizophyllum, Cypripedium parviflorum var. pubescens, Cystopteris bulbifera, Hepatica nobilis var. acuta, Pachysandra procumbens, Saxifraga virginiensis*, and *Sedum ternatum*. Nonvascular species provide an additional 30% cover on the exposed bedrock.
Global Vegetation: Stands are characterized by moderate cover of *Hydrangea arborescens* over scattered and variable herbs, ferns, and nonvascular plants. Herbs observed include *Impatiens capensis, Impatiens pallida, Heuchera villosa, Saxifraga virginiensis, Dodecatheon meadia, Cardamine diphylla, Polymnia canadensis*, and *Thaspium pinnatifidum* (*sensu lato*). Other *Heuchera* spp. may be present. Some examples are primarily herbaceous, but may be ringed by shrubs. *Hydrangea arborescens* is invariably present and often dominant in this marginal shrub zone; other shrubs present include *Staphylea trifolia* and *Hypericum prolificum*. Sheltered areas under rock overhangs or boulders may harbor thallose liverworts and various mosses, including *Mnium* sp. In a sparsely vegetated variant on near-vertical, gently concave exposures of gray siltstone talus of the Fort Payne, *Polymnia canadensis* and *Heuchera villosa* dominate; also present in this variant are *Pellaea atropurpurea, Monarda fistulosa*, and *Packera obovata (= Senecio obovatus)*.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

MOST ABUNDANT SPECIES

Natchez Trace Parkway

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Hydrangea arborescens*
Herb (field)	Flowering forb	*Heuchera villosa*

Global

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hydrangea arborescens*
Herb (field)	Flowering forb	*Heuchera villosa*, *Impatiens capensis*, *Impatiens pallida*

CHARACTERISTIC SPECIES

Natchez Trace Parkway: *Heuchera villosa*, *Hydrangea arborescens*
Global: *Heuchera villosa*, *Hydrangea arborescens*, *Impatiens capensis*, *Impatiens pallida*

OTHER NOTEWORTHY SPECIES

Global: Vulnerable Plants: *Thaspium pinnatifidum* (G2G3)
Natchez Trace Parkway Threats Comments:
Global Threats Comments:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (31-Jan-2007). This community is restricted to the southern Interior Low Plateau. It is well-distributed in the Eastern and Western Highland Rim of Tennessee, extending north at least into south-central Kentucky (at Mammoth Cave National Park), and may range as far south and west as Alabama and northeastern Mississippi. There are probably at least 50 EOs of this community, although not many are documented. Most sites would be expected to be small ones, less than an acre in extent. An outstanding example would need to be well-situated in a matrix of hardwood forest, and well-buffered from disturbances or hydrologic alterations. This association is threatened by the effects of upslope timber removal and from alterations to the groundwater hydrology. This type would generally not have decreased in extent, although some examples may be less well-buffered or protected from disturbance than in the past.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Global Comments: These habitats are commonly utilized by a variety of salamanders. The *Heuchera villosa* present in this community has often been treated as *Heuchera villosa var. macrorhiza*, now recognized by Kartesz (1999) as *Heuchera villosa var. villosa*. Vegetation related to this ("Calcareous Seep") is reported from Mississippi; its precise composition needs to be verified.

ELEMENT DISTRIBUTION

Natchez Trace Parkway Range: The one sampled site is in Tennessee in the vicinity of M395.
Global Range: This association is well-distributed in the Eastern and Western Highland Rim of Tennessee, extending north at least into south-central Kentucky (at Mammoth Cave National Park), and may range as far south and west as Alabama and northeastern Mississippi.
Nations: US
States/Provinces: AL?, KY, MS?, TN
TNC Ecoregions: 43:P, 44:C
USFS Ecoregions (1994/95): 221Hc:CCC, 222Dg:CCC, 222Ea:CCC, 222Eb:CCC, 222Ee:CC?, 222Ef:CC?, 222Eg:CCC, 222Eh:CCC, 222Eo:CCC, 231Be:PPP
Federal Lands: NPS (Abe Lincoln Birthplace, Mammoth Cave, Natchez Trace)

ELEMENT SOURCES

Natchez Trace Parkway Plots and Observation Points: NATR.205.
Local Description Authors: M.J. Russo
Global Description Authors: M. Pyne
References: Nordman et al. 2011, Pyne 1997, Pyne et al. 2010, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Wieland 1994b, Wieland 2000b

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Bibliography for Natchez Trace Parkway

ALNHP [Alabama Natural Heritage Program]. 2002. Eufaula National Wildlife Refuge: Natural community and rare plant survey. Alabama Natural Heritage Program, The Nature Conservancy, Montgomery.

ALNHP [Alabama Natural Heritage Program]. No date. Unpublished data on file. Alabama Natural Heritage Program, Auburn University.

Allard, D. J. 1990. Southeastern United States ecological community classification. Interim report, Version 1.2. The Nature Conservancy, Southeast Regional Office, Chapel Hill, NC. 96 pp.

Ambrose, J. 1990a. Georgia's natural communities--A preliminary list. Unpublished document. Georgia Natural Heritage Inventory. 5 pp.

Ambrose, Jon. Personal communication. Georgia Natural Heritage Program, Wildlife Resources Division, Georgia Department of Natural Resources, Social Circle.

Anderson, D. M. 1982. Plant communities of Ohio: A preliminary classification and description. Division of Natural Areas and Preserves, Ohio Department of Natural Resources, Columbus, OH. 182 pp.

Anderson, D. M. 1996. The vegetation of Ohio: Two centuries of change. Draft. Ohio Biological Survey.

Andreu, M. G., and M. L. Tukman. 1995. Forest communities of the Tellico Lake Area, East Tennessee. M.F. project report, Duke University, School of the Environment. Durham, NC. 66 pp. plus appendices.

Applequist, M. B. 1959. A study of soil and site factors affecting the growth and development of swamp blackgum and tupelo gum stands in southeastern Georgia. D.F. dissertation, Duke University, Durham, NC. 180 pp.

Areces-Mallea, A. E., A. S. Weakley, X. Li, R. G. Sayre, J. D. Parrish, C. V. Tipton, and T. Boucher. 1999. A guide to Caribbean vegetation types: Preliminary classification system and descriptions. The Nature Conservancy, Arlington, VA. 166 pp.

Aulbach-Smith, C. Personal communication. Botanical Services of SC.

Baalman, R. J. 1965. Vegetation of the Salt Plains National Wildlife Refuge, Jet, Oklahoma. Unpublished Ph.D. dissertation, University of Oklahoma, Norman.

Badger, K. S., J. Taylor, B. Jones, and M. Shell. 1997. Mammoth Cave National Park forest vegetation study. Cooperative Agreement No. CA-5530-3-9001, Subagreement No. CA-5530-3-9003. Ball State University, Muncie, IN.

Barden, L. S. 1997. Historic prairies in the Piedmont of North and South Carolina, USA. Natural Areas Journal 17 (2):149-152.

Barnes, B. V. 1991. Deciduous forests of North America. Pages 219-344 in: E. Röhrig and B. Ulrich, editors. Ecosystems of the World 7: Temperate deciduous forests. Elsevier Scientific Publishing Company, New York.

Bartgis, R. 1986. Natural community descriptions. Unpublished draft. Maryland Natural Heritage Program, Maryland Department of Natural Resources, Annapolis.

Beckett, S., and M. S. Golden. 1982. Forest vegetation and vascular flora of Reed Brake Research Natural Area, Alabama. Castanea 48:368-392.

Behler, J. L. 1988. Familiar reptiles and amphibians. Alfred A. Knopf, New York. 191 pp.

Benyus, J. M. 1989. The field guide to wildlife habitats of the eastern United States. A Fireside Book. Simon and Schuster, Inc. 336 pp.

Blair, W. F. 1938. Ecological relationships of the mammals of the Bird Creek region, northeastern Oklahoma. The American Midland Naturalist 20:473-526.

Blair, W. F., and T. H. Hubbell. 1938. The biotic districts of Oklahoma. The American Midland Naturalist 20:425-454.

Borhidi, A. 1991. Phytogeography and vegetation ecology of Cuba. Akademiai Kiado. Budapest, Hungary. 858 pp. plus color plates and map by A. Borhidi and O. Muniz (1970) inside of back cover.

Bowen, B., M. Pyne, and D. Withers. 1995. An ecological survey of selected tracts in the Tennessee River Gorge: A report to the Tennessee River Gorge Trust. Tennessee Natural Heritage Program, Department of Environment and Conservation, Nashville. 100 pp.

Bransby, D. L. No date. Herbaceous biomass sources for the southeastern United States: Have all the options been properly evaluated? Department of Agronomy and Soils, Auburn University. [Abstract]

Braun, E. L. 1950. Deciduous forests of eastern North America. Hafner Press, New York. 596 pp.

Breden, T. F. 1989. A preliminary natural community classification for New Jersey. Pages 157-191 in: E. F. Karlin, editor. New Jersey's rare and endangered plants and animals. Institute for Environmental Studies, Ramapo College, Mahwah, NJ. 280 pp.

Breden, T. F., Y. R. Alger, K. S. Walz, and A. G. Windisch. 2001. Classification of vegetation communities of New Jersey: Second iteration. Association for Biodiversity Information and New Jersey Natural Heritage Program, Office of Natural Lands Management, Division of Parks and Forestry, New Jersey Department of Environmental Protection, Trenton.

Brewer, J. S. 2001. Current and presettlement tree species composition of some upland forests in northern Mississippi. Journal of the Torrey Botanical Society 128(4):332-349.

Bruner, W. E. 1931. The vegetation of Oklahoma. Ecological Monographs 1:99-188.

Bryant, W. S., W. C. McComb, and J. S. Fralish. 1993. Oak-hickory forests (western mesophytic/oak-hickory forests). Pages 143-201 in: W. H. Martin, S. G. Boyce, and A. C. Echternacht, editors. Biodiversity of the southeastern United States. John Wiley and Sons, Inc., New York.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Bryant, W. S., and M. E. Held. 2001. An ordination of the plant communities of the Jackson Purchase Region of Kentucky. Pages 11-18 in: Contributed Papers: Session I: Botany. Austin Peay State University, Clarksville, TN. [http://www.apsu.edu/field_biology/center/sym2001/botany.htm]

Bryant, W. S., and W. H. Martin. 1988. Vegetation of the Jackson Purchase of Kentucky based on the 1820 general land office survey. Pages 264-276 in: D. H. Snyder, editor. Proceedings of the first annual symposium on the natural history of lower Tennessee and Cumberland river valleys. Austin Peay State University, Clarksville, TN. 328 pp.

Bull, J., and J. Farrand, Jr. 1977. The Audubon Society field guide to North American birds: Eastern region. Alfred A. Knopf, New York. 784 pp.

Burdant, C. L., Jr., E. S. Nixon, and R. L. Willett. 1977. Woody vegetation of an inland heronry in East Texas. Southwestern Naturalist 21:475-486.

Burk, J. H. 1977. Sonoran Desert vegetation. Pages 869-889 in: M. G. Barbour and J. Major, editors. Terrestrial vegetation of California. John Wiley and Sons, New York.

Burns, R. M., and B. H. Honkala, technical coordinators. 1990a. Silvics of North America: Volume 1. Conifers. Agriculture Handbook 654. USDA Forest Service, Washington, DC. 675 pp.

Burns, R. M., and B. H. Honkala, technical coordinators. 1990b. Silvics of North America. Volume 2: Hardwoods. Agriculture Handbook 654. USDA Forest Service, Washington, DC. 877 pp.

CAP [Central Appalachian Forest Working Group]. 1998. Central Appalachian Working group discussions. The Nature Conservancy, Boston, MA.

CDPNQ [Centre de données sur le patrimoine naturel du Québec]. No date. Unpublished data. Centre de données sur le patrimoine naturel du Québec, Québec.

Campbell, J. 2001. Native vegetation types of Appalachian Kentucky. Unpublished report. The Nature Conservancy, Lexington, KY. 210 pp.

Campbell, J. J. N. 1980. Present and presettlement forest conditions in the Inner Bluegrass region of Kentucky. Ph.D. dissertation, University of Kentucky, Lexington. 109 pp. [Excerpts only]

Campbell, J. J. N. 1988. Natural vegetation types. Pages 153-171 in: B. Palmer-Ball, Jr., J. N. N. Campbell, M. E. Medley, D. T. Towles, J. R. MacGregor, and R. R. Cicerello. Cooperative inventory of endangered, threatened, sensitive and rare species, Daniel Boone National Forest, Somerset Ranger District. USDA Forest Service, Winchester, KY.

Campbell, J. J. N. 1989a. Natural vegetation types. Pages 185-200 in: J. J. N. Campbell, D. T. Towles, J. R. MacGregor, R. R. Cicerello, B. Palmer-Ball, Jr., M. E. Medley, and S. Olson. Cooperative inventory of endangered, sensitive, and rare species, Daniel Boone National Forest, Stanton Ranger District. USDA Forest Service, Winchester, KY.

Campbell, J. J. N. 1989b. Historical evidence of presettlement forest composition in the Inner Bluegrass of Kentucky. Pages 231-246 in: G. Rink and C. A. Budelsky, editors. Proceedings of the Seventh Central Hardwood Forest Conference, Southern Illinois University, Carbondale.

Campbell, Julian J. N. Personal communication. Kentucky Field Office, The Nature Conservancy.

Chapman, K. A., D. A. Albert, and G. A. Reese. 1989. Draft descriptions of Michigan's natural community types. Michigan Department of Natural Resources, Lansing, MI. 35 pp.

Chastain, R. A., M.A. Struckhoff, K. W. Grabner, E. D. Stroh, H. He, D. R. Larsen, T. A. Nigh, and J. Drake. 2006. Mapping vegetation communities in Ozark National Scenic Riverways: Final technical report to the National Park Service. Open-File Report 2006-1354. U.S. Geological Survey, Reston, VA. 90 pp. plus appendices.

Christensen, N. L. 1988. Vegetation of the southeastern Coastal Plain. Pages 317-363 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Cambridge University Press, New York.

Christensen, N. L. 2000. Vegetation of the Southeastern Coastal Plain. Pages 398-448 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

Ciferri, R. 1936. Studio geobotanico dell'Isola Hispaniola (Antille), R. Universita di Pavia. Atti Ist. Bot. Univ. Pavia 8:3-336.

Clancy, K. 1996. Natural communities of Delaware. Unpublished review draft. Delaware Natural Heritage Program, Division of Fish and Wildlife, Delaware Division of Natural Resources and Environmental Control, Smyrna, DE. 52 pp.

Clark, B. F., and J. G. Hutchinson, editors. 1994. Central hardwood notes. USDA Forest Service: Northeastern Area State and Private Forestry, Northeastern Forest Experiment Station, Southern Forest Experiment Station.

Clark, G. T. 1974. A preliminary ecological study of Crowley's Ridge. Pages 213-241 in: Arkansas Department of Planning. Arkansas natural area plan. Arkansas Department of Planning. Little Rock. 248 pp.

Clark, J. R., and J. Benforado. 1981. Introduction. Pages 1-9 in: J. R. Clark and J. Benforado, editors. Wetlands of bottomland hardwood forests. Elsevier Scientific Publications, New York.

Cleland, D. T., J. A. Freeouf, J. E. Keys, Jr., G. J. Nowacki, C. Carpenter, and W. H. McNab. 2007. Ecological subregions: Sections and subsections for the conterminous United States. A. M. Sloan, cartographer. General Technical Report WO-76. USDA Forest Service, Washington, DC. [1:3,500,000] [CD-ROM].

Clewell, A. F. 2013. Prior prevalence of shortleaf pine-oak-hickory woodlands in the Tallahassee Red Hills. Castanea 78(4):266-276.

Collingwood, G. H., and W. D. Brush. 1984. Knowing your trees. The American Forestry Association, Washington, DC. 391 pp.

Collins, B. R., and K. H. Anderson. 1994. Plant communities of New Jersey. Rutgers University Press, New Brunswick, NJ. 287 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Conard, H. S. 1935. The plant associations of central Long Island. The American Midland Naturalist 16:433-516.

Conner, W. H., J. G. Gosselink, and R. T. Parrondo. 1981. Comparison of the vegetation of three Louisiana swamp sites with different flooding regimes. American Journal of Botany 68:320-331.

Coulling, P. P. 2002. A preliminary classification of tidal marsh, shrub swamp, and hardwood swamp vegetation and assorted non-tidal, chiefly non-maritime, herbaceous wetland communities of the Virginia Coastal Plain. October 2002. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Natural Heritage Technical Report 02-18. 30 pp.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. USDI Fish & Wildlife Service, Office of Biological Services, Washington, DC. 103 pp.

Coxe, R. 2009. Guide to Delaware vegetation communities. Spring 2009 edition. State of Delaware, Division of Fish and Wildlife, Delaware Natural Heritage Program, Smyrna.

Craighead, F. C. 1949. Insect enemies of eastern forests. USDA Miscellaneous Publication No. 657, United States Printing Office, Washington, DC. 679 pp.

Crites, G. D., and E. E. C. Clebsch. 1986. Woody vegetation in the inner Nashville Basin: An example from the Cheek Bend area of the central Duck River valley. ASB Bulletin 33:167-177.

Curtis, J. T. 1959. The vegetation of Wisconsin: An ordination of plant communities. Reprinted in 1987. University of Wisconsin Press, Madison. 657 pp.

Damman, A. W. H., and B. Kershner. 1977. Floristic composition and topographical distribution of the forest communities of the gneiss areas of western Connecticut. Naturaliste Canadien 104:23-45.

Dansereau, P. 1966. Studies on the vegetation of Puerto Rico. Part I. Description and integration of the plant-communities. University of Puerto Rico, Institute of Caribbean Sciences. Special Publication No. 1. Mayagüez, Puerto Rico. 287 pp.

Davidson, U. M. 1950. The original vegetation of Lexington, Kentucky and vicinity. M.S. thesis, University of Kentucky, Lexington. 45 pp.

Davis, D. H. 1923. The geography of the Jackson Purchase. Kentucky Geologic Survey, Frankfort.

DeSelm, H. R. 1988. The barrens of the western Highland Rim of Tennessee. Pages 199-219 in: D. H. Snyder, editor. Proceedings of the first annual symposium on the natural history of the lower Tennessee and Cumberland river valleys. Austin Peay St. University, Center for Field Biology, Clarksville, TN.

DeSelm, H. R. 1989a. The barrens of Tennessee. Journal of the Tennessee Academy of Science 64:89-95.

DeSelm, H. R. 1989b. The barrens of West Tennessee. Pages 3-27 in: A. F. Scott, editor. Proceedings of the contributed paper session, second annual symposium on the natural history of Lower Tennessee and Cumberland River Valleys. Center for Field Biology of Land Between the Lakes, Austin Peay State University, Clarksville, TN.

DeSelm, H. R. 1990. Flora and vegetation of some barrens of the eastern Highland Rim of Tennessee. Castanea 55:187-206.

DeSelm, H. R., and N. Murdock. 1993. Grass-dominated communities. Pages 87-141 in: W. H. Martin, S. G. Boyce, and A. C. Echternacht, editors. Biodiversity of the southeastern United States: Upland terrestrial communities. John Wiley and Sons, New York.

Delcourt, H. R., and P. A. Delcourt. 1977. Presettlement magnolia-beech climax of the Gulf Coastal Plain: Quantitative evidence from the Apalachicola River bluffs, north-central Florida. Ecology 58:1085-1093.

Demaree, D. 1932. Submerging experiments with *Taxodium*. Ecology 13:258-262.

Dennis, J. V. 1988. The great cypress swamps. Louisiana State University Press. 142 pp.

Diamond, D. D. 1993. Classification of the plant communities of Texas (series level). Unpublished document. Texas Natural Heritage Program, Austin. 25 pp.

Dickson, J. G., and C. A. Segelquist. 1978. Winter bird populations in pine and pine-hardwood forest stands in east Texas. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 31:134-137.

Doyle, K. M., and D. J. Allard. 1990. Applying an ecosystem classification on national forest land in the southeastern United States: A pilot study. 108 pp. plus appendices.

Duck, L. G., and J. B. Fletcher. 1945. A survey of the game and furbearing animals of Oklahoma; chapter 2, The game types of Oklahoma. Oklahoma Game and Fish Commission, Division of Wildlife Restoration and Research, Oklahoma City.

Duever, L. C., and S. Brinson. 1984b. Florida natural communities. Florida Game and Freshwater Fish Commission, Nongame Wildlife Program, Natural Areas Inventory, Tallahassee. 8 pp.

Duffey, E., M. G. Morris, J. Sheail, L. K. Ward, D. A. Wells, and T. C. E. Wells. 1974. Grassland ecology and wildlife management. Chapman and Hall, London.

Duncan, W. H., and M. B. Duncan. 1988. Trees of the southeastern United States. The University of Georgia Press. 322 pp.

EPA [Environmental Protection Agency]. 2004. Level III and IV Ecoregions of EPA Region 4. U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division, Corvallis, OR. Scale 1:2,000,000.

Eastern Ecology Working Group of NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification. Terrestrial Vegetation. NatureServe, Boston, MA.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Echols, Lee. Personal communication. Conservation Biologist, North American Land Trust, Georgia Field Office, Athens, GA.
Edinger, G. J. 2003b. A calcareous red cedar barrens. The Eastern New York Chapter of The Nature Conservancy, New York Natural Heritage Program, Albany, NY.
Edinger, G. J., A. L. Feldmann, T. G. Howard, J. J. Schmid, E. Eastman, E. Largay, and L. A. Sneddon. 2008a. Vegetation classification and mapping at Gateway National Recreation Area. Technical Report NPS/NER/NRTR--2008/107. National Park Service, Philadelphia, PA. 283 pp.
Edinger, G. J., A. L. Feldmann, T. G. Howard, J. J. Schmid, F. C. Sechler, E. Eastman, E. Largay, and L. A. Sneddon. 2007. Vegetation classification and mapping of vegetation at Saratoga National Historical Park. Draft Technical Report NPS/NER/NRTR--XXXX/XXX. National Park Service, Northeast Region, Coastal Institute in Kingston, University of Rhode Island, Kingston, RI.
Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero, editors. 2002. Ecological communities of New York state. Second edition. A revised and expanded edition of Carol Reschke's ecological communities of New York state. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
Edwards, M. B. 1982. Kudzu--ecological friend or foe: *Pueraria lobata* in the southern United States. Proceedings of the Southern Weed Science Society 35:232-236.
Ehrenfeld, J. G. 1977. Vegetation of Morristown National Historical Park: Ecological analysis and management alternatives. Final Report. USDI National Park Service Contract No. 1600-7-0004. 166 pp.
Eichelberger, B. 2011a. Pennsylvania Natural Heritage Program. Spatterdock - Water-lily Emergent Wetland Factsheet. [http://www.naturalheritage.state.pa.us/Community.aspx?=15996] (accessed February 13, 2012)
Eichelberger, B. 2011i. Pennsylvania Natural Heritage Program. Red Maple - Black-gum Palustrine Forest Factsheet. [http://www.naturalheritage.state.pa.us/Community.aspx?=16023] (accessed January 31, 2012)
Eichelberger, B. 2011o. Pennsylvania Natural Heritage Program. Red Maple - Magnolia Palustrine Forest Factsheet. [http://www.naturalheritage.state.pa.us/Community.aspx?=16024] (accessed February 15, 2012)
Elias, T. B. 1980. The complete trees of North America, field guide and natural history. Book Division, Times Mirror Magazines, Inc. 948 pp.
Ellis, W. H., and E. W. Chester. 1989. Upland swamps of the Highland Rim of Tennessee. Journal of the Tennessee Academy of Science 64(3):97-101.
Enser, R. W., and J. A. Lundgren. 2006. Natural communities of Rhode Island. A joint project of the Rhode Island Department of Environmental Management Natural Heritage Program and The Nature Conservancy of Rhode Island. Rhode Island Natural History Survey, Kingston. 40 pp. [www.rinhs.org]
Epstein, Eric. Personal communication. Community Ecologist, Wisconsin Natural Heritage Program, Madison, WI.
Estes, J., R. Tyrl, and J. Brunken, editors. 1979. Grasses and grasslands: Systematics and ecology. University of Oklahoma Press, Norman.
Evans, M. 1991. Kentucky ecological communities. Draft report to the Kentucky Nature Preserves Commission. 19 pp.
Evans, M., B. Yahn, and M. Hines. Kentucky ecological communities. 2009. Kentucky Nature Preserves Commission, Frankfort, KY.
Evans, Marc. Personal communication. Ecologist. Kentucky Natural Heritage Program, Kentucky State Nature Preserves Commission, Frankfort.
Evans, Rob. Personal communication. Regional Ecologist, Plant Conservation Program, North Carolina Department of Agriculture and Consumer Services, Raleigh, NC.
Ewel, K. C., and H. T. Odum, editors. 1984b. Cypress swamps. University of Florida Press, Gainesville.
Eyre, F. H., editor. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 pp.
FNA Editorial Committee [Flora of North America Editorial Committee], editors. 2002a. Flora of North America, north of Mexico. Volume 26. Magnoliophyta: Liliidae: Liliales and Orchidales. Oxford University Press, New York. 723 pp.
FNAI [Florida Natural Areas Inventory]. 1990. Guide to the natural communities of Florida. Florida Natural Areas Inventory and Florida Department of Natural Resources, Tallahassee. 111 pp.
FNAI [Florida Natural Areas Inventory]. 1992a. Natural communities. Unpublished document. The Nature Conservancy, Florida Natural Areas Inventory, Tallahassee. 6 pp.
FNAI [Florida Natural Areas Inventory]. 1992b. Natural community classification. Unpublished document. The Nature Conservancy, Florida Natural Areas Inventory, Tallahassee. 16 pp.
FNAI [Florida Natural Areas Inventory]. 2010a. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL.
Faber-Langendoen, D., J. Drake, M. Hall, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, M. Russo, K. Schulz, L. Sneddon, K. Snow, and J. Teague. 2013-2016b. Screening alliances for induction into the U.S. National Vegetation Classification: Part 1 - Alliance Concept Review. NatureServe, Arlington, VA.
Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2016a. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Faber-Langendoen, D., and Midwest State Natural Heritage Program Ecologists. 1996. Terrestrial vegetation of the midwest United States. International classification of ecological communities: Terrestrial vegetation of the United States. The Nature Conservancy, Arlington, VA.

Faber-Langendoen, D., and P. F. Maycock. 1989. Community patterns and environmental gradients of buttonbush, *Cephalanthus occidentalis*, ponds in lowland forests of southern Ontario. The Canadian Field-Naturalist 103(4):479-485.

Faber-Langendoen, D., and S. Menard. 2006. A key to eastern forests of the United States: Macrogroups, groups, and alliances. September 15, 2006. NatureServe, Arlington, VA.

Faber-Langendoen, D., editor. 2001. Plant communities of the Midwest: Classification in an ecological context. Association for Biodiversity Information, Arlington, VA. 61 pp. plus appendix (705 pp.).

Faircloth, W. 1971. The vascular flora of central south Georgia. University microfilms. Ph.D. dissertation, University of Georgia, Athens.

Faller, A. 1975. The plant ecology of Mammoth Cave National Park, Kentucky. Ph.D. dissertation, Indiana State University, Terre Haute.

Fanning, D. D., and M. C. Fanning. 1989. Soil morphology, genesis, and classification. John Wiley and Sons, Inc., NY. 395 pp.

Farrar, D. R. 1998. The tropical flora of rockhouse cliff formations in the eastern United States. Journal of the Torrey Botanical Society 125(2):91-108.

Faulkner, S. P., and W. H. Patrick, Jr. No date. Characterization of bottomland hardwood wetland transition zones in the lower Mississippi Valley. Unpublished document.

Fehrenbacher, J. B., J. D. Alexander, I. J. Jansen, R. A. Pope, M. A. Flock, W. F. Andrews, L. J. Bushue, J. W. Scott, and E. E. Voss. 1982. General soil map of Illinois, 1:500,000 scale. University of Illinois, College of Agriculture, Agricultural Experiment Station, and USDA Soil Conservation Service, Champaign, IL.

Felix, A. C., III, T. L. Sharik, B. S. McGinnes, and W. C. Johnson. 1983. Succession in loblolly pine plantations converted from second growth forest in the central Piedmont of Virginia. The American Midland Naturalist 110:365-380.

Ferguson, E. R. 1958. Age of rough (ground cover) affects shortleaf pine establishment and survival. Journal of Forestry 56:422-423.

Fike, J. 1999. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Diversity Inventory. Pennsylvania Department of Conservation and Recreation, Bureau of Forestry, Harrisburg, PA. 86 pp.

Fleming, G. P. 2002b. Preliminary classification of Piedmont & Inner Coastal Plain vegetation types in Virginia. Natural Heritage Technical Report 02-14. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 29 pp.

Fleming, G. P. 2007. Ecological communities of the Potomac Gorge in Virginia: Composition, floristics, and environmental dynamics. Natural Heritage Technical Report 07-12. Unpublished report submitted to the National Park Service. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 341 pp. plus appendices.

Fleming, G. P., K. Taverna, and P. P. Coulling. 2007b. Vegetation classification for the National Capitol Region parks, eastern region. Regional (VA-MD-DC) analysis prepared for NatureServe and USGS-NPS Vegetation Mapping Program, March 2007. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond.

Fleming, G. P., P. P. Coulling, D. P. Walton, K. M. McCoy, and M. R. Parrish. 2001. The natural communities of Virginia: Classification of ecological community groups. First approximation. Natural Heritage Technical Report 01-1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 76 pp.

Fleming, G. P., P. P. Coulling, K. D. Patterson, and K. M. McCoy. 2004. The natural communities of Virginia: Classification of ecological community groups. Second approximation. Natural Heritage Technical Report 04-01. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. [http://www.dcr.virginia.gov/dnh/ncintro.htm]

Fleming, G. P., P. P. Coulling, K. D. Patterson, and K. Taverna. 2006. The natural communities of Virginia: Classification of ecological community groups. Second approximation. Version 2.2. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. [http://www.dcr.virginia.gov/natural_heritage/ncTIV.shtml]

Fleming, G. P., and J. T. Weber. 2003. Inventory, classification, and map of forested ecological communities at Manassas National Battlefield Park, Virginia. Unpublished report submitted to the National Park Service. Natural Heritage Technical Report 03-07. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 101 pp. plus appendix.

Fleming, G. P., and K. D. Patterson. 2003. Preliminary vegetation classification for the National Capitol Region parks. Regional (VA-WVA-MD-DC) analysis prepared for NatureServe and USGS-NPS Vegetation Mapping Program, March 2003. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond.

Fleming, G. P., and K. D. Patterson. 2011a. Natural communities of Virginia: Ecological groups and community types. Natural Heritage Technical Report 11-07. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 34 pp.

Fleming, G. P., and K. Taverna. 2006. Vegetation classification for the National Capitol Region parks, western region. Regional (VA-WVA-MD-DC) analysis prepared for NatureServe and USGS-NPS Vegetation Mapping Program, March 2006. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond.

Fleming, G. P., and P. P. Coulling. 2001. Ecological communities of the George Washington and Jefferson national forests, Virginia. Preliminary classification and description of vegetation types. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 317 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Fleming, G. P., and W. H. Moorhead, III. 2000. Plant communities and ecological land units of the Peter's Mountain area, James River Ranger District, George Washington and Jefferson national forests, Virginia. Natural Heritage Technical Report 00-07. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. Unpublished report submitted to the USDA Forest Service. 195 pp. plus appendices.

Fleming, Gary P. Personal communication. Ecologist, Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.

Flinchum, D. M. 1977. Lesser vegetation as indicators of varying moisture regimes in bottomland and swamp forests of northeastern North Carolina. Ph.D. dissertation, North Carolina State University, Raleigh. 105 pp.

Flores, D. L. 1984. Jefferson and southwestern exploration. The Freeman and Curtis accounts of the Red River Expedition of 1806. University of Oklahoma Press.

Foti, T. 1994a. Natural communities of Arkansas (terrestrial and palustrine). Unpublished document. Arkansas Natural Heritage Commission, Little Rock. 2 pp.

Foti, T., M. Blaney, X. Li, and K. G. Smith. 1994. A classification system for the natural vegetation of Arkansas. Proceedings of the Arkansas Academy of Science 48:50-53.

Foti, T., compiler. 1994b. Natural vegetation classification system of Arkansas, draft five. Unpublished document. Arkansas Natural Heritage Commission, Little Rock. 8 pp.

Foti, Tom. Personal communication. Ecologist [retired]. Arkansas Natural Heritage Commission, Little Rock.

Fralish, J. S. 1987. Forest stand basal area and its relationship to individual soil and topographic factors in the Shawnee Hills. Transactions of the Illinois Academy of Science 80(3 and 4):183-194.

Fralish, J. S. 1988b. Predicting potential stand composition from site characteristics in the Shawnee Hills Forest of Illinois. The American Midland Naturalist 120(1):79-101.

Fralish, J. S., F. B. Crooks, J. L. Chambers, and F. M. Harty. 1991. Comparison of presettlement, second-growth and old-growth forest on six site types in the Illinois Shawnee Hills. The American Midland Naturalist 125:294-309.

Fralish, J. S., S. B. Franklin, and D. D. Close. 1999. Open woodland communities of southern Illinois, western Kentucky, and middle Tennessee. Pages 171-189 in: R. C. Anderson, J. S. Fralish, and J. M. Baskin, editors. Savannas, Barrens, and Rock Outcrop Plant Communities of North America. Cambridge University Press, Cambridge, MA.

Fralish, J. S., and S. B. Franklin. 2002. Taxonomy and ecology of woody plants of North America (excluding Mexico and subtropical Florida). John Wiley & Sons, Inc., New York.

Franklin, S. 1990a. The effect of soil and topography on forest community composition at Land Between the Lakes, KY and TN. M.S. thesis, Southern Illinois University, Carbondale. 138 pp.

Franklin, S. B., P. A. Robertson, J. S. Fralish, and S. M. Kettler. 1993. Overstory vegetation and successional trends of Land Between the Lakes, USA. Journal of Vegetation Science 4:509-520.

Franklin, S. B., and J. A. Kupfer. 2004. Forest communities of Natchez Trace State Forest, western Tennessee Coastal Plain. Castanea 69(1):15-29.

Franklin, S. Personal communication.

Frick, T. A. 1939. Slope vegetation near Nashville, Tennessee. Journal of the Tennessee Academy of Science 14:344-420.

Funk, V. A. 1975. A floristic and geologic survey of selected seeps in Calloway County, Kentucky. M.S. thesis, Murray State University, Murray, KY. 84 pp.

Funk, V. A., and M. J. Fuller. 1978. A floristic survey of the seeps of Calloway County, Kentucky. Castanea 43:162-172.

Gaertner, F. 1955. Honeylocust (*Gleditsia triacanthos* L.) in field shelterbelts of western Oklahoma. Unpublished M.S. thesis, Oklahoma State University, Stillwater.

Gallyoun, M., G. Meyer, A. Andreu, and W. Slocumb. 1996. Mapping vegetation communities with The Nature Conservancy's vegetation classification system on five small national parks in the southeastern USA. Unpublished report. The Nature Conservancy, Southeast Regional Office, Conservation Science Department, Chapel Hill, NC.

Gawler, S. C. 2002. Natural landscapes of Maine: A guide to vegetated natural communities and ecosystems. Maine Natural Areas Program, Department of Conservation, Augusta, ME.

Gawler, S. C., R. E. Zaremba, and B. Agius. 2005. Vegetation mapping at Minute Man National Historical Park. Draft final report. Technical Report NPS/NER/NRTR--XXXX/XXX. National Park Service. Philadelphia, PA.

Gawler, S. C., and A. Cutko. 2010. Natural landscapes of Maine: A classification of vegetated natural communities and ecosystems. Maine Natural Areas Program, Department of Conservation, Augusta.

Gawler, S. C., and P. S. Bowman. 2012. Vegetation classification and mapping at Saint-Gaudens National Historic Site, New Hampshire. Natural Resource Technical Report NPS/NER/NRTR--2012/584.1. National Park Service, Fort Collins, CO.

Gettman, R. W. 1974. A floristic survey of Sumter National Forest--The Andrew Pickens Division. M.S. thesis, Clemson University, Clemson, SC. 131 pp.

Gettys, L. A., W. T. Haller, and M. Bellaud, editors. 2009. Biology and control of aquatic plants: A best management practices handbook. Aquatic Ecosystem Restoration Foundation, Marietta GA. 210 pp. [http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf]

Glitzenstein, J. S., and D. R. Streng. 2004. Evaluating the NatureServe preliminary plant community classification for Francis Marion National Forest. Tall Timbers Research Station, Tallahassee, FL. Plus appendices and data.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Golden, M. S. 1979. Forest vegetation of the lower Alabama Piedmont. Ecology 60:770-782.
Greller, A. M. 1988. Deciduous forest. Pages 288-316 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Cambridge University Press, New York.
Griffith, G. E., J. M. Omernik, J. A. Comstock, S. Lawrence, G. Martin, A. Goddard, V. J. Hulcher, and T. Foster. 2001. Ecoregions of Alabama and Georgia. (Two-sided color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, VA. Scale 1:1,700,000.
Griffith, G. E., J. M. Omernik, and S. H. Azevedo. 1998. Ecoregions of Tennessee. (Two-sided color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, VA. Scale 1:940,000.
Gunn, S. C. 1985. Flora of Alabama River bluffs in the Black Belt. M.S. thesis, Auburn University, Auburn, AL.
Gupta, S. C., and W. E. Larson. 1979. Estimating soil water retention characteristics from particle size distribution, organic matter content and bulk density. Water Resource Research 15(6):1633-1635.
Guthrie, M. 1989. Silurian limestone glades and barrens of the Western Valley of Tennessee. Contract report to the Division of Ecological Services, Tennessee Department of Conservation, Nashville. 113 pp.
Hall, R. L., and E. D. Mathews. 1974. Soil survey of Charles County, Maryland. U.S. Department of Agriculture Soil Conservation Service. Washington, DC.
Hanks, J. P. 1985. Plant communities and ground-water levels in southern Nassau County, Long Island, New York. Bulletin of the Torrey Botanical Club 112:79-86.
Harcombe, P. A., and J. E. Neaville. 1977. Vegetation types of Chambers County, Texas. The Texas Journal of Science 29:209-234.
Hardeman, W. D. 1966. Geologic map of Tennessee. West sheet.
Harlow, W. M., E. S. Harrar, F. M. White, and J. W. Hardin. 1991. Textbook of dendrology: Covering the important forest trees of the United States and Canada. 7th edition. McGraw-Hill, Inc., New York. 501 pp.
Harrison, J. W. 2011. The natural communities of Maryland: 2011 working list of ecological community groups and community types. Unpublished report. Maryland Department of Natural Resources, Wildlife and Heritage Service, Natural Heritage Program, Annapolis. 33 pp.
Harrison, J. W., compiler. 2004. Classification of vegetation communities of Maryland: First iteration. A subset of the International Classification of Ecological Communities: Terrestrial Vegetation of the United States, NatureServe. Maryland Natural Heritage Program, Maryland Department of Natural Resources, Annapolis. 243 pp.
Harrison, Jason W. Personal communication. State Community Ecologist, Maryland Wildlife and Heritage Division, Department of Natural Resources, Tawes State Office Building, E-1, Annapolis, MD 21401.
Harvill, A. M., Jr. 1967. The vegetation of Assateague Island, Virginia. Castanea 32:105-108.
Hatch, S. L., K. N. Gandhi, and L. E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agricultural Experiment Station, Texas A&M University System, College Station. 158 pp.
Heath, M. E., D. S. Metcalfe, and R. E. Barnes. 1973. Forages: the science of grassland agriculture. Iowa State University Press, Ames.
Heckscher, S. 1994. The vegetation of the Glades Region, Cumberland County, New Jersey. Bartonia 58:101-113.
Hefley, H. M. 1937. Ecological studies on the Canadian River floodplain in Cleveland County, Oklahoma. Ecological Monographs 7:347-402.
Heineke, T. E. 1987. The flora and plant communities of the middle Mississippi River Valley. Ph.D. dissertation, Southern Illinois University, Carbondale. 653 pp.
Hillestad, H. O., J. R. Bozeman, A. S. Johnson, C. W. Berisford, and J. I. Richardson. 1975. The ecology of the Cumberland Island National Seashore, Camden County, Georgia. Technical Report Series No. 75-5. Georgia Marine Sciences Center, Skidway Island, GA.
Hoagland, B. 2000. The vegetation of Oklahoma: A classification for landscape mapping and conservation planning. The Southwestern Naturalist 45(4):385-420.
Hoagland, B. W. 1997. Preliminary plant community classification for Oklahoma. Unpublished draft document, version 35629. University of Oklahoma, Oklahoma Natural Heritage Inventory, Norman. 47 pp.
Hoagland, B. W. 1998a. Classification of Oklahoma vegetation types. Working draft. University of Oklahoma, Oklahoma Natural Heritage Inventory, Norman. 43 pp.
Hoagland, B. W. 1998b. The vegetation of Oklahoma: A classification for landscape mapping and conservation planning. Oklahoma Biological Survey. University of Oklahoma, Norman.
Hoagland, B. W. 1998c. Oklahoma riparian vegetation. In: A. Fallon and M. Smolen, editors. Riparian area management handbook. Publication number E-952. Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater.
Hoagland, B. W., L. R. Sorrels, and S. M. Glenn. 1996. Woody species composition of floodplain forests of the Little River, McCurtain and LeFlore counties, Oklahoma. Proceedings of the Oklahoma Academy of Science 76:23-26.
Hoagland, B. W., and S. L. Collins. 1997. Heterogeneity in shortgrass prairie vegetation: The role of playa lakes. Journal of Vegetation Science 8:277-286.
Holm, L. G., D. L. Plucknett, J. V. Pancho, and J. P. Herberger. 1977. The world's worst weeds: Distribution and biology. University Press of Hawaii, Honolulu. 609 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Homoya, M. A., J. Aldrich, J. Bacone, L. Casebere, and T. Post. 1988. Indiana natural community classification. Indiana Natural Heritage Program, Indianapolis, IN. Unpublished manuscript.

Homoya, Michael. Personal communication. Indiana Natural Heritage Data Center. Division of Nature Preserves, Department of Natural Resources, 402 West Washington Street, Room W267, Indianapolis, IN 46204. 317/232-4052. Personal communication with S. L. Neid, MRO, March/April, 1997.

Hop, K., S. Lubinski, J. Dieck, J. Drake, and S. Menard. 2009. National Park Service Vegetation Inventory Program: Indiana Dunes National Lakeshore, Indiana. USDI U.S. Geological Survey, La Crosse, WI, and NatureServe, St. Paul, MN. 312 pp.

Hop, K., S. Lubinski, and S. Menard. 2005. U.S. Geological Survey-National Park Service Vegetation Mapping Program, Effigy Mounds National Monument, Iowa. USDI U.S. Geological Survey, La Crosse, WI. 202 pp.

House, H. D. 1917. The vegetation of the eastern end of Oneida Lake. New York State Museum Bulletin #197. Albany, NY. pp. 61-71.

Hughes, R. H. 1966. Fire ecology of canebrakes. Proceedings of the Tall Timbers Fire Ecology Conference 5:149-158.

INAI [Iowa Natural Areas Inventory]. No date. Vegetation classification of Iowa. Iowa Natural Areas Inventory, Iowa Department of Natural Resources, Des Moines.

Illinois Nature Preserve Commission. 1973. Comprehensive plan for the Illinois nature preserves system, part 2: The natural divisions of Illinois, J. E. Schwegman, principal author. 32 pp.

Jenkins, M. A., and S. G. Pallardy. 1993. A comparison of forest dynamics at two sites in the southeastern Ozark mountains of Missouri. Pages 327-341 in: Proceedings of the 9th Central Hardwood Forest Conference. Purdue University, West Lafayette, IN.

Johnson, F. L. 1984. Vegetational changes in a black willow forest over a 23 year period. Proceedings of the Oklahoma Academy of Science 64:11-13.

Johnson, F. L., and D. T. Bell. 1976. Tree growth and mortality in the streamside forest. Castanea 41(1):34-40.

Jones, S. B. 1971. A virgin prairie and a virgin loblolly pine stand in central Mississippi. Castanea 36:223-225.

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

Jones, S. M., D. H. Van Lear, and S. K. Cox. 1981a. Composition and density-diameter pattern of an old-growth forest stand of the Boiling Springs Natural Area, South Carolina. Bulletin of the Torrey Botanical Club 108:347-353.

Jones, S. M., D. H. Van Lear, and S. K. Cox. 1981b. Major forest community types of the Savannah River Plant: A field guide. USDE Savannah River Plant, National Environmental Research Park Program. Report No. SRO-NERP-9. 79 pp. plus 24 illustrations.

Jones, S. M., and L. A. Churchill. 1987. The use of vegetation in assessing site potential within the upper coastal plain of South Carolina. Castanea 52:1-8.

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

Keever, C. 1973. Distribution of major forest species in southeastern Pennsylvania. Ecological Monographs 43:303-327.

Kelting, R. W., and W. T. Penfound. 1950. The vegetation of stock pond dams in central Oklahoma. American Midland Naturalist 44:69-75.

Keys, J. E., Jr., C. A. Carpenter, S. L. Hooks, F. G. Koenig, W. H. McNab, W. E. Russell, and M-L. Smith. 1995. Ecological units of the eastern United States - first approximation (map and booklet of map unit tables). Presentation scale 1:3,500,000, colored. USDA Forest Service, Atlanta, GA.

Klawitter, R. A. 1962. Sweetgum, swamp tupelo and water tupelo sites in a South Carolina bottomland forest. D.F. dissertation, Duke University, Durham, NC. 176 pp.

Klimas, C. V., C. O. Martin, and J. W. Teaford. 1981. Impacts of flooding regime modification on wildlife habitats of bottomland hardwood forests in the lower Mississippi. U.S. Army Corps of Engineers, Waterways Experimental Station and Environmental Lab. Technical Report EL-81-13. Vicksburg, MS. 137 pp. plus appendix.

Kossuth, S. V., and J. L. Michael. 1990. *Pinus glabra* Walt., spruce pine. Pages 355-358 in: R. M. Burns and B. H. Honkala, editors. Silvics of North America. Volume 1, Conifers. USDA Forest Service, Agriculture Handbook 654, Washington, DC.

Kral, R. 1983. A report on some rare, threatened, or endangered forest-related vascular plants of the South: Volume I. Isoetaceae through Euphorbiaceae. Technical Publication R8-TP2. USDA Forest Service, Atlanta. 718 pp.

Kushlan, J. A. 1990. Freshwater marshes. Pages 324-363 in: R. L. Myers and J. J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press, Orlando.

Kwit, C., M. W. Schwartz, W. J. Platt, and J. P. Geaghan. 1998. The distribution of tree species in steepheads of the Apalachicola River Bluffs, Florida. Bulletin of the Torrey Botanical Club 125(4):309-318.

Küchler, A. W. 1964. Potential natural vegetation of the conterminous United States. American Geographic Society Special Publication 36. New York, NY. 116 pp.

LNHP [Louisiana Natural Heritage Program]. 2004. Natural communities of Louisiana. Louisiana Natural Heritage Program, Baton Rouge.

LNHP [Louisiana Natural Heritage Program]. 2009. Natural communities of Louisiana. Louisiana Natural Heritage Program, Louisiana Department of Wildlife & Fisheries, Baton Rouge. 46 pp. [http://www.wlf.louisiana.gov/sites/default/files/pdf/page_wildlife/6776-Rare%20Natural%20Communities/LA_NAT_COM.pdf]

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Landfire [Landfire National Vegetation Dynamics Database]. 2007a. Landfire National Vegetation Dynamics Models. Landfire Project, USDA Forest Service, U.S. Department of Interior. (January - last update) [http://www.LANDFIRE.gov/index.php] (accessed 8 February 2007).

Largay, E. F., and L. A. Sneddon. 2010. Vegetation mapping and classification of Boston Harbor Islands National Recreation Area. Technical Report NPS/NER/NRTR--XXXX/XXX. National Park Service. Philadelphia, PA.

Lauver, C. L., K. Kindscher, D. Faber-Langendoen, and R. Schneider. 1999. A classification of the natural vegetation of Kansas. The Southwestern Naturalist 44:421-443.

Lea, C. 2000. Plant communities of the Potomac Gorge and their relationship to fluvial factors. M.S. thesis, George Mason University. Fairfax, VA. 219 pp.

Lea, C. 2003. Vegetation types in the National Capital Region Parks. Draft for review by NatureServe, Virginia Natural Heritage, West Virginia Natural Heritage, Maryland Natural Heritage, and National Park Service. March 2003. 140 pp.

Lea, C. 2004. Draft vegetation types in National Capital Region Parks. Edited by S.C. Gawler and J. Teague. Working draft for review by NatureServe, Virginia Natural Heritage, West Virginia Natural Heritage, Maryland Natural Heritage, and National Park Service. July 2004. 157 pp.

Lea, C., B. Waltermire, and C. Nordman. 2013. Vegetation classification and mapping, Vicksburg National Military Park, Mississippi. Natural Resource Technical Report NPS/GULN/NRTR--2013/710. National Park Service, Fort Collins, CO.

Lea, C., L. A. Sneddon, and E. Eastman. 2012. Vegetation classification and mapping at Thomas Stone National Historic Site, Maryland. Natural Resource Technical Report NPS/NER/NRTR--2012/550. National Park Service, Fort Collins, CO.

Leahy, Mike. Personal communication. Missouri Natural Heritage Database, Missouri Department of Conservation, Jefferson City.

Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological land classification for southern Ontario: First approximation and its application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

Leidolf, A., S. McDaniel, and T. Nuttle. 2002. The flora of Oktibbeha County, Mississippi. Sida 20(2):691-765.

Leidolf, A., and S. McDaniel. 1998. A floristic study of black prairie plant communities at Sixteen Section Prairie, Oktibbeha County, Mississippi. Castanea 63:51-62.

Little, E. L. 1980a. The Audubon Society field guide to North American trees: Eastern region. Alfred A. Knopf, New York. 714 pp.

Little, E. L. 1980b. Baldcypress (*Taxodium distichum*) in Oklahoma. Proceedings of the Oklahoma Academy of Science 60:105-107.

Lowe, E. N. 1921. Topographic and floristic regions in Mississippi. Pages 29-57 in: E. N. Lowe. Plants of Mississippi: A list of flowering plants and ferns. Mississippi State Geologic Survey Bulletin No. 17.

Lubinski, S., K. Hop, and S. Gawler. 2003. Vegetation Mapping Program: Acadia National Park, Maine. Report produced by U.S. Department of the Interior, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, and Maine Natural Areas Program in conjunction with M. Story (NPS Vegetation Mapping Coordinator) NPS, Natural Resources Information Division, Inventory and Monitoring Program, and K. Brown (USGS Vegetation Mapping Coordinator), USGS, Center for Biological Informatics and NatureServe. [http://biology.usgs.gov/npsveg/ftp/vegmapping/acad/reports/acadrpt.pdf]

Lui, K., M. Butler, M. Allen, J. da Silva, and B. Brownson. 2008. Field guide to aquatic invasive species: Identification, collection and reporting of aquatic invasive species in Ontario waters. Queen's Printer for Ontario. MNR # 52089. [http://www.ontariostewardship.org/councils/duff-simcoe/files/invading_species_field_guide.pdf]

MNHP [Missouri Natural Heritage Program]. 2000. Missouri Natural Heritage GIS Database. Missouri Natural Heritage Program, Missouri Department of Conservation, Jefferson City. (last accessed 2000).

MNNHP [Minnesota Natural Heritage Program]. 1993. Minnesota's native vegetation: A key to natural communities. Version 1.5. Minnesota Department of Natural Resources, Natural Heritage Program, St. Paul, MN. 110 pp.

MSNHP [Mississippi Natural Heritage Program]. 2006. Ecological communities of Mississippi. Museum of Natural Science, Mississippi Department of Wildlife, Fisheries, and Parks, Jackson, MS. 9 pp.

Major, C. S., C. Bailey, J. Donaldson, R. McCoy, C. Nordman, M. Williams, and D. Withers. 1999. An ecological inventory of selected sites in the Cherokee National Forest. Cost Share Agreement #99-CCS-0804-001. Tennessee Department of Environment and Conservation, Tennessee Division of Natural Heritage, Nashville, TN.

Martin, D. L., and L. M. Smith. 1991. A survey and description of the natural plant communities of the Kisatchie National Forest, Winn and Kisatchie districts. Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA. 372 pp.

Martin, W. H. 1989. Forest patterns in the Great Valley of Tennessee. Journal of the Tennessee Academy of Science 64:137-144.

Martin, W. H., S. G. Boyce, and A. C. Echternacht, editors. 1993a. Biodiversity of the southeastern United States: Lowland terrestrial communities. John Wiley and Sons, New York. 502 pp.

McAlister, W. H., and M. K. McAlister. 1995. A naturalist's guide: Aransas. University of Texas Press, Austin. 354 pp.

McClain, W. E. Personal communication. Ecologist, Illinois Department of Natural Heritage.

McCoy, D. A. 1958. Vascular plants of Pontotoc County, Oklahoma. American Midland Naturalist 59:371-396.

McCoy, K. M., and G. P. Fleming. 2000. Ecological communities of U.S. Army Garrison, Fort Belvoir, Fort Belvoir, Virginia. Unpublished report submitted to the U.S. Army. Natural Heritage Technical Report 00-08. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 156 pp. plus appendices.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

McCrain, G. R., and B. H. Church. 1985. An analysis of past and present plant community patterns in Moores Creek National Battlefield along with associated impacts affecting distribution and restoration. Prepared by Resource Management Co., Raleigh, NC, under Purchase Order Number PX-5550-3-0062 for the USDI, National Park Service, Southeast Regional Office, Atlanta, GA.
McDonald, A. 1938. Erosion and its control in Oklahoma Territory. Miscellaneous Publication 301, U.S. Department of Agriculture, Washington, DC.
McInteer, B. B. 1952. Original vegetation in the Bluegrass Region of Kentucky. Castanea 17:153-164.
McKinney, M. L., and J. L. Lockwood. 1999. Biotic homogenization: A few winners replacing many losers in the next mass extinction. Trends in Ecology and Evolution 14: 450-453.
McKnight, J. S., D. D. Hook, O. G. Langdon, and R. L. Johnson. 1981. Flood tolerance and related characteristics of trees of the bottomland forests of the southern U.S. Pages 29-69 in: J. R. Clark and J. Benforado, editors. Wetlands of bottomland hardwood forests. Elsevier Scientific Publishing Company, New York.
McManamay, R. H., A. Curtis, and M. W. Byrne. 2012. Vegetation mapping at Moores Creek National Battlefield. Natural Resource Data Series NPS/SECN/NRDS--2012/319. National Park Service, Fort Collins, CO. 173 pp.
McWilliams, W. H. 1992. Forest resources of Alabama. Resource Bulletin SO-170. USDA Forest Service, Southern Forest Experiment Station, New Orleans, LA. 78 pp.
McWilliams, W. H., and J. F. Rosson, Jr. 1990. Composition and vulnerability of bottomland hardwood forests of the Coastal Plain province in the south central United States. Forest Ecology and Management 33/34:485-501.
Meanley, B. 1972. Swamps, river bottoms and canebrakes. Barre Publishing, Barre, MA. 142 pp.
Metzler, K. J., J. P. Barrett, T. E. Nosal, W. A. Millinor, and L. A. Sneddon. 2009. Vegetation classification and mapping at Weir Farm National Historic Site, Connecticut. Technical Report NPS/NER/NRTR--2008/130. National Park Service, Philadelphia, PA. 128 pp.
Metzler, K., and J. Barrett. 2006. The vegetation of Connecticut: A preliminary classification. State Geological and Natural History Survey, Report of Investigations No. 12. Connecticut Natural Diversity Database, Hartford.
Midwestern Ecology Working Group of NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification. Terrestrial Vegetation. NatureServe, Minneapolis, MN.
Miller, N. A., and J. B. Neiswender. 1987. Plant communities of the Third Chickasaw Loess Bluff and Mississippi River Alluvial Plain, Shelby County, Tennessee. Journal of the Tennessee Academy of Sciences 62:1-6.
Miller, R. B., and L. R. Tehon. 1929. The native and naturalized trees of Illinois. Volume XVIII, Article I. State of Illinois Department of Registration and Education, Division of the Natural History Survey, Urbana. 339 pp.
Minney, D. 2000. Edge of Appalachia Preserve: Plant community descriptions. Preliminary draft. An unpublished report for the Ohio Chapter of The Nature Conservancy.
Minney, D. Personal communication. The Nature Conservancy, Ohio Chapter, Dublin.
Mitsch, W. J., and J. G. Gosselink. 1986a. Southern deepwater swamps. Pages 317-351 in: J. W. Mitsch and J. G. Gosselink, Wetlands. Van Nostrand Reinhold Company, New York.
Mitsch, W. J., and J. G. Gosselink. 1993. Wetlands. Second edition. Van Nostrand Reinhold Company, New York. 722 pp.
Mohlenbrock, R. H. 1959. A floristic study of a southern Illinois swampy area. Ohio Journal of Science 59:89-100.
Mohlenbrock, R. H. 1986. Guide to the vascular flora of Illinois. Southern Illinois University Press, Carbondale. 507 pp.
Mohlenbrock, R. H., and J. W. Voigt. 1959. A flora of southern Illinois. Southern Illinois University Press, Carbondale. 390 pp.
Mohr, C. T. 1901. Plant life of Alabama. Contributions to the U.S. National Herbarium No. 6. Washington, DC. 921 pp.
Monk, C. D., D. W. Imm, R. L. Potter, and G. G. Parker. 1989. A classification of the deciduous forest of eastern North America. Vegetatio 80:167-181.
Moran, L. P., D. E. Pettry, R. E. Switzer, S. T. McDaniel, and R. G. Wieland. 2003. Soils of native prairie remnants in the Jackson Prairie region of Mississippi. Office of Agricultural Communications, Division of Agriculture, Forestry, and Veterinary Medicine, Mississippi State University. 16 pp. [http://msucares.com/pubs/bulletins/b1067.htm] (Accessed 5 May 2003)
Morris, M. W., C. T. Bryson, and R. C. Warren. 1993. Rare vascular plants and associate plant communities from the Sand Creek Chalk Bluffs, Oktibbeha County, Mississippi. Castanea 58:250-259.
Morris, T. L. 1974. Water hyacinth *Eichhornia crassipes* (Mart.) Solms: Its ability to invade aquatic ecosystems of Paynes Prairie Preserve. M.S. thesis, University of Florida, Gainesville.
Mulligan, Maureen. Personal communication. Ecologist, TNC Fort Benning Project, PO Box 52452, Fort Benning, GA 31995.
Mundorff, K. T. 1998. Ecological classification of bottomland hardwood forests in east Texas and central Louisiana. M.S. thesis, Stephen F. Austin University, Nacogdoches, TX.
Murdock, Nora. No. date. U.S. National Park Service, Appalachian Highlands Network, Ashville, NC.
NAP [Northern Appalachian-Boreal Forest Working Group]. 1998. Northern Appalachian-Boreal Working group discussions. The Nature Conservancy, Boston, MA.
NRCS [Natural Resources Conservation Service]. 2001b. Soil survey of Gateway National Recreation Area, New York and New Jersey. USDA Natural Resources Conservation Service and USDI National Park Service, Gateway National Recreation Area in partnership with Cornell University Agricultural Experiment Station and New York City Soil and Water Conservation District.
NRCS [Natural Resources Conservation Service]. 2004a. Soil survey of Saratoga County, New York. USDA Natural Resources Conservation Service. 590 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

NYNHP [New York Natural Heritage Program]. 2013r. Online conservation guide for Oak-Tulip Tree Forest. New York Natural Heritage Program, Albany, NY. [http://www.acris.nynhp.org/guide.php?id=9985]
NatureServe Ecology - Southeastern United States. No date. Unpublished data. NatureServe, Durham, NC.
NatureServe. 2009. Vegetation of the E.B. Forsythe National Wildlife Refuge. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 1 December 2009.
NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification. Central Databases. NatureServe, Arlington, VA.
Nelson, J. B. 1986. The natural communities of South Carolina: Initial classification and description. South Carolina Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries, Columbia, SC. 55 pp.
Nelson, P. 2005. The terrestrial natural communities of Missouri. Third edition. Missouri Natural Areas Committee, Department of Natural Resources and the Department of Conservation, Jefferson City, MO. 550 pp.
Nelson, P. 2010. The terrestrial natural communities of Missouri. Revised edition. Missouri Natural Areas Committee, Department of Natural Resources and the Department of Conservation, Jefferson City.
Nelson, P. W. 1985. The terrestrial natural communities of Missouri. Missouri Natural Areas Committee, Jefferson City. 197 pp. Revised edition, 1987.
Newell, C. L., and R. K. Peet. 1995. Vegetation of Linville Gorge Wilderness, North Carolina. Unpublished report. to USDA Forest Service. University of North Carolina, Department of Biology, Chapel Hill. 211 pp.
Newton, M. B. 1972. Atlas of Louisiana: A guide for students. Miscellaneous publication 72-1. Louisiana State University School of Geoscience, Baton Rouge.
Niering, N. A. 1985. Wetlands. The Audubon Society Nature Guides. Chanticleer Press, Inc. 638 pp.
Niering, W. A. 1979. The Audubon Society field guide to North American wildflowers: Eastern region. Alfred A. Knopf, New York. 887 pp.
Niering, W. A., R. H. Goodwin, and S. Taylor. 1970. Prescribed burning in southern New England. Introduction to long-range studies. Proceedings of the Tall Timbers Fire Ecology Conference 10:267-286.
Nigh, T., C. Buck, J. Grabner, J. Kabrick, and D Meinert. 2000. An ecological classification system for the Current River Hills subsection. Missouri Ecological Classification System and Missouri Resource Assessment Partnership. 44 pp.
Nigh, Tim A. Personal communication. Ecologist, Missouri Conservation Commission, Jefferson City.
Nijjer, S., W. E. Rogers, and E. Siemann. 2007. Negative plant-soil feedbacks may limit persistence of an invasive tree due to rapid accumulation of soil pathogens. Proceedings of the Royal Society: Biological Sciences 274(1625): 2621-2627. [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2275889/]
Nordman, C. 2004a. Vascular plant community classification for Stones River National Battlefield. NatureServe, Durham, NC. 64 pp. plus appendices and CD.
Nordman, C., M. Russo, and L. Smart. 2011. Vegetation types of the Natchez Trace Parkway, based on the U.S. National Vegetation Classification. NatureServe Central Databases (International Ecological Classification Standard: Terrestrial Ecological Classifications). Arlington, VA. Data current as of 11 April 2011. 548 pp.
Noss, R. F. 2013. Forgotten grasslands of the South: Natural history and conservation. Island Press, Washington, DC. 317 pp.
Nuttall, T. 1821. A journal of travels into the Arkansas territory during the year 1819. T. H. Palmer, Philadelphia. (Re-published 1980. University of Oklahoma Press, Norman.)
ONHD [Ohio Natural Heritage Database]. No date. Vegetation classification of Ohio and unpublished data. Ohio Natural Heritage Database, Division of Natural Areas and Preserves, Ohio Department of Natural Resources, Columbus.
ONHI [Oklahoma Natural Heritage Inventory]. No date. Unpublished data. Oklahoma Natural Heritage Inventory, Norman, OK.
Oberholster, C. 1993. Preliminary list of natural communities of Alabama. Unpublished document. Alabama Department Conservation and Natural Resources, Natural Heritage Section, Montgomery, AL. 6 pp.
Oosting, H. J. 1942. An ecological analysis of the plant communities of Piedmont, North Carolina. The American Midland Naturalist 28:1-127.
Osborn, B. 1941. Biotic type mapping of Oklahoma watersheds. Proceedings of the Oklahoma Academy of Science 22:31-33.
Outcalt, K. W. 1990. *Magnolia grandiflora* L., southern magnolia. Pages 445-448 in: R. M. Burns and B. H. Honkala, editors. Silvics of North America. Volume 2, Hardwoods. USDA Forest Service, Agriculture Handbook 654, Washington, DC.
Overlease, W. R. 1987. 150 years of vegetation change in Chester County, Pennsylvania. Bartonia 53:1-12.
Palmer-Ball, B., Jr., J. J. N. Campbell, M. E. Medley, D. T. Towles, J. R. MacGregor, and R. R. Cicerello. 1988. Cooperative inventory of endangered, threatened, sensitive and rare species, Daniel Boone National Forest, Somerset Ranger District. USDA Forest Service, Daniel Boone National Forest, Berea, KY. 244 pp.
Parker, G. R. 1989. Old-growth forest of the central hardwood region. Natural Areas Journal 9(1):5-11.
Patterson, D. T. 1976. The history and distribution of five exotic weeds in North Carolina (*Ailanthus altissima, Lonicera japonica, Polygonum cuspidatum, Pueraria lobata, Rosa multiflora*). Castanea 41:177-180.
Patterson, K. D. 2008a. Vegetation classification and mapping at Appomattox Court House National Historical Park, Virginia. Technical Report NPS/NER/NRTR--2008/125. National Park Service, Philadelphia, PA.
Patterson, K. D. 2008b. Vegetation classification and mapping at Booker T. Washington National Monument, Virginia. Technical Report NPS/NER/NRTR--2008/100. National Park Service, Philadelphia, PA. 173 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Patterson, K. D. 2008c. Vegetation classification and mapping at Colonial National Historical Park, Virginia. Technical Report NPS/NER/NRTR--2008/129. National Park Service, Philadelphia, PA. 369 pp.
Patterson, K. D. 2008d. Vegetation classification and mapping at George Washington Birthplace National Monument, Virginia. Technical Report NPS/NER/NRTR--2008/099. National Park Service, Philadelphia, PA. 231 pp.
Patterson, K. D. 2008e. Vegetation classification and mapping at Petersburg National Battlefield, Virginia. Technical Report NPS/NER/NRTR--2008/127. National Park Service, Philadelphia, PA. 235 pp.
Patterson, K. D. 2008f. Vegetation classification and mapping at Richmond National Battlefield Park, Virginia. Technical Report NPS/NER/NRTR--2008/128. National Park Service. Philadelphia, PA. 244 pp.
Patterson, K. D., C. J. Ulrey, and J. Drake. 1999. Vegetation classification of Great Smoky Mountains National Park: Cades Cove and Mount Le Conte quadrangles. Unpublished report submitted to BRD-NPS Vegetation Mapping Program. The Nature Conservancy, Chapel Hill, NC.
Patterson, W. B., and H. R. DeSelm. 1989. Classification of forest vegetation of the bottomlands of west Tennessee. University of Tennessee, Department of Biological Sciences, Knoxville, and Tennessee Department of Conservation, Ecological Services Division. Report for Contract No. 89-3347. Nashville. 151 pp.
Peet, R. K., T. R. Wentworth, M. P. Schafale, and A.S. Weakley. No date. Unpublished data of the North Carolina Vegetation Survey. University of North Carolina, Chapel Hill.
Peet, R. K., and N. L. Christensen. 1980. Hardwood forest vegetation of the North Carolina Piedmont. Veroffentlichungen des Geobotanischen Institutes der ETH, Stiftung Rubel 68:14-39.
Penfound, W. T. 1948. An analysis of an elm-ash floodplain community near Norman, Oklahoma. Proceedings of the Oklahoma Academy of Science 28:59-60.
Penfound, W. T. 1953. Plant communities of Oklahoma lakes. Ecology 34:561-583.
Penfound, W. T. 1961. The composition of a black willow forest in south central Oklahoma. Proceedings of the Oklahoma Academy of Science 41:30-31.
Penfound, W. T. 1965. Vegetational changes in a black willow forest over a four-year period. Proceedings of the Oklahoma Academy of Science 45:39.
Penfound, W. T. 1967. A physiognomic classification of vegetation in conterminous United States. Botanical Review 33:289-320.
Penfound, W. T., J. S. Shed, and M. C. Jennison. 1964b. A plant community dominated by vines. Proceedings of the Oklahoma Academy of Science 45:41-43.
Penfound, W. T., and T. F. Hall. 1939. A phytosociological analysis of a tupelo gum forest near Huntsville, Alabama. Ecology 20:358-64.
Perles, S. J., G. S. Podniesinski, E. A. Zimmerman, W. A. Millinor, and L. A. Sneddon. 2006b. Vegetation classification and mapping at Friendship Hill National Historic Site. Technical Report NPS/NER/NRTR--2006/041. National Park Service, Philadelphia, PA. 113 pp.
Perles, S. J., G. S. Podniesinski, E. Eastman, L. A. Sneddon, and S. C. Gawler. 2007. Classification and mapping of vegetation and fire fuel models at Delaware Water Gap National Recreation Area. Technical Report NPS/NER/NRTR--2007/076. National Park Service, Philadelphia, PA. 2 volumes.
Perles, S. J., G. S. Podniesinski, M. Furedi, B. A. Eichelberger, A. Feldmann, G. Edinger, E. Eastman, and L. A. Sneddon. 2008. Vegetation classification and mapping at Upper Delaware Scenic and Recreational River. Technical Report NPS/NER/NRTR--2008/133. National Park Service, Philadelphia, PA. 370 pp.
Perles, S. J., G. S. Podniesinski, W. A. Millinor, and L. A. Sneddon. 2006c. Vegetation classification and mapping at Gettysburg National Military Park and Eisenhower National Historic Park. Technical Report NPS/NER/NRTR--2006/058. National Park Service, Philadelphia, PA.
Perles, S., G. Podniesinski, and J. Wagner. 2004. Classification, assessment and protection of non-forested floodplain wetlands of the Susquehanna drainage. Report to the U.S. Environmental Protection Agency and Pennsylvania Department of Conservation and Natural Resources. Pennsylvania Natural Heritage Program, Harrisburg. 128 pp.
Petranka, J. W., and R. Holland. 1980. A quantitative analysis of bottomland communities in south-central Oklahoma. Southwestern Naturalist 25:207-214.
Pittman, Dr. Albert. Personal communication. South Carolina Heritage Trust, South Carolina Department of Natural Resources, PO Box 167, Columbia, SC 29202. (803)734-3920.
Platt, S. G., and C. G. Brantley. 1992. The management and restoration of switchcane (Louisiana). Restoration Management Notes 10:84-85.
Platt, S. G., and C. G. Brantley. 1993. Switchcane: Propagation and establishment in the southeastern United States. Restoration and Management Notes 11(2):135-137.
Platt, S. G., and C. G. Brantley. 1997. Canebrakes: An ecological and historical perspective. Castanea 62:8-21.
Platt, W. J., and M. W. Schwartz. 1990. Temperate hardwood forests. Pages 194-229 in: R. L. Myers and J. J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press, Orlando.
Podniesinski, G. S., L. A. Sneddon, J. Lundgren, H. Devine, B. Slocumb, and F. Koch. 2005b. Vegetation classification and mapping of Valley Forge National Historical Park. Technical Report NPS/NER/NRTR--2005/028. National Park Service, Philadelphia, PA. 129 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Powell, J. W. 1985. Physiographic regions of the United States, National Geographic Society. Monograph 3. Pages 65-100.
Putnam, J. A. 1951. Management of bottomland hardwoods. Occasional Paper No. 116. USDA Forest Service, Southern Forest Experiment Station, New Orleans, LA.
Putnam, J. A., G. M. Furnival, and J. S. McKnight. 1960. Management and inventory of southern hardwoods. Handbook 181. USDA Forest Service, Washington, DC. 102 pp.
Pyne, M. 1994. Tennessee natural communities. Unpublished document. Tennessee Department of Conservation, Ecology Service Division, Nashville. 7 pp.
Pyne, M. 1997. Biodiversity of Beaman Park Property -- Davidson County, Tennessee: A report on the vegetation, rare plant species, and invasive exotic plant species. Unpublished report to Lose and Associates, Nashville, TN. 20 pp.
Pyne, M., E. Lunsford Jones, and R. White. 2010. Vascular plant inventory and plant community classification for Mammoth Cave National Park. NatureServe, Durham, NC. 334 pp.
Pyne, Milo. Personal communication. Southeast Regional Ecologist. NatureServe, Southeast Regional Office, Durham, NC.
Quarterman, E., M. P. Burbanck, and D. J. Shure. 1993. Rock outcrop communities: Limestone, sandstone, and granite. Pages 35-86 in: W. H. Martin, S. G. Boyce, and A. C. Echternacht, editors. Biodiversity of the southeastern United States: Upland terrestrial communities. John Wiley and Sons, New York.
Rabie, P.A. 2000. Invasive nitrogen fixers. Restoration and Reclamation Review 6:6.3. [http://horticulture.coafes.umn.edu/vd/h5015/rrr.htm]
Radford, A. E., and D. L. Martin. 1975. Potential ecological natural landmarks: Piedmont region, eastern United States. University of North Carolina, Department of Botany, Chapel Hill. 249 pp.
Rawinski, T. 1984a. Natural community description abstract - southern New England calcareous seepage swamp. Unpublished report. The Nature Conservancy, Boston, MA. 6 pp.
Rawinski, T. J. 1992. A classification of Virginia's indigenous biotic communities: Vegetated terrestrial, palustrine, and estuarine community classes. Unpublished document. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Natural Heritage Technical Report No. 92-21. Richmond, VA. 25 pp.
Rawinski, T. J., K. N. Hickman, J. Waller-Eling, G. P. Fleming, C. S. Austin, S. D. Helmick, C. Huber, G. Kappesser, F. C. Huber, Jr., T. Bailey, and T. K. Collins. 1996. Plant communities and ecological land units of the Glenwood Ranger District, George Washington and Jefferson national forests, Virginia. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Natural Heritage Technical Report 96-20. Richmond. 65 pp. plus appendices.
Remo, J. 1999. Geologic controls on mass movement in the New River Gorge, West Virginia. M.S. thesis, West Virginia University, Morgantown. 106 pp.
Rentch, J. S., R. H. Forney, S. L. Stephenson, H. S. Adams, W. N. Grafton, R. B. Coxe, and H. H. Mills. 2005. Vegetation patterns within the lower Bluestone River gorge in southern West Virginia. Castanea 70:170-183.
Ribbeck, K. Personal communication. Louisiana Department of Forestry.
Rice, E. L. 1960. The microclimate of a relict stand of sugar maple in Devil's Canyon in Canadian County, Oklahoma. Ecology 41:445-452.
Rice, E. L. 1963. Vegetation of Beavers Bend State Park, Oklahoma. Geological Survey Guide Book 9:39-45.
Rice, E. L., and W. T. Penfound. 1956. Composition of a green ash forest near Norman, Oklahoma. Southwestern Naturalist 1:145-147.
Robertson, P. A., M. D. MacKenzie, and L. F. Elliott. 1984. Gradient analysis and classification of the woody vegetation for four sites in southern Illinois and adjacent Missouri. Vegetatio 58:87-104.
Robertson, P. A., and A. L. Heikens. 1994. Fire frequency in oak-hickory forests of southern Illinois. Castanea 59(3):286-291.
Robichaud, B., and M. F. Buell. 1973. Vegetation of New Jersey. Rutgers University Press, New Brunswick, NJ. 340 pp.
Roe, S. A. 1998. The vegetation of a tract of ancient cross timbers in Osage County, Oklahoma. Unpublished M.S. thesis, Oklahoma State University, Stillwater.
Rolfsmeier, S. B., and G. Steinauer. 2010. Terrestrial ecological systems and natural communities of Nebraska (Version IV - March 9, 2010). Nebraska Natural Heritage Program, Nebraska Game and Parks Commission. Lincoln, NE. 228 pp.
Rosson, J. F. 1995. The timberland and woodland resources of central and western Oklahoma. Southern Forest Experiment Station, U.S. Department of Agriculture, New Orleans, LA.
Rostlund, E. 1957. The myth of a natural prairie belt in Alabama: An interpretation of historical records. Annals of the Association of American Geographers 47:392-411.
Russell, E. W. B., and A. E. Schuyler. 1988. Vegetation and flora of Hopewell Furnace National Historic Site, eastern Pennsylvania. Bartonia 54:124-143.
Russo, M. J. 1997. Arnold Engineering Development Center preliminary community classification. Appendix to draft report to The Nature Conservancy, Tennessee Field Office, Nashville. 23 pp.
SAF [Society of American Foresters]. 1967. Forest cover types of North America. Society of American Foresters, Washington, DC. 67 pp.
Salas, D. E., T. Folts-Zettner, R. W. Sanders, and J. Drake. 2010c. Vegetation classification and mapping at Chickasaw National Recreation Area. Natural Resource Technical Report NPS/SOPN/NRTR--2010/286. National Park Service, Fort Collins, CO. 176 pp.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Samek, V., and M. Moncada. 1971. Comunidades vegetales de las lagunas blancas de Pinar del Rio, Cuba. Acad. Cien. Cuba, Ser. Pinar del Rio 27:1-48.
Schafale, M. 1998b. Fourth approximation guide. High mountain communities. March 1998 draft. North Carolina Natural Heritage Program, Raleigh.
Schafale, M. 2000. Fourth approximation guide. Coastal Plain. January 2000 draft. North Carolina Natural Heritage Program, Raleigh.
Schafale, M. 2002. Fourth approximation guide. Mountain communities. November 2002 draft. North Carolina Natural Heritage Program, Raleigh.
Schafale, M. P. 2004. Classification of the natural communities of North Carolina, 4th Approximation. Draft report. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program, Raleigh.
Schafale, M. P. 2012. Classification of the natural communities of North Carolina, 4th Approximation. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program, Raleigh.
Schafale, M. P., and A. S. Weakley. 1985. Classification of the natural communities of North Carolina: Second approximation. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program, Raleigh. 202 pp.
Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina. Third approximation. North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation, Natural Heritage Program, Raleigh. 325 pp.
Schmalzer, P. A., and H. R. DeSelm. 1982. Vegetation, endangered and threatened plants, critical plant habitats and vascular flora of the Obed Wild and Scenic River. Unpublished report. USDI National Park Service, Obed Wild and Scenic River. 2 volumes. 369 pp.
Schotz, A., H. Summer, and R. White, Jr. 2008. Vascular plant inventory and ecological community classification for Little River Canyon National Preserve. NatureServe, Durham, NC. 244 pp.
Schotz, A., M. Hall, and R. D. White, Jr. 2006. Vascular plant inventory and ecological community classification for Russell Cave National Monument. NatureServe, Durham, NC. 108 pp.
Schotz, A., and M. Barbour. 2009. Ecological assessment and terrestrial vertebrate surveys for Black Belt Prairies in Alabama. Submitted to Alabama Department of Conservation and Natural Resources, Division of Wildlife & Freshwater Fisheries, State Wildlife Grants Program, Montgomery, AL. Alabama Natural Heritage Program, Environmental Institute, Auburn University, Auburn, AL. [http://www.alnhp.org/reports/Prairie_SWG_Final_Report.PDF]
Schotz, Al. Personal communication. Community Ecologist. Alabama Natural Heritage Program. Huntingdon College, Massey Hall, 1500 East Fairview Avenue, Montgomery, AL 36106-2148.
Schwartz, C. W., and E. R. Schwartz. 1959. The wild mammals of Missouri. University of Missouri Press and Missouri Conservation Commission. 341 pp.
Shreve, F., M. A. Chrysler, F. H. Blodgett, and F. W. Besley. 1910. The plant life of Maryland. Maryland Weather Service. Special Publication, Volume III. The Johns Hopkins Press, Baltimore, MD. 533 pp.
Singleton, R., S. Gardescu, P. L. Marks, and M. A. Geber. 2001. Forest herb colonization of postagricultural forests in central New York State, USA. Journal of Ecology 89:325-338.
Smeins, F. E., D. D. Diamond, and C. W. Hanselka. 1992. Coastal Prairie. Pages 269-290 in: R. T. Coupland, editor. Natural Grasslands. Elsevier, New York.
Smith, L. M. 1988c. The natural communities of Louisiana. Unpublished document. Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge. 35 pp.
Smith, L. M., and N. J. Craig. 1990. The natural communities of Louisiana. Revised edition. Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge. 23 pp.
Smith, L. M., compiler. 1996a. Natural plant communities in Louisiana currently recognized by the Louisiana Natural Heritage Program. Unpublished document. Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge. 2 pp.
Smith, Latimore M. Personal communication. Natural Heritage Program Ecologist. Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge.
Smith, T. L. 1991. Natural ecological communities of Pennsylvania. First revision. Unpublished report. Pennsylvania Science Office of The Nature Conservancy, Middletown, PA. 111 pp.
Sneddon, L. A. 1994. Descriptions of coastal plain pondshore proposed community elements. Unpublished. The Nature Conservancy, Boston, MA.
Sneddon, L. A., Zaremba, R. E., and M. Adams. 2010. Vegetation classification and mapping at Cape Cod National Seashore, Massachusetts. Natural Resources Technical Report NPS/NER/NRTR--2010/147. National Park Service, Philadelphia, PA. 481 pp. [http://biology.usgs.gov/npsveg/caco/cacorpt.pdf]
Sneddon, L., M. Anderson, and K. Metzler. 1994. A classification and description of terrestrial community alliances in The Nature Conservancy's Eastern Region: First approximation. Unpublished report to USDI Fish & Wildlife Service, Gap Analysis Program. The Nature Conservancy, Eastern Heritage Task Force, Boston, MA. 116 pp.
Sneddon, L., R. E. Zaremba, E. Largay, G. Podniesinski, S. Perles, and J. Thompson. 2008. Vegetation classification and mapping of Morristown National Historical Park, New Jersey. Technical Report NPS/NER/NRTR--2008/116. National Park Service, Philadelphia, PA. 162 pp. [http://biology.usgs.gov/npsveg/morr/morrrpt.pdf]

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Southeastern Ecology Working Group of NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification. Terrestrial Vegetation. NatureServe, Durham, NC.
Sperduto, D. D., and W. F. Nichols. 2004. Natural communities of New Hampshire: A guide and classification. New Hampshire Natural Heritage Bureau, DRED Division of Forests and Lands, Concord. 242 pp.
Suiter, D. W. 1995. The vascular flora, rare species and plant migrations of New River Gorge National River, West Virginia. Master's thesis, Marshal University, Huntington, WV. 174 pp.
Swain, P. C., and J. B. Kearsley. 2000. Classification of natural communities of Massachusetts. July 2000 draft. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, MA.
Swain, P. C., and J. B. Kearsley. 2001. Classification of natural communities of Massachusetts. September 2001 draft. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Westborough, MA.
Swain, P. C., and J. B. Kearsley. 2011. Classification of the natural communities of Massachusetts. Version 1.4. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, Westborough, MA. [http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/natural-communities/classification-of-natural-communities.html]
TDNH [Tennessee Division of Natural Heritage]. No date. Unpublished data. Tennessee Division of Natural Heritage, Nashville, TN.
TNC [The Nature Conservancy]. 1985. Global Vertebrate Characterization Abstract Habitats. Unpublished document. The Nature Conservancy, Arlington, VA.
TNC [The Nature Conservancy]. 1995a. A classification and description of plant communities in southern Illinois. Report by the Southern Illinois Field Office, Ullin, IL, and the Midwest Regional Office, Minneapolis, MN.
TNC [The Nature Conservancy]. 1996c. Portfolio assessment and conservation plan for calcareous glades of the Interior Low Plateau (working draft of August 1996). Calcareous Glades Conservation Team, The Nature Conservancy, Chapel Hill, NC. 28 pp.
TNC [The Nature Conservancy]. 1998a. An investigation and assessment of the vegetation of Arnold Air Force Base. Coffee and Franklin counties, Tennessee. The Nature Conservancy, Tennessee Field Office, Nashville. 37 pp. plus appendices.
TNC [The Nature Conservancy]. 1998c. Vegetation Classification of Rock Creek Park. Report for the NBS/NPS Vegetation Mapping Program. The Nature Conservancy, Boston. 50 pp.
TNC [The Nature Conservancy]. [1998]b. Classification of the vegetation of Congaree Swamp National Monument. Report to BRD-NPS Vegetation Mapping Program. The Nature Conservancy, Southern Conservation Science, Chapel Hill, NC. 67 pp.
TNC and WPC [The Nature Conservancy and Western Pennsylvania Conservancy]. 2004. Classification, assessment, and protection of non-forested floodplain wetlands of the Susquehanna drainage. Pennsylvania Natural Heritage Program, Harrisburg, PA. 128 pp.
TNHS [Texas Natural History Survey]. No date. Unpublished data. Texas Natural History Survey, The Nature Conservancy, San Antonio.
Taft, J. B. 1997a. Savanna and open-woodland communities. Pages 24-54 in: M. W. Schwartz, editor. Conservation in highly fragmented landscapes. Chapman and Hall, New York. 436 pp.
Taft, J. B. 2009. Effects of overstory stand density and fire on ground layer vegetation in oak woodland and savanna habitats. In: T. F. Hutchinson, editor. Proceedings of the 3rd Fire in Eastern Oak Forests Conference. 2008 May 20-22. Carbondale, IL. General Technical Report NRS-P-46. USDA Forest Service, Northern Research Station, Newtown Square, PA.
Taft, J. B., M. W. Schwartz, and L. R. Phillippe. 1995. Vegetation ecology of flatwoods on the Illinoian till plain. Journal of Vegetation Science 6:647-666.
Tanner, W. F. 1960. Florida coastal classification. Gulf Coast Association of Geological Societies Transactions 10:259-266.
Tarr, J., G. Botkin, E. L. Rice, E. Carpenter, and M. Hart. 1980. A broad analysis of fifteen sites in the tall-grass prairie of Oklahoma. Proceedings of the Oklahoma Academy of Science 60:39-42.
Taverna, K. and K. D. Patterson. 2008. Vegetation classification and mapping at Fredericksburg and Spotsylvania National Military Park, Virginia. Technical Report NPS/NER/NRTR-2008/126. National Park Service, Philadelphia, PA. 277 pp.
Thomas, R. D., and C. M. Allen. 1996. Atlas of the vascular flora of Louisiana. Volume II: Dicotyledons Acanthaceae - Euphorbiaceae. Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge, LA. 213 pp.
Thompson, E. 1996. Natural communities of Vermont uplands and wetland. Nongame and Natural Heritage Program, Department of Fish and Wildlife in cooperation with The Nature Conservancy, Vermont chapter. 34 pp.
Thompson, E. H., and E. R. Sorenson. 2000. Wetland, woodland, wildland: A guide to the natural communities of Vermont. The Nature Conservancy and the Vermont Department of Fish and Wildlife. University Press of New England, Hanover, NH. 456 pp.
Thompson, E., and J. Jenkins. 1992. Summary of field data from Minuteman National Park plant communities study. A report prepared under a contract with the Massachusetts Natural Heritage and Endangered Species Program for the National Park Service. 39 pp.
Thornbury, W. D. 1965. Regional geomorphology of the United States. John Wiley and Sons, Inc., New York. 609 pp.
Tiner, R. W., Jr. 1985a. Wetlands of Delaware. Cooperative publication of USDI Fish & Wildlife Service, National Wetlands Inventory, Newton Corner, MA, and Delaware Department of Natural Resources and Environmental Control, Dover, DE. 77 pp.
Trusty, J. L., B. G. Lockaby, W. C. Zipperer, and L. R. Goertzen. 2007. Identity of naturalised exotic *Wisteria* (Fabaceae) in the southeastern United States. Weed Research 47:479-487.
Turnbo, Dennis. Personal communication. Retired. National Park Service, Shiloh National Military Park, Shiloh, TN.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Turner, R. L., J. E. Van Kley, L. S. Smith, and R. E. Evans. 1999. Ecological classification system for the national forests and adjacent areas of the West Gulf Coastal Plain. The Nature Conservancy, Nacogdoches, TX. 95 pp. plus appendices.

Turner, R. L., J. E. Van Kley, L. S. Smith, and R. E. Evans. No date. Unpublished data from the national forests and adjacent areas of the West Gulf Coastal Plain. The Nature Conservancy, Nacogdoches, TX.

Tyrrell, L. E. 1987. A floristic survey of buttonbrush swamps in Gahanna Woods State Nature Preserve, Franklin County, Ohio. The Michigan Botanist 26(1):29-36.

UNESCO [United Nations Educational, Scientific and Cultural Organization]. 1973. International classification and mapping of vegetation. Series 6, Ecology and Conservation. United Nations Educational, Scientific, and Cultural Organization. Paris. 93 pp.

USFS [U.S. Forest Service]. 1988. Silvicultural examination and prescription field book. USDA Forest Service, Southern Region. Atlanta, GA. 35 pp.

USGS [U.S. Geological Survey]. 1992. National land cover dataset. U.S. Geological Survey, EROS Data Center, Sioux Falls, SD.

VDNH [Virginia Division of Natural Heritage]. 2003. The natural communities of Virginia: Hierarchical classification of community types. Unpublished document, working list of November 2003. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Ecology Group, Richmond.

VDNH [Virginia Division of Natural Heritage]. No date. Unpublished data. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond.

Van Kley, J. E., G. R. Parker, D. P. Franzmeier, and J. C. Randolph. 1995. Field Guide - Ecological classification of the Hoosier National Forest and surrounding areas of Indiana. USDA Forest Service, Hoosier National Forest.

Van Kley, J. E., and D. N. Hine. 1998. The wetland vegetation of Caddo Lake. Texas Journal of Science 50(4):267-290.

Vanderhorst, J. 2001a. Plant community classification and mapping of the Camp Dawson Collective Training Area, Preston County, West Virginia. West Virginia Natural Heritage Program, West Virginia Division of Natural Resources, Elkins. 101 pp.

Vanderhorst, J. 2001b. Plant communities of the New River Gorge National River, West Virginia: Northern and southern thirds. Non-game Wildlife and Natural Heritage Program, West Virginia Division of Natural Resources. Elkins. 146 pp.

Vanderhorst, J. P., B. P. Streets, J. Jeuck, and S. C. Gawler. 2008. Vegetation classification and mapping of Bluestone National Scenic River, West Virginia. Technical Report NPS/NER/NRTR--2008/106. National Park Service, Philadelphia, PA.

Vanderhorst, J. P., B. P. Streets, Z. Arcaro, and S. C. Gawler. 2010. Vegetation classification and mapping at Gauley River National Recreation Area. Technical Report NPS/NER/NRTR--2010/148. National Park Service, Philadelphia, PA.

Vanderhorst, J. P., J. Jeuck, and S. C. Gawler. 2007. Vegetation classification and mapping of New River Gorge National River, West Virginia. Technical Report NPS/NER/NRTR-2007/092. National Park Service, Philadelphia, PA. 396 pp.

Vanderhorst, J., and B. P. Streets. 2006. Vegetation classification and mapping of Camp Dawson Army Training Site, West Virginia: Second approximation. Natural Heritage Program, West Virginia Division of Natural Resources, Elkins. 83 pp.

Vanderpool, S. S., and E. L. Richards. 1998. A floristic inventory of three bogs on Crowley's Ridge in northeast Arkansas. Journal of the Arkansas Academy of Science 52:99-109. [http://dante.ddns.uark.edu/aas/authors.asp?letter=V]

Vogelmann, H. W. 1969. Vermont natural areas. Report 2. Central Office and Interagency Committee on Natural Resources. State Office Building, Montpelier, VT.

Vogelmann, H. W. 1976. An unusual black gum swamp in Maine. Rhodora 78:326-327.

Voigt, J. W., and R. H. Mohlenbrock. 1964. Plant communities of southern Illinois. Southern Illinois University Press, Carbondale. 202 pp.

WNHI [Wisconsin Natural Heritage Inventory]. No date. Vegetation classification of Wisconsin and unpublished data. Wisconsin Natural Heritage Program, Wisconsin Department of Natural Resources, Madison.

WVNHP [West Virginia Natural Heritage Program]. No date (b). Unpublished data. West Virginia Natural Heritage Program, Elkins.

Walck, J. L., J. M. Baskin, and C. C. Baskin. 1996. Sandstone rockhouses of the eastern United States, with particular reference to the ecology and evolution of the endemic plant taxa. Botanical Review 62(4):311-362.

Walton, D. P., P. P. Coulling, J. Weber, A. Belden, Jr., and A. C. Chazal. 2001. A plant community classification and natural heritage inventory of the Pamunkey River floodplain. Unpublished report submitted to the U.S. Environmental Protection Agency. Natural Heritage Technical Report 01-19. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 200 pp. plus appendices.

Walton, D., and M. Anderson. 1997. Critical habitats and associated communities in the riparian zone of the Gauley River. West Virginia Division of Natural Resources, Natural Heritage Program, Elkins.

Walz, K. S., K. H. Anderson, L. C. Kelly, A. G. Windisch, and M. C. Wong. 2008. New Jersey ecological community crosswalk: A tool for the identification of habitats across jurisdictional boundaries. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton.

Ware, D. M. E., and S. Ware. 1992. An *Acer barbatum*-rich ravine forest community in the Virginia coastal plain. Castanea 57:110-122.

Warren, R.J., II. 2016. Ghosts of Cultivation Past - Native American Dispersal Legacy Persists in Tree Distribution. PLoS ONE 11(3): e0150707. doi:10.1371/journal.pone.0150707 [http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0150707].

Weakley, A. S. 2002. Flora of the Carolinas and Virginia. Unpublished working draft of 2002. UNC Herbarium / North Carolina Botanical Garden, University of North Carolina, Chapel Hill, NC.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Weakley, A. S., K. D. Patterson, S. Landaal, M. Pyne, and others, compilers. 1998. International classification of ecological communities: Terrestrial vegetation of the Southeastern United States. Working draft of March 1998. The Nature Conservancy, Southeast Regional Office, Southern Conservation Science Department, Community Ecology Group. Chapel Hill, NC. 689 pp.
West, E. M. 1934. Canebrakes of the southeastern United States. Ph.D. dissertation, Ohio State University, Columbus.
Wharton, C. H. 1978. The natural environments of Georgia. Georgia Department of Natural Resources, Atlanta. 227 pp.
Wharton, C. H. 1989. The natural environments of Georgia. Georgia Dep. of Natural Resources. Bulletin 114:75-80.
Wharton, C. H., W. M. Kitchens, E. C. Pendleton, and T. W. Sipe. 1982. The ecology of bottomland hardwood swamps of the Southeast: A community profile. U.S. Fish and Wildlife Service, Office of Biological Services. FWS/OBS-81/37. Washington, DC.
Wharton, M. E. 1945. Floristics and vegetation of the Devonian-Mississippian Black-Shale Region of Kentucky. Ph.D. dissertation, University of Michigan, Ann Arbor. 45 pp.
White, J., and M. Madany. 1978. Classification of natural communities in Illinois. Pages 311-405 in: Natural Areas Inventory technical report: Volume I, survey methods and results. Illinois Natural Areas Inventory, Urbana, IL.
White, J., and R. C. Anderson. 1970. A cypress swamp outlier in southern Illinois. Illinois State Academy of Science 63(1):6-13.
White, Jr., R. D. 2003. Vascular plant inventory and plant community classification for Carl Sandburg Home National Historic Site. NatureServe, Durham, NC. 160 pp.
White, Jr., R. D. 2004. Vascular plant inventory and plant community classification for Cowpens National Battlefield. NatureServe, Durham, NC. 126 pp.
White, Jr., R. D. 2005. Vascular plant inventory and plant community classification for Fort Donelson National Battlefield. NatureServe, Durham, NC. 135 pp.
White, Jr., R. D., and T. Govus. 2005. Vascular plant inventory and plant community classification for Kings Mountain National Military Park. NatureServe, Durham, NC. 178 pp.
White, R. D., Jr. 2006. Vascular plant inventory and ecological community classification for Cumberland Gap National Historical Park. NatureServe, Durham, NC. 246 pp.
White, R. D., Jr., and M. Pyne. 2003. Vascular plant inventory and plant community classification for Guilford Courthouse National Military Park. Prepared for the National Park Service. NatureServe, Southeast Regional Office, Durham, NC. 124 pp.
White, R. D., Jr., and T. Govus. 2003. Vascular plant inventory and plant community classification for Ninety Six National Historic Site. Prepared for the National Park Service. NatureServe, Durham, NC. 146 pp.
Whited, Mark. Personal communication. Consultant. Center for Remote Sensing and Mapping Science, University of Georgia, Athens.
Wichmann, B. 2009. Vegetation of geographically isolated montane non-alluvial wetlands of the Southern Blue Ridge of North Carolina. Masters thesis, North Carolina State, Raleigh. [http://www.lib.ncsu.edu/theses/available/etd-05152009-120239/unrestricted/etd.pdf]
Wieland, R. G. 1994b. Mississippi Natural Heritage Program: Ecological communities. Unpublished document. Mississippi Department of Wildlife, Fisheries, and Parks, Museum of Natural Science, Natural Heritage Program, Jackson, MS. 7 pp.
Wieland, R. G. 1995. Jackson Prairie openings, clay barrens of the Gulf Coastal Plain. Unpublished document. Mississippi Department of Wildlife, Fisheries, and Parks, Museum of Natural Science, Natural Heritage Program, Jackson. 49 pp.
Wieland, R. G. 2000b. Ecological communities of Mississippi: Mississippi Natural Heritage Program. Unpublished document. Mississippi Department of Wildlife, Fisheries, and Parks, Museum of Natural Science, Natural Heritage Program, Jackson, MS. 8 pp.
Wieland, R. W. 2000a. Ecology and vegetation of LeFleur's Bluff State Park, Jackson, Mississippi. Journal of the Mississippi Academy of Sciences 45(3):150-183.
Wieland, Ron G. Personal communication. Ecologist, Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi Museum of Natural Science, Mississippi Natural Heritage Program, Jackson.
Wieland, Ron G. Unpublished data. Mississippi Department of Wildlife, Fisheries, and Parks, Museum of Natural Science, Natural Heritage Program, Jackson, MS.
Wiens, J. A., and M. I. Dyer. 1975. Rangeland avifaunas: Their composition, energetics and role in the ecosystem. Pages 146 182 in: D. R. Smith, technical coordinator. Proceedings of the Symposium on Management of Forest and Range Habitats for Nongame Birds. 1975 May 6-9. Tucson, AZ. General Technical Report WO-1. USDA Forest Service, Washington, DC.
Williams, C. E. 1993. Age structure and importance of naturalized *Paulownia tomentosa* in a central Virginia streamside forest. Castanea 58:243-249.
Windisch, A .G. 2014a. Pinelands ecological communities and higher level groups with crosswalk / proposed 2008 revisions to NVC. November 16, 2014 draft. New Jersey Natural Heritage Program, Trenton.
Wolfe, S. H., editor. 1990. An ecological characterization of the Florida Springs Coast: Pithlachascotee to Waccasassa rivers. USDI Fish & Wildlife Service, Biological Report 90(21). Slidell, LA. 323 pp.
Wright, J. P., and J. D. Fridley. 2010. Biogeographic synthesis of secondary succession rates in eastern North America. Journal of Biogeography 37:1584-1596.
Yeager, J. E. 1949. Effect of permanent flooding in a river-bottom timber area. Bulletin of the Illinois Natural History Survey 25:33-65.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Young, J., G. Fleming, P. Townsend, and J. Foster. 2006. Vegetation of Shenandoah National Park in relation to environmental gradients. Final Report (v.1.1). Research technical report prepared for USDI, National Park Service. USGS/NPS Vegetation Mapping Program. 92 pp. plus appendices.

Young, J., G. Fleming, P. Townsend, and J. Foster. 2007a. Vegetation of Shenandoah National Park in relation to environmental gradients. Final Report, volume 1.1. Unpublished report submitted to the U.S. Department of the Interior, National Park Service. 103 pp. plus appendices and GIS products.

Young, J., G. Fleming, W. Cass, and C. Lea. 2009. Vegetation of Shenandoah National Park in relation to environmental gradients, Version 2.0. Technical Report NPS/NER/NRTR--2009/142. National Park Service, Philadelphia, PA. 389 pp.

Zanoni, T. A., P. G. Risser, and I. H. Butler. 1979. Natural areas for Oklahoma. Oklahoma Natural Heritage Program, Norman. 72 pp.

Zimmerman, E. A. 2011m. Pennsylvania Natural Heritage Program. Sycamore Floodplain Forest Factsheet. [http://www.naturalheritage.state.pa.us/Community.aspx?=16025] (accessed January 31, 2012)

Zimmerman, E. A. 2011r. Pennsylvania Natural Heritage Program. Water-willow (*Justicia americana*) - Smartweed Riverbed Community Factsheet. [http://www.naturalheritage.state.pa.us/Community.aspx?=16017] (accessed February 13, 2012)

Zimmerman, E. A., T. Davis, M. A. Furedi, B. Eichelberger, J. McPherson, S. Seymour, G. Podniesinski, N. Dewar, and J. Wagner, editors. 2012. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Heritage Program, Pennsylvania Department of Conservation and Natural Resources, Harrisburg. [http://www.naturalheritage.state.pa.us/Communities.aspx]

Zollner, Douglas. Personal communication. Ecologist, The Nature Conservancy, Arkansas Field Office, Little Rock.

Copyright © 2016 NatureServe | Printed from Biotics on: 9 Feb 2016 | Natchez Trace Parkway

Appendix C: Field Key to Vegetation Associations

Explanation and Use of the Field Key

This is a field key to vegetation associations (plant communities) of the Natchez Trace Parkway (NATR). The vegetation associations in this key represent a subset of the U.S. National Vegetation Classification (USNVC) and were initially identified from field data collected for the NATR vegetation mapping project of the National Park Service Vegetation Mapping Inventory Program. For each vegetation association in the field key, the USNVC association colloquial name is given followed by the Community Element Global (CEGL00###) code or Community Element Park Special (CEPS00####) code. The Alliance Code, Alliance Name, Group Code, and Group Name are also given in brackets. In a few cases, a lead goes to three, rather than two, options.

For best results, all assessments of plant communities in the field should be done on a defined area of homogeneous (uniform) vegetation (i.e., a single vegetation community). For vegetation types that are larger scale (>0.5 hectares [ha]), a half ha area (5,000 meters squared) is used. This area is equivalent to a 40 meter (m) radius around a point or a rectangle of 50 by 100 m. For vegetation types that are smaller scale (0.25–0.5 ha), a quarter ha area (2500 meters squared). This area is equivalent to a 28 m radius around a point or a square 50 m by 50 m.

Some associations that exist as small-scale patches and may not be mappable include seeps, rock outcrops, kudzu dominated, and tallow tree dominated areas, such as CEGL004301, CEGL004394, CEGL004425, CEGL008477, and CEGL004161.

“Appendix B: Descriptions of Vegetation Associations” in the report for the NATR vegetation mapping project is recommended to complement this vegetation field key to determine a correct assessment of vegetation classification.

When the term “total canopy cover” is used, it is in reference to the absolute cover of the entire canopy. All other cover values refer to relative canopy cover of a plant species; for example, if total cover of the tree canopy is 40%, then a notation of >25% cover of sugar maple (*Acer saccharum*) would refer to 25% of the 40% total cover.

Page Reference to Vegetation Keys

Page

KEY TO KEYS....C-5
KEY A – UPLAND EVERGREEN FORESTS....C-6
KEY B – UPLAND MIXED FORESTS....C-7
KEY C – UPLAND DECIDUOUS FORESTS (not Oak-Hickory dominated)....C-9
KEY D – UPLAND DECIDUOUS FORESTS (Oak-Hickory dominated)....C-13
KEY E – WETLAND FORESTS....C-18
KEY F – SHRUBLANDS....C-24
KEY G – GRAMINOID VEGETATION....C-27
KEY H – FORB (BROADLEAF) VEGETATION....C-30
LIST OF INDICATOR SPECIES FOR DIFFERENT HABITAT TYPES....C-33

KEY TO KEYS

1a. Vegetation dominated by trees generally greater than 5 m tall, either closed forests (with 60–100% total canopy cover of trees) or open woodlands (with 25–60% total canopy cover of trees)..... **2**

1b. Vegetation not dominated by trees; trees greater than 5 m tall are absent or very sparse (with <25% total canopy cover of trees), includes natural barrens and prairies that have sparse trees such as Eastern Redcedar (*Juniperus virginiana*), have less than 25% total canopy cover of trees, and have grasses and other herbaceous plants typical of natural barrens and prairies **3**

2a. Upland forests and woodlands, not prone to flooding or saturation **5**

2b. Forests of bottomlands, swamps, seeps or other areas prone to flooding. ***These areas may not currently be wet; a list of species characteristic of areas prone to flooding is presented at the end of this document, as well as a list of hydrophytic trees ..... (p. C-18) ***KEY E – WETLAND FORESTS***

3a. Shrub-dominated and vine-dominated areas (with few or no trees)(p. C-24) ***KEY F – SHRUBLANDS***

3b. Vegetation dominated by herbaceous plants..... **4**

4a. Vegetation dominated or characterized by grasses or grass-like plants (perennial or annual) .....(p. C-27) ***KEY G – GRAMINOID VEGETATION***

4b. Vegetation dominated by forbs (broadleaf herbaceous plants)..... ..... (p. C-30) ***KEY H – FORB (BROADLEAF) VEGETATION***

5a. Upland deciduous forests or woodlands, if evergreen trees are present they are a minor canopy component (less than 25% cover of evergreen trees)..... **7**

5b. Upland forests or woodlands dominated or codominated by evergreen trees (greater than 25% cover of evergreen trees) in the canopy layer such as Pine (*Pinus* spp.), Eastern Redcedar (*Juniperus virginiana*), or Southern Magnolia (*Magnolia grandiflora*) **6**

6a. Upland evergreen forests or woodlands; dominated by evergreen trees (generally greater than 50% cover of evergreen trees) .....(p. C-6) ***KEY A – UPLAND EVERGREEN FORESTS***

6b. Upland mixed forests or woodlands; codominated by a mixture of evergreen and deciduous trees (at least 25% of one and 20% of the other) .....(p. C-7) ***KEY B – UPLAND MIXED FORESTS***

7a. Upland deciduous forests or woodlands, not dominated by Oak (*Quercus* spp.) and/or Hickory (*Carya spp.*) .....(p. C-9) ***KEY C – UPLAND DECIDUOUS FORESTS (not Oak-Hickory dominated)***

7b. Upland deciduous forests or woodlands, dominated by Oak (*Quercus* spp.) and/or Hickory (*Carya spp.*) with combined cover of Oak and Hickory trees at least 50% of the canopy (relative cover) .... (p. C-13) ***KEY D – UPLAND DECIDUOUS FORESTS (Oak-Hickory dominated)***

KEY A – UPLAND EVERGREEN FORESTS

1a. Evergreen forest, dominated (greater than 50%) by Eastern Redcedar (*Juniperus virginiana*)..... 2
1b. Evergreen forest dominated by Pine (*Pinus* spp.)..... 3

2a. Successional Eastern Redcedar (*Juniperus virginiana*) evergreen forests, not in the Black Belt region, not between mile markers 247 and 264.....***Ruderal Eastern Red-cedar Forest*** **(CEGL007124)**
.....[A3227 *Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest Alliance*
.....in G030 *Eastern North American Native Ruderal Forest Group*]
2b. Natural vegetation on chalk in the Black Belt region (between mileposts 247 and 264 mainly in Lee County, MS), dominated by Eastern Redcedar (*Juniperus virginiana*). .....
.....***Black Belt Prairie Cedar Woodland*** **(CEGL007747)**
.....[A3273 *Chinquapin Oak - Blue Ash - Eastern Red-cedar Woodland Alliance*
..... in G601 *Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest Group*]

3a. Evergreen forest dominated by Loblolly Pine (*Pinus taeda*)..... 5
3b. Evergreen forest dominated by Virginia Pine (*Pinus virginiana*), Shortleaf Pine (*Pinus echinata*), or White Pine (*Pinus strobus*).....(3 choices) 4
.....[A3227 *Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest Alliance*
.. in G030 *Eastern North American Native Ruderal Forest Group*] (NOTE: has 3 Association choices)

4a. (one of 3 choices) Dominated by Virginia Pine (*Pinus virginiana*).....
.....***Ruderal Virginia Pine Forest*** **(CEGL002591)**
4b. (one of 3 choices) Dominated by Shortleaf Pine (*Pinus echinata*).....
.....***Ruderal Shortleaf Pine Forest*** **(CEGL006327)**
4c. (one of 3 choices) Dominated by White Pine (*Pinus strobus*).....
..... ***Ruderal Eastern White Pine Forest*** **(CEGL007944)**

5a. Monospecific stands of (generally young) planted and intensively managed Loblolly Pine (*Pinus taeda*), with little understory .....***Loblolly Pine Plantation*** **(CST007179)**
.....[CTY012 *Native Southern Pine Plantation Cultural Type*
.....in CSG005 *Eastern North American Temperate Forest Plantation Cultural Subgroup*]
5b. Forest dominated by Loblolly Pine (*Pinus taeda*) with a hardwood component of the canopy or subcanopy.....(3 choices) 6
..... [A3231 *Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest Alliance*
..... in *Southeastern Native Ruderal Forest Group*] (NOTE: has 3 Association choices)

6a. (one of 3 choices) Forest or woodland with monospecific canopy dominated by Loblolly Pine and with subcanopy primarily of Sweetgum (*Liquidambar styraciflua*) and/or Red Maple (*Acer rubrum var. rubrum*) .....***Ruderal Loblolly Pine / Sweetgum - Red Maple Forest*** **(CEGL006011)**
6b. (one of 3 choices) Loblolly Pine forest with significant Sweetgum (*Liquidambar styraciflua*) in the canopy, typical of unmanaged, older planted or successional Loblolly Pine stands.....
..... ***Ruderal Loblolly Pine - Sweetgum Forest*** **(CEGL008462)**
6c. (one of 3 choices) Evergreen mixed forest of Loblolly Pine (*Pinus taeda)* with an evergreen oak component of Water Oak (*Quercus nigra*) and/or Sand Laurel Oak (*Quercus hemisphaerica*) and sometimes with Southern Red Oak (*Quercus falcata*) and Sweetgum (*Liquidambar styraciflua*).....
..... ***Ruderal Loblolly Pine - Oak Forest*** **(CEGL008450)**

KEY B – UPLAND MIXED FORESTS

1a. Forests codominated by Shortleaf Pine (*Pinus echinata),* Loblolly Pine (*Pinus taeda),* and Cherrybark Oak (*Quercus pagoda*) ..... ***Mixed Pine - Cherrybark Oak Forest*** **(CEGL004834)**
..... [A3270 *Coastal Plain Shortleaf Pine - Oak Woodland Alliance*
.....in G012 *Shortleaf Pine - Oak Forest & Woodland Group*]

1b. Forests not as above, not codominated by Shortleaf Pine (*Pinus echinata*), Loblolly Pine (*Pinus taeda*), and Cherrybark Oak (*Quercus pagoda*) .....(3 choices) 2

2a. (one of 3 choices) Successional Eastern Redcedar (*Juniperus virginiana*) mixed forests, not in the Black Belt region, not between mileposts 247 and 264 .....
.....***Ruderal Eastern Red-cedar Forest*** **(CEGL007124)**
..... [A3227 *Ruderal Eastern Red-cedar - Virginia Pine - Mixed Conifer Forest Alliance*
.....in G030 *Eastern North American Native Ruderal Forest Group*]

2b. (one of 3 choices) Forests of Shortleaf Pine (*Pinus echinata*) mixed with Oak (*Quercus* spp.)..... 5
..... [A3270 *Coastal Plain Shortleaf Pine - Oak Woodland Alliance*
.....in G012 *Shortleaf Pine - Oak Forest & Woodland Group*]

2c. (one of 3 choices) Forests of Loblolly Pine (*Pinus taeda*), Spruce Pine (*Pinus glabra*), and/or Southern Magnolia (*Magnolia grandiflora*) mixed with deciduous hardwoods .....(3 choices) 3

3a. (one of 3 choices) Natural (not successional) forests of Loblolly Pine (*Pinus taeda)* and/or Spruce Pine (*Pinus glabra*), and White Oak (*Quercus alba*) and without Cherrybark Oak (*Quercus pagoda*) or Southern Sugar Maple (*Acer barbatum*) 7

3b. (one of 3 choices) Forests with Southern Magnolia (*Magnolia grandiflora*) and/or Loblolly Pine (*Pinus taeda)* mixed with mesic hardwoods such as American Beech (*Fagus grandifolia*)*,* White Ash (*Fraxinus americana*), Cherrybark Oak (*Quercus pagoda*) and Southern Sugar Maple (*Acer barbatum*) 4

3c. (one of 3 choices) Loblolly Pine forest with significant Oak (*Quercus* spp.) and/or Sweetgum (*Liquidambar styraciflua*) in the canopy, typical of unmanaged, older planted or successional Loblolly Pine and Loblolly Pine mixed hardwood stands..... 8

4a. Calcareous beech - magnolia forest with canopy dominated by American Beech (*Fagus grandifolia*) and Southern Magnolia (*Magnolia grandiflora*), with lesser amounts of American Elm (*Ulmus americana*), White Ash (*Fraxinus americana*), White Oak (*Quercus alba*), Southern Basswood (*Tilia americana var. caroliniana*), Pignut Hickory (*Carya glabra*), Shumard's Oak (*Quercus shumardii*), Chinquapin Oak *(Quercus muehlenbergii*), Swamp Chestnut Oak (*Quercus michauxii*), and Black Walnut (*Juglans nigra*) .....
.....***East Gulf Coastal Plain Calcareous Bluff Beech - Magnolia Forest*** **(CEGL007458)**
.....[A0369 *Beech - Magnolia Forest Alliance*
.....in G007 *Southern Mesic Beech - Magnolia - Oak Forest Group*]

4b. Forests on loess soils of Southern Magnolia (*Magnolia grandiflora*) and Loblolly Pine (*Pinus taeda)* mixed with hardwoods such as American Beech (*Fagus grandifolia*), Cherrybark Oak (*Quercus pagoda*) and Southern Sugar Maple (*Acer barbatum*) .....
.....***Southern Loess Hills Hardwood -Pine Forest*** **(CEGL004963)**
.....[A0369 *Beech - Magnolia Forest Alliance*
.....in G007 *Southern Mesic Beech - Magnolia - Oak Forest Group*]

5a. Shortleaf Pine (*Pinus echinata)* with Post Oak (*Quercus stellata*) or Southern Red Oak (*Quercus falcata*)..... 6

5b. Shortleaf Pine (*Pinus echinata)* mixed with White Oak (*Quercus alba*) and/or Mockernut Hickory (*Carya alba*) ..... ***Upper East Gulf Coastal Plain Shortleaf Pine - Mesic Oak Forest*** **(CEGL004050)**

6a. Shortleaf Pine (*Pinus echinata)* mixed with Southern Red Oak (*Quercus falcata*); examples may also contain Black Oak (*Quercus velutina),* Scarlet Oak (*Quercus coccinea*) .... ***East Gulf Coastal Plain Shortleaf Pine - Southern Red Oak Forest*** **(CEGL004052)**

6b. Shortleaf Pine (*Pinus echinata*) mixed with Post Oak (*Quercus stellata*); examples may have Blackjack Oak (*Quercus marilandica*)..... ..... ***East Gulf Coastal Plain Shortleaf Pine - Post Oak Forest*** **(CEGL004053)**

7a. Natural (not successional) forests of Loblolly Pine (*Pinus taeda*) with White Oak (*Quercus alba*) and without Southern Magnolia (*Magnolia grandiflora*), Cherrybark Oak (*Quercus pagoda*) or Southern Sugar Maple (*Acer barbatum*) ***East Gulf Coastal Plain Loblolly – White Oak Forest*** **(CEGL004763)** ..... [A2059 *Mesic Southern Coastal Plain Deciduous Forest Alliance* ..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]

7b. Natural (not successional) forests of Spruce Pine (*Pinus glabra*), Loblolly Pine (*Pinus taeda),* American Beech (*Fagus grandifolia*), and White Oak (*Quercus alba*); Southern Magnolia (*Magnolia grandiflora*) can be present, but not north of Jackson, Mississippi..... ..... ***East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest*** **(CEGL007460)** .....[A0369 *Beech - Magnolia Forest Alliance* .....in G007 *Southern Mesic Beech - Magnolia - Oak Forest Group*]

8a. Loblolly Pine (*Pinus taeda*) forest with significant Sweetgum (*Liquidambar styraciflua*) in the canopy, typical of unmanaged, older planted or successional Loblolly Pine (*Pinus taeda*) stands .... ***Ruderal Loblolly Pine - Sweetgum Forest*** **(CEGL008462)** ..... [A3231 *Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest Alliance* ..... in G031 *Southeastern Native Ruderal Forest Group*]

8b. Evergreen mixed forest of Loblolly Pine (*Pinus taeda)* with an evergreen oak component of Water Oak (*Quercus nigra*) and/or Sand Laurel Oak (*Quercus hemisphaerica*) and sometimes with Southern Red Oak (*Quercus falcata*) and Sweetgum (*Liquidambar styraciflua*)..... ..... ***Ruderal Loblolly Pine - Oak Forest*** **(CEGL008450)** ..... [A3231 *Loblolly Pine - Tuliptree - Sweetgum Ruderal Forest Alliance* ..... in G031 *Southeastern Native Ruderal Forest Group*]

KEY C – UPLAND DECIDUOUS FORESTS (not Oak-Hickory dominated)

1a. Forest or woodland dominated by native trees 2
1b. Forest or woodland dominated by exotic trees 19

2a. Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Post Oak (*Quercus stellata*), or Chinquapin Oak (*Quercus muehlenbergii*) and/or Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*). Woodland canopy is generally between 25 and 60% total canopy cover, but can be more in degraded (overstocked) examples of this woodland type 3
2b. Not an open woodland, but instead a forest (>60% total canopy cover of canopy and subcanopy combined) 4

3a. Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Post Oak (*Quercus stellata*), Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*) ..... ***Western Highland Rim Post Oak Barrens* (CEGL004686)** ..... [A3291 *Interior Low Plateau Mixed Oak Woodland Alliance* ..... in G159 *South-Central Interior Oak Forest & Woodland Group*]
3b. Open canopied grassy woodland (in the Western Highland Rim of Tennessee's Interior Low Plateau) without Post Oak (*Quercus stellata*), but usually with Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*) ..... ***Western Highland Rim Blackjack Oak Barrens (CEGL004756)*** ..... [A3315 *Clay/Loess Oak Woodland Alliance* ..... in G651 *South-Central Interior Oak Savanna & Barrens Group*]

4a. Forests dominated or codominated by Sweetgum (*Liquidambar styraciflua*), Tuliptree (*Liriodendron tulipifera*), and/or Pecan (*Carya illinoinensis*) OR highly disturbed stand (less than 30 years old) dominated by a variable mixture of early successional species such as Red Maple (*Acer rubrum*), Sugar Maple (*Acer* saccharum), Redbud (*Cercis canadensis*), Persimmon (*Diospyros virginiana*), Ash (*Fraxinus sp.*), Honey-locust (*Gleditsia triacanthos*), Eastern Redcedar (*Juniperus virginiana*), and/or Elm (*Ulmus* spp.) 5
4b. Forests not dominated nor codominated by Sweetgum (*Liquidambar styraciflua*), Tuliptree (*Liriodendron tulipifera*), nor Pecan (*Carya illinoinensis*), nor a mixture of successional species. Forest may be dominated or codominated by American Beech (*Fagus grandifolia*) and/or Sugar Maple (*Acer saccharum*), Southern Sugar Maple (*Acer barbatum*), or Black Maple (*Acer nigrum*); OR (in the east gulf coastal plain) by Shumard's oak (*Quercus shumardii*) with Mockernut Hickory (*Carya alba*) and White Ash (*Fraxinus americana*) 15

5a. Forest on loess slopes, dominated by Sweetgum (*Liquidambar styraciflua*), (and usually) Pecan (*Carya illinoinensis*), and to a lesser extent Water Oak (*Quercus nigra*). Only found south of vicinity of milepost 80, SW of Jackson, MS ..... ***Loess Bluff Sweetgum - Pecan - Water Oak Forest* (CEGL004122)** ..... [A3234 *Mesic Coastal Plain Oak - Hickory Forest Alliance* ..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]
5b. Forest not having the above combination of characteristics, more widely distributed 6

6a. Forests successional, stands composed of a variable mixture of early successional species 8
6b. Forests not successional, natural mesic forests on slopes, with American Beech (*Fagus grandifolia*), Tuliptree (*Liriodendron tulipifera*), and/or White Oak (*Quercus alba*) 7

7a. Mature mesic forests of the Tennessee (and perhaps Alabama) Highland Rim (generally not successional) with White Oak (*Quercus alba*), Tuliptree (*Liriodendron* tulipifera), and Hickories (*Carya* spp.) ..... ***Highland Rim White Oak – Tuliptree Mesic Lower Slope Forest*** **(CEGL007709)**
..... [A3291 *Interior Low Plateau Mixed Oak Woodland Alliance*
..... in *G159 South-Central Interior Oak Forest & Woodland Group*]
7b. Mesic hardwood forests on slopes, dominated by American Beech (*Fagus grandifolia*) and Tuliptree *(Liriodendron tulipifera*) generally lacking oak (*Quercus* spp.), Sugar Maple (*Acer saccharum*), and Southern Sugar Maple (*Acer barbatum*). Found north of Jackson, MS (milepost 87), could range north into Alabama and southern Tennessee. .....
..... ***Southern Mesic Beech - Tuliptree Slopes*** **(CEGL007201)**
..... [A2033 *Interior Highlands Basic Mesic Forest Alliance*
..... in G020 *Appalachian & Interior Mesic Forest Group*]

8a. Forests dominated by Black Locust (*Robinia pseudoacacia*) or Honey-locust (*Gleditsia triacanthos*). 9
..... [A3228 *Ruderal Tuliptree - Black Walnut - Black Locust Forest Alliance*
..... in G030 Eastern North American Native Ruderal Forest Group]
8b. Forest not dominated by Black Locust (*Robinia pseudoacacia*) 10

9a. Forests dominated by Black Locust (*Robinia pseudoacacia*) .....
..... ***Ruderal Black Locust Forest*** **(CEGL007279)**
9a. Forests dominated by Honey-locust (*Gleditsia triacanthos*), typically with Elm (*Ulmus* spp.) .....
..... ***Ruderal Honey-locust - Elm Woodland*** **(CEGL003686)**

10a. Forest codominated by Hackberry (*Celtis occidentalis*) or Sugarberry (*Celtis laevigata*) .....
..... ***Interior Low Plateau Ruderal Sugarberry, Hackberry Forest*** **(CEGL004697)**
..... [A3228 *Ruderal Tuliptree - Black Walnut - Black Locust Forest Alliance*
..... *Tuliptree - Black Walnut - Black Locust Ruderal Forest Alliance*
..... in G030 *Eastern North American Native Ruderal Forest Group*]
10b. Forest not codominated by Hackberry *(Celtis occidentalis*) or Sugarberry (*Celtis laevigata*) 11

11a. Forests dominated or codominated by Sweetgum (*Liquidambar styraciflua*) and/or by Tuliptree (*Liriodendron tulipifera*) 12
11b. Forest not wholly dominated by either Sweetgum or Tuliptree, but instead dominated by a variable mixture of Sugar Maple (*Acer saccharum*), Red Maple (*Acer rubrum*), Redbud (*Cercis canadensis*), Eastern Redcedar (*Juniperus virginiana*), Osage-orange (*Maclura pomifera*), and/or Winged Elm (*Ulmus alata*), with potentially some Tuliptree and Sweetgum, but these at less than 25% relative combined cover. This is a catch-all placeholder for highly disturbed early successional vegetation found along dry to mesic uplands along the Parkway (a park special, not a recognized USNVC type)..
..... **Ruderal Mixed Deciduous Forest (CEPS004809)**
..... [in G031 *Southeastern Native Ruderal Forest Group*]

12a. Forests dominated or codominated by Sweetgum (*Liquidambar styraciflua*) 13
..... [A3232 *Ruderal Sweetgum - Sugarberry - Water Oak Forest Alliance*
..... in G031 Southeastern Native Ruderal Forest Group]
12b. Forests dominated or codominated by Tuliptree (*Liriodendron tulipifera*) 14
..... [A3228 *Ruderal Tuliptree - Black Walnut - Black Locust Forest Alliance*
..... in G030 *Eastern North American Native Ruderal Forest Grou*p]

13a. Forest, typically early successional, nearly completely dominated by Sweetgum (*Liquidambar styraciflua*) on disturbed or formerly cut-over sites ..... ***Ruderal Sweetgum Forest*** **(CEGL007216)**
13b. Mid to late successional forest dominated by Sweetgum (*Liquidambar styraciflua*) with Oak (*Quercus* spp.) and/or Tuliptree (*Liriodendron tulipifera*) in the overstory. Occasionally contains remnant Loblolly Pine (*Pinus taeda*), in some stands that may have been CEGL008462 in the past .....
..... ***Ruderal Interior Sweetgum - Oak Forest*** **(CEGL007217)**

14a. Forest dominated or codominated by Tuliptree (*Liriodendron tulipifera*) with a hardwood component indicative of acidic conditions; with Red Maple (*Acer rubrum*), White Oak (*Quercus alba*), or Southern Red Oak (*Quercus falcata*) ..... ***Ruderal Tuliptree Forest (Typic Type)*** **(CEGL007221)**
14b. Forest dominated or codominated by Tuliptree (*Liriodendron tulipifera*) with a hardwood component indicative of basic or circumneutral conditions; with a diverse herbaceous layer and woody associates such as Black Walnut (*Juglans nigra*), White Ash (*Fraxinus americana*), Slippery Elm (*Ulmus rubra*), Chinquapin Oak (*Quercus muehlenbergii*), and Shagbark Hickory (*Carya ovata)*. Species often found in the subcanopy include Sugar Maple (*Acer saccharum*), Redbud (*Cercis canadensis*), and Spicebush (*Lindera benzoin*) ..... ***Ruderal Tuliptree Forest (Rich Type)*** **(CEGL007220)**

15a. Mature calcareous slope forest characterized by prominence of Shumard's Oak (*Quercus shumardii*) in the moderately dense canopy (20–35 m tall), and to a lesser extent, by Mockernut Hickory (*Carya alba*) and White Ash (*Fraxinus americana*). The moderately dense subcanopy (10–15 m) is dominated by Southern Sugar Maple (*Acer barbatum*) and Chinquapin Oak (*Quercus muehlenbergii*). American Hornbeam (*Carpinus caroliniana*) is the dominant shrub or understory tree.....
..... ***Upper East Gulf Calcareous Bluff Forest*** **(CEGL004671)**
..... [A3236 *Coastal Plain Mesic Southern Sugar Maple - Oak Forest Alliance*
..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]
15b. Forest not having the above combination of characteristics 16

16a. Forests dominated or codominated by American Beech (*Fagus grandifolia*) and/or Sugar Maple (*Acer saccharum*), Southern Sugar Maple (*Acer barbatum*) or Black Maple (*Acer nigrum*), this latter species only found at a few locations in Tennessee 17
16b. Forests not dominated or codominated by American Beech or Sugar Maple, etc. .....
..... **See Key D UPLAND DECIDUOUS FORESTS** (Oak-Hickory dominated)

17a. Forests south of Jackson, MS only, canopy dominated by American Beech (*Fagus grandifolia*) and White Oak (*Quercus alba*), with Blackgum (*Nyssa sylvatica*), Sweetgum (*Liquidambar styraciflua*), and Sand Laurel Oak (*Quercus hemisphaerica*) (this more prevalent on upper slopes). The open subcanopy can contain Southern Magnolia (*Magnolia grandiflora*), Big-leaf Magnolia (*Magnolia macrophylla*), Hop Hornbeam (*Ostrya virginiana*), Tuliptree (*Liriodendron tulipifera*), Red Maple (*Acer rubrum*), and Flowering Dogwood (*Cornus florida*)..... ***East Gulf Coastal Plain Rich Beech – White Oak Forest* (CEGL007210)** [A2059 *Mesic Southern Coastal Plain Deciduous Forest Alliance* in G166 Southern Mesic Beech - Oak - Mixed Deciduous Forest Group]

17b. Forests of northern MS, AL, and TN that are dominated by American Beech (*Fagus grandifolia*) and/or Sugar Maple (*Acer saccharum*), or with Black Maple (*Acer nigrum*), this species found only at a few locations in Tennessee 18
..... [A2033 *Interior Highlands Basic Mesic Forest Alliance* in G020 *Appalachian & Interior Mesic Forest Group*]

18a. White Oak (*Quercus alba*) not present or at very low cover (type occurs in Alabama and Tennessee only). Canopy is usually dominated by American Beech (*Fagus grandifolia*), but occasionally it is completely supplanted by Sugar Maple (*Acer saccharum*). Black Maple (*Acer nigrum*) may replace or accompany Sugar Maple in some cases. Other canopy species can include Tuliptree (*Liriodendron* tulipifera), Sweetgum (*Liquidambar styraciflua*), White Ash (*Fraxinus americana*), Northern Red Oak (*Quercus rubra*), Basswood (*Tilia americana*), Pignut Hickory (*Carya glabra*), and Bitternut Hickory (*Carya cordiformis*)..... ***Beech - Maple Unglaciated Forest* (CEGL002411)**

18b. White Oak (*Quercus alba*) present, often codominant. Tuliptree (*Liriodendron* tulipifera) can sometimes be codominant ..... ***Central Interior Beech - White Oak Forest* (CEGL007881)**

19a. Forest dominated by exotic trees typical of invaded habitats in the Interior Low Plateau and related areas, such as Tree of Heaven (*Ailanthus altissima*) or Princesstree (*Paulownia tomentosa*) 20
..... [A3230 *Eastern Exotic Ruderal Forest Alliance* in G032 *Northern & Central Exotic Ruderal Forest Group*]

19b. Forest dominated by other exotic trees typical of the Coastal Plain, such as Chinaberrytree (*Melia azedarach*) or Chinese Tallow (*Triadica sebifera*) 21
..... [A3233 *Southeastern Exotic Ruderal Forest Alliance* in G779 *Southeastern Exotic Ruderal Forest Group*]

20a. Forest dominated by the exotic (not native) Tree of Heaven (*Ailanthus altissima*)..... ***Ruderal Tree-of-Heaven Forest* (CEGL007191)**

20b. Forest or woodland dominated by Princesstree (*Paulownia tomentosa*) ..... ***Ruderal Princess-tree Woodland* (CEGL003687)**

21a. Forest dominated by Chinese Tallow (*Triadica sebifera*)..... ***Ruderal Upland Chinese Tallow Forest* (CEGL007037)**

21b. Forest dominated by Chinaberrytree (*Melia azedarach*); (a park special, not a recognized USNVC type)..... ***Ruderal Chinaberrytree Forest* (CEPS004837)**

KEY D – UPLAND DECIDUOUS FORESTS (Oak-Hickory dominated)

1a. Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Post Oak (*Quercus stellata*), or Chinquapin Oak (*Quercus muehlenbergii*) and/or Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*). Woodland canopy is generally between 25 and 60% total canopy cover, but can be more in degraded (overstocked) examples of this woodland type .....(3 choices) 2

1b. Not an open woodland, but instead a forest (>60% total canopy cover of canopy and subcanopy combined)..... 3

2a. (one of 3 choices) Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Post Oak (*Quercus stellata*), or Blackjack Oak (*Quercus marilandica*) and with Little Bluestem (*Schizachyrium scoparium*) ..... ***Western Highland Rim Post Oak Barrens* (CEGL004686)** .....[A3291 *Interior Low Plateau Mixed Oak Woodland Alliance* .....in G159 *South-Central Interior Oak Forest & Woodland Grou*p]

2b. (one of 3 choices) Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) without Post Oak (*Quercus stellata*), but with Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*)..... ***Western Highland Rim Blackjack Oak Barrens* (CEGL004756)** .....[A3315 *Clay/Loess Oak Woodland Alliance* ..... in G651 *South-Central Interior Oak Savanna & Barrens Group*]

2c. (one of 3 choices) Open canopied woodland on steep shale slopes with Chinquapin Oak (*Quercus muehlenbergii*), White Ash (*Fraxinus americana*), Eastern Redcedar (*Juniperus virginiana*), Hop Hornbeam (*Ostrya virginiana*), Redbud (*Cercis canadensis*), Coralberry (*Symphoricarpos orbiculatus*), and Little Bluestem (*Schizachyrium scoparium*) ..... ***Chinquapin Oak Unglaciated Bluff Woodland* (CEGL004267)** .....[A3273 *Chinquapin Oak - Blue Ash - Eastern Red-cedar Woodland Alliance* ..... in G601 *Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest Group*]

3a. Forests dominated or codominated by American Beech (*Fagus grandifolia*) or Sugar Maple (*Acer saccharum*) with codominant oaks [White Oak (*Quercus alba*], Northern Red Oak [*Quercus rubra*]), some examples of *Beech - Maple Unglaciated Forest* (CEGL002411) may lack American Beech (*Fagus grandifolia*) ..... 4 .....[A2033 *Interior Highlands Basic Mesic Forest Alliance* .....in G020 *Appalachian & Interior Mesic Forest Group*]

3b. Forests not dominated or codominated by American Beech (*Fagus grandifolia*) or Sugar Maple (*Acer saccharum*) 5

4a. White Oak (*Quercus alba*) not present or at very low cover (type occurs in Tennessee only). The forest canopy is dominated by American Beech (*Fagus grandifolia*) and Sugar Maple (*Acer saccharum*), though some examples only have a token amount of American Beech. Black Maple (*Acer nigrum*) may replace or accompany Sugar Maple in some cases. Other canopy species include Tuliptree (*Liriodendron tulipifera*), Sweetgum (*Liquidambar styraciflua*), White Ash (*Fraxinus americana*), Northern Red Oak (*Quercus rubra*), Basswood *(Tilia americana*), Pignut Hickory *(Carya glabra*), and Bitternut Hickory (*Carya cordiformis*) ..... ***Beech - Maple Unglaciated Forest*** **(CEGL002411)**

4b. White Oak (*Quercus alba*) present, often codominant ..... ***Central Interior Beech - White Oak Forest*** **(CEGL007881)**

5a. Dry forests dominated or codominated by Chestnut Oak (*Quercus prinus*) or dominated by Scarlet Oak (*Quercus coccinea*), but in some cases, dry-site hickories may dominate, but Chestnut Oak will still be the primary oak species 11
..... [A3289 *Southern Chestnut Oak Forest Alliance* ..... in G159 *South-Central Interior Oak Forest & Woodland Group*]

5b. Forests dry to mesic, not dominated nor codominated by Chestnut Oak (*Quercus prinus*) 6

6a. Basic or circumneutral forests dominated or codominated by Chinquapin Oak (*Quercus muehlenbergii),* Cherrybark Oak (*Quercus pagoda)*, Water Oak (*Quercus nigra*), and/or Shumard's Oak (*Quercus shumardii*) 7

6b. Forests neither dominated nor codominated by Chinquapin Oak (*Quercus muehlenbergii)*, Cherrybark Oak (*Quercus pagoda)*, Water Oak (*Quercus nigra*), or Shumard's Oak (*Quercus shumardii*) 12

7a. Forests with White Oak (*Quercus alba),* Northern Red Oak (*Quercus rubra),* Chinquapin Oak (*Quercus muehlenbergii),* and/or Black Oak *(Quercus velutina)* important components of the canopy . ..... ***White Oak - Mixed Oak Dry-Mesic Alkaline Forest*** **(CEGL002070)**
..... [A2060 *South-Central Interior Chinquapin Oak - Maple - Ash Forest Alliance* ..... in G601 Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest Group]

7b. Forests with Chinquapin Oak (*Quercus muehlenbergii),* Cherrybark Oak (*Quercus pagoda),* Water Oak (*Quercus nigra),* and/or Shumard's Oak (*Quercus shumardii*) codominant and with insignificant canopy cover of Northern Red Oak (*Quercus rubra*) and *Quercus velutina* (Black Oak). Usually White Oak (*Quercus alba*) is also insignificant, but it may be important in some examples of CEGL008442 (at 10b below). 8

8a. Forest canopy dominated by Water Oak (*Quercus nigra*), other oaks may be intermixed, especially Willow Oak (*Quercus phellos*), as well as Sweetgum (*Liquidambar styraciflua*)..... ***Ruderal Water Oak Forest*** **(CEGL004638)**
..... [A3232 *Sweetgum - Sugarberry - Water Oak Ruderal Forest Alliance* ..... in G031 *Southeastern Native Ruderal Forest Group*]

8b. Forest canopy not dominated by Water Oak (*Quercus nigra*).....(3 choices) 9

9a. (one of 3 choices) Forests on rocky calcareous bluffs in northeastern Mississippi or adjacent Alabama, as well as in the Black Belt and related regions canopy species include Southern Sugar Maple (*Acer barbatum*), Ohio Buckeye (*Aesculus glabra*), Carolina Shagbark Hickory (*Carya carolinae-septentrionalis*), Shellbark Hickory (*Carya laciniosa*), Nutmeg Hickory (*Carya myristiciformis*), Sugarberry (*Celtis laevigata*), White Ash (*Fraxinus americana*), Blue Ash (*Fraxinus quadrangulata*), Honey-locust (*Gleditsia triacanthos*), Black Walnut (*Juglans nigra*), Red Mulberry (*Morus rubra*), Sycamore (*Platanus occidentalis*), Eastern Cottonwood (*Populus deltoides*), Chinquapin Oak (*Quercus muehlenbergii*), Shumard's Oak (*Quercus shumardii*), Southern Basswood (*Tilia americana var. caroliniana*), Winged Elm (*Ulmus alata*), and American Elm (*Ulmus americana*) ..... ***Upper East Gulf Calcareous Bluff Forest*** **(CEGL004671)**
..... [A3236 Coastal Plain Mesic Southern Sugar Maple - Oak Forest Alliance
..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]

9b. (one of 3 choices) Forests on loess in SW Mississippi, dominated by *Quercus nigra* and *Quercus pagoda* ..... ***Cherrybark Oak – Water Oak Loess Bluff Forest*** **(CEGL004109)**
..... [A3235 *Coastal Plain Shumard Oak - Cherrybark Oak - White Ash Forest Alliance*
..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]

9c. (one of 3 choices) Forests in Alabama or Tennessee 10
..... [A2060 *South-Central Interior Chinquapin Oak - Maple - Ash Forest Alliance*
..... in G601 *Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest Group*]

10a. Dry-mesic forests in Alabama or Tennessee, dominated by combinations of Carolina Shagbark Hickory (*Carya carolinae-septentrionalis*), Shagbark Hickory (*Carya ovata*), White Ash (*Fraxinus americana*), White Oak (*Quercus alba*), Southern Red Oak (*Quercus falcata*), Chinquapin Oak (*Quercus muehlenbergii*), and/or Shumard's Oak (*Quercus shumardii*) ..... ***Interior Plateau Chinquapin Oak - Shumard Oak Forest*** **(CEGL007808)**

10b. More mesic forests in Alabama or Tennessee, dominated by Chinquapin Oak (*Quercus muehlenbergii*) and Shumard's Oak (*Quercus shumardii*); additional common and/or abundant tree species include Sugar Maple (*Acer saccharum*), Hickory (*Carya* spp.), White Ash (*Fraxinus americana*), Tuliptree (*Liriodendron tulipifera*), White Oak (*Quercus alba*), Cherrybark Oak (*Quercus pagoda*), and Black Oak (*Quercus velutina*) ..... ***Shumard Oak - Chinquapin Oak Mesic Limestone Forest*** **(CEGL008442)**

11a. Canopy is strongly dominated by Chestnut Oak (*Quercus prinus)*, Mockernut Hickory (*Carya alba*) and/or other Hickories (*Carya* spp.), with Black Oak (*Quercus velutina*). Bigleaf Snowbell (*Styrax grandifolius*) is generally absent. The term "Piedmont" is in the name, but it has a wider distribution that includes nonmontane ecoregions of AL, MS, and TN ..... ***Lower Piedmont Chestnut Oak Forest*** **(CEGL007261)**
..... [A3289 *Southern Chestnut Oak Forest Alliance*
..... in G159 *South-Central Interior Oak Forest & Woodland Group*]

11b. Canopy strongly dominated by Chestnut Oak (*Quercus prinus*), or Scarlet Oak (*Quercus coccinea*), and/or Black Oak (*Quercus velutina*), and with lesser amounts of Northern Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), and Red Maple (*Acer rubrum*). Bigleaf Snowbell (*Styrax grandifolius*) is an important shrub..... ***Interior Low Plateau Chestnut Oak - Mixed Oak Forest*** **(CEGL007700)**
..... [A3289 *Southern Chestnut Oak Forest Alliance*
..... in G159 *South-Central Interior Oak Forest & Woodland Group*]

12a. Forests where Southern Red Oak (*Quercus falcata*) and/or Post Oak (*Quercus stellata*) are important (>15% cover) or codominant canopy trees (or if dominated by hickories, Southern Red Oak or Post Oak is the most important Oak species present)..... 13
12b. Southern Red Oak (*Quercus falcata*) and/or Post Oak (*Quercus stellata*) is less than 15% canopy cover and not important or codominant canopy trees..... 15

13a. Flatwoods (upland flats with poor drainage and having some ponding of water after heavy rains).....
.....***Southern Red Oak Flatwoods Forest*** **(CEGL004412)**
.....[A3445 *Interior & West Gulf Coastal Plain Oak Flatwoods Alliance*
.....in G130 *Loblolly Pine & Hardwood Wet Flatwoods Group*]
13b. Dry forests of upland ridges or slopes (generally facing southeast to southwest to northwest) 14

14a. Dominated by Southern Red Oak (*Quercus falcata*), and/or Post Oak (*Quercus stellata*), with less White Oak (*Quercus alba*). Forests dominated only by Post Oak (*Quercus stellata*) or dominated only by Southern Red Oak (*Quercus falcata)* are included here.....
..... ***Dry Acidic Eastern Coastal Plain Oak - Hickory Forest*** **(CEGL007246)**
.....[A3294 *Piedmont Oak - Hickory - Pine Woodland Alliance*
.....in G165 *Piedmont-Central Atlantic Coastal Plain Oak Forest Group*]
14b. Dominated by Southern Red Oak (*Quercus falcata*) with White Oak (*Quercus alba*) as an important component of the canopy, and less Post Oak (*Quercus stellata*), stands with White Oak (*Quercus alba*) and Post Oak (*Quercus stellata*) codominant also should key here.....
..... ***Interior Southern Red Oak - White Oak Forest*** **(CEGL007244)**
..... [A3291 *Interior Low Plateau Mixed Oak Woodland Alliance*
.....in G159 *South-Central Interior Oak Forest & Woodland Group*]

15a. Forest codominated by Hackberry *(Celtis occidentalis*) or Sugarberry (*Celtis laevigata*) .....
.....***Interior Low Plateau Ruderal Sugarberry, Hackberry Forest*** **(CEGL004697)**
.....[A3228 *Ruderal Tuliptree - Black Walnut - Black Locust Forest Alliance*
..... in G030 *Eastern North American Native Ruderal Forest Group*]
15b. Forest not codominated by Hackberry *(Celtis occidentalis*) or Sugarberry (*Celtis laevigata*)..... 16

16a. Forest codominated by Northern Red Oak (*Quercus rubra*) and White Oak (*Quercus alba*) (or if dominated by Hickory (*Carya* spp.), then Northern Red Oak and/or White Oak are the primary Oak species in the canopy). These types should be found only within the range of Northern Red Oak, i.e., Natchez Trace Parkway from around milepost 250 north..... 17
16b. Forest codominated by White Oak (*Quercus alba*) without, or with very little Northern Red Oak (*Quercus rubra*) in the canopy 18

17a. Forest with Sugar Maple (*Acer saccharum*), Hop Hornbeam (*Ostrya virginiana*), Redbud (*Cercis canadensis*) or other circumneutral or alkaline indicator species..... ***White Oak - Mixed Oak Dry-Mesic Alkaline Forest* (CEGL002070)** .....[A2060 *South-Central Interior Chinquapin Oak - Maple - Ash Forest Alliance* ..... in G601 *Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest Group*]

17b. Forest with Mockernut Hickory (*Carya alba*) and other plants indicative of acid conditions, such as Blackgum (*Nyssa sylvatica*) and Sourwood (*Oxydendrum arboreum*) in the subcanopy and Eastern hayscented fern (*Dennstaedtia punctilobula*) in the herbaceous layer. This type has been documented from Mississippi and Tennessee, at locations north of about milepost 300. ..... ***White Oak - Red Oak Dry-Mesic Acidic Forest* (CEGL002067)** .....[A3288 *Ozark-Ouachita Oak - Hickory Forest Alliance* .....in G159 *South-Central Interior Oak Forest & Woodland Grou*p]

18a. Forest in the Interior Low Plateau, dominant canopy species include White Oak (*Quercus alba*), Tuliptree (*Liriodendron tulipifera*), Sweetgum (*Liquidambar styraciflua*), and/or Willow Oak (*Quercus phellos*), as well as Red Maple (*Acer rubrum*), Mockernut Hickory (*Carya alba*), Shagbark Hickory (*Carya ovata*), Black Walnut (*Juglans nigra*), Water Oak (*Quercus nigra*), and American Elm (*Ulmus americana*) ..... ***Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest* (CEGL007709)** .....[A3291 *Interior Low Plateau Mixed Oak Woodland Alliance* .....in G159 *South-Central Interior Oak Forest & Woodland Group*]

18b. Forests of the Interior Low Plateau or Coastal Plain, not with above characteristics..... 19

19a. Mesic forest of the Coastal Plains, typically dominated by White Oak (*Quercus alba*) with Mockernut Hickory (*Carya alba*), Pignut Hickory (*Carya glabra*), Red Hickory (*Carya ovalis*), and/or Shagbark Hickory (*Carya ovata*); also with American Beech (*Fagus grandifolia*), Sweetgum *(Liquidambar styraciflua*), Water Oak (*Quercus nigra*), Cherrybark Oak (*Quercus pagoda*), Shumard's Oak (*Quercus shumardii*), Post Oak (*Quercus stellata*); subcanopy is dominated by Southern Sugar Maple (*Acer barbatum*), Red Maple (*Acer rubrum*), American Hornbeam (*Carpinus caroliniana*), Hickory (*Carya* spp.), Sweetgum, and Hop Hornbeam (*Ostrya virginiana*) ..... ***Basic Mesic Coastal Plain Oak-Hickory Forest* (CEGL007225)** .....[A3234 *Mesic Coastal Plain Oak - Hickory Forest Alliance* .....in G007 *Southern Mesic Beech - Magnolia - Oak Forest Group*]

19b. Forest dominated by White Oak (*Quercus alba*) and Mockernut Hickory (*Carya alba*), with Pignut Hickory (*Carya glabra*) and Black Oak (*Quercus velutina*) ..... ***Interior Dry-Mesic White Oak -Hickory Forest* (CEGL007795)** .....[A3291 *Interior Low Plateau Mixed Oak Woodland Alliance* .....in G159 *South-Central Interior Oak Forest & Woodland Group*]

KEY E – WETLAND FORESTS

Includes bottomland and floodplain forests. If unsure of wetland/upland status, refer to hydrophytic tree/shrub/herb species lists at end of key.

1a. Forest dominated by Chinese Tallow (*Triadica sebifera*).....
..... ***Ruderal Chinese Tallow Wet Forest*** **(CEGL007412)**
.....[A3339 *Southern Woody Exotic Flooded & Swamp Forest Alliance*
..... in G762 *Southeastern Exotic Ruderal Flooded & Swamp Forest Group*]
1b. Forest of native trees, not dominated by Chinese Tallow (*Triadica sebifera*)..... 2

2a. Forested acidic seepage wetland .....(3 choices) 3
2b. Forest or woodland vegetation of ponds, lakes, riparian areas, bottomlands, or swamps ....(3 choices) 4

3a. (couplet has 3 choices) Mixed evergreen-deciduous forest of seepage or saturated wetland sites with greater than 25% cover of Loblolly Pine (*Pinus taeda),* with hardwoods typical of saturated acidic wetlands such as Sweetbay *(Magnolia virginiana*), Red Maple *(Acer rubrum*), Swamp Tupelo *(Nyssa biflora*), and Sweetgum (*Liquidambar styraciflua*), could be found in the 75–100 mile section south of Tupelo, MS.....
.....***Ruderal Loblolly Pine - Sweetgum Wet Forest*** **(CEGL007560)**
.....[A3345 *Southern Pine - Sweetgum Ruderal Wetland Forest Alliance*
..... in G553 *Southeastern Native Ruderal Flooded & Swamp Forest Group*]
3b. (couplet has 3 choices) Forested acid seep found in Mississippi, with Swamp Tupelo (*Nyssa biflora*) and Sweetbay (*Magnolia virginiana*) in the subcanopy.....
.....***Southern Upper East Gulf Coastal Plain Seepage Forest*** **(CEGL008477)**
.....[A0378 *Sweetbay - Swamp Tupelo - Laurel Oak Wetland Forest Alliance*
..... in G037 *Coastal Plain Mixed Evergreen Swamp Group*]
3c. (couplet has 3 choices) Forested acid seep found in northwest Alabama or Tennessee, at the base of steep to moderate slopes where water percolates out through Cretaceous or Pennsylvanian sands and gravels .....***Interior Forested Acidic Seep*** **(CEGL004425)**
.....[A3359 *Ozark-Interior Red Maple - Blackgum Seepage Forest Alliance*
..... in G044 *Central & Appalachian Seepage Swamp Group*]

4a. (couplet has 3 choices) Black Willow (*Salix nigra*) forest. Both riparian and palustrine in nature.....
.....***Interior Low Plateau Willow Pond Forest*** **(CEGL007703)**
.....[A1914 *Coastal Plain Depression Willow Forest Alliance*
..... in G759 Southern Ash - Elm - Willow Floodplain Forest Group]
.....(for Black Willow <5 m, see Key F [7a] *Black Willow Riverbank Shrubland* [CEGL003901])
..... [A0948 *Black Willow Riverwash Scrub Alliance*
..... in G755 *Eastern North American Riverine Wetland Vegetation Group*]
4b. (couplet has 3 choices) Swamps, seasonally or semi-permanently (long duration) flooded 5
4c. (couplet has 3 choices) Bottomlands or riparian areas, temporarily (short duration) flooded 12

5a. Semi-permanently flooded Swamp dominated by Bald Cypress (*Taxodium distichum*)..... 6
5b. Swamp dominated by deciduous hardwoods 7

6a. Semi-open woodland along shore of pond, lake or impoundment, sometimes with Sweetgum (*Liquidambar styraciflua*) ..... ***East Gulf Coastal Plain Bald-cypress Pondshore*** **(CEGL004046)**
.....[A0652 *Lakeshore Cypress Woodland Alliance*
..... in G036 *Pond-cypress Basin Swamp Group*]

6b. Bald Cypress (*Taxodium distichum*) swamp forest of more extensive wetland areas, often also has Water Tupelo (*Nyssa aquatica*) in the canopy ..... ***Bald-cypress Swamp*** **(CEGL002420)**
.....[A3594 *Bald-cypress - Tupelo Southern Floodplain Forest Alliance*
..... in G033 *Bald-cypress - Tupelo Floodplain Forest Group*]

7a. Semi-permanently flooded Swamp dominated by Water Tupelo (*Nyssa aquatica)* with less Bald Cypress (*Taxodium distichum*)..... ***Water Tupelo Swamp Forest*** **(CEGL002419)**
..... [A0345 *Water Tupelo Swamp Alliance*
..... in G033 *Bald-cypress - Tupelo Floodplain Forest Group*]

7b. Seasonally flooded bottomlands or floodplains, not dominated by Water Tupelo (*Nyssa aquatica*)..... 8

8a. Seasonally flooded swamp codominated by Red Maple (*Acer rubrum*) and/or Green Ash (*Fraxinus pennsylvanica)*..... ***Red Maple - Green Ash Seasonally Flooded Swamp*** **(CEGL007380)**
..... [A3625 *Southeastern Sweetgum - Green Ash Floodplain Forest Alliance*
..... in G034 *Oak - Sweetgum Floodplain Forest Group*]

8b. Seasonally flooded swamp not codominated by Red Maple (*Acer rubrum*) and/or Green Ash (*Fraxinus pennsylvanica),* but Green Ash (*Fraxinus pennsylvanica*) may be a minor canopy tree..... 9

9a. Seasonally flooded swamp dominated by Planertree (*Planera aquatica*).....
.....***Coastal Plain Planertree Floodplain Swamp Forest*** **(CEGL007394)**
.....[A3594 *Bald-cypress - Tupelo Southern Floodplain Forest Alliance*
..... in G033 *Bald-cypress - Tupelo Floodplain Forest Group*]

9b. Seasonally flooded forest or swamp, not dominated by Planertree (*Planera aquatica*)..... 10

10a. Floodplain or depression forests dominated or codominated by Laurel Oak (*Quercus laurifolia*).....
(this should be found only in a limited area, the three sampled sites are in Mississippi between mileposts 70 and 75, mileposts 150 and 155, and in the vicinity of milepost 130).....
..... ***Laurel Oak Bottomland Forest*** **(CEGL007348)**
.....[A3628 *Coastal Plain Oak - Loblolly Pine Floodplain Forest Alliance*
..... in G034 *Oak - Sweetgum Floodplain Forest Group*]

10b. Seasonally flooded forest neither dominated nor codominated by Laurel Oak (*Quercus laurifolia*). 11

11a. Seasonally flooded forest dominated by Overcup Oak (*Quercus lyrata*) and Sweetgum (*Liquidambar styraciflua*); occasionally Sweetgum is sparse to absent. ***Overcup Oak – Sweetgum Bottomland Forest* (CEGL002424)** [A3629 *Overcup Oak Bottomland Forest Alliance* in G034 *Oak - Sweetgum Floodplain Forest Group*]

11b. Seasonally flooded bottomlands or floodplains, dominant trees include Willow Oak (*Quercus phellos*), Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica*), and American Elm (*Ulmus americana*). In addition, Overcup Oak (*Quercus lyrata*) and Nuttall Oak (*Quercus texana*) may sometimes occur ***Willow Oak Bottomland Flatwoods Forest* (CEGL002102)** [A3429 *Interior Oak Pond & Flatwoods Alliance* in G654 *South-Central Flatwoods & Pond Forest Grou*p]

12a. Forest canopy dominated or codominated by Box-elder (*Acer negundo*), with or without Sycamore (*Platanus occidentalis*) or Eastern Cottonwood (*Populus deltoides*), either or both of which can be present as a supercanopy 13

12b. Forest not as above, canopy not dominated or codominated by Box-elder (*Acer negundo*); Sycamore (*Platanus occidentalis*) and/or Eastern Cottonwood (*Populus deltoides*) not codominant with Box-elder; these species may be present, but not as an overtopping supercanopy. Forests keying here include those dominated by Sycamore with Sweetgum *(Liquidambar styraciflua*) or with Silver Maple (*Acer saccharinum*) 14

13a. Forest canopy / subcanopy dominated by Box-elder (*Acer negundo*), without codominance by Sycamore (*Platanus occidentalis*) or Eastern Cottonwood (*Populus deltoides*) ***Ruderal Box-elder Floodplain Forest* (CEGL005033)** [A4099 *Box-elder - Mixed Hardwoods / Garlic Mustard Ruderal Floodplain Forest Alliance* in G552 *Eastern North American Ruderal Flooded & Swamp Forest Group*]

13b. Forest canopy codominated by Sycamore (*Platanus occidentalis*), Eastern Cottonwood (*Populus deltoides*), and Box-elder (*Acer negundo*), OR subcanopy dominated by Box-elder (*Acer negundo*), this overtopped by a (super)canopy of Sycamore (*Platanus occidentalis*) and/or Eastern Cottonwood (*Populus deltoides*) ***Southern Interior Box-elder Riparian Forest* (CEGL004690)** [A3700 *Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest Alliance* in G673 *Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group*]

14a. Forest canopy dominated by Silver Maple (*Acer saccharinum*) often with Sugarberry (*Celtis laevigata*), and Pecan (*Carya illinoinensis*) ***Silver Maple - Sugarberry - Pecan Floodplain Forest* (CEGL002431)** [A3700 *Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest Alliance* in G673 *Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group*]

14b. Forest canopy not dominated by Silver Maple (*Acer saccharinum*), Sugarberry (*Celtis laevigata*), and Pecan (*Carya illinoinensis*) 15

15a. Forest dominated by River Birch (*Betula nigra*) with Sycamore (*Platanus occidentalis*) generally near or on the banks of creeks or rivers..... ***River Birch Levee Forest*** **(CEGL007312)**
.....[A3699 *Atlantic & East Gulf River Birch - Sycamore Levee Forest Alliance*
.....in G673 *Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group*]
15b. Forest not dominated by River Birch (*Betula nigra*) 16

16a. Forest dominated or codominated by Sycamore (*Platanus occidentalis*) 17
16b. Forest neither dominated nor codominated by Sycamore (*Platanus occidentalis*)..... 18

17a. Canopy dominated by Sycamore (*Platanus occidentalis*) and Sweetgum (*Liquidambar styraciflua*), found south of Tupelo, MS (milepost 260) .....
..... ***Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest*** **(CEGL007335)**
.....[A3625 *Southeastern Sweetgum - Green Ash Floodplain Forest*
..... in G034 *Oak - Sweetgum Floodplain Forest Group*]
17b. Canopy dominated by Sycamore (*Platanus occidentalis*) without Sweetgum (*Liquidambar styraciflua*), silver maple (*Acer saccharinum*) may be present; found north of Tupelo, MS (milepost 260)..... ***Sycamore - Silver Maple Calcareous Floodplain Forest*** **(CEGL007334)**
.....[A3712 *American Sycamore - River Birch Floodplain Forest*
..... in G652 *Silver Maple - Green Ash - Sycamore - Hackberry Floodplain Forest Group*]

18a. Forests with Sugarberry (*Celtis laevigata*) and American Elm (*Ulmus americana*) as codominants or important components of the canopy or subcanopy 19
18b. Forests lacking or with low cover of Sugarberry (*Celtis laevigata*) and American Elm (*Ulmus americana*)..... 20

19a. Forests codominated by some combination of Sugarberry (*Celtis laevigata*), Honey-locust (*Gleditsia triacanthos*), and American Elm (*Ulmus americana*); Nuttall Oak (*Quercus texana*) typically present but not always..... ***Nuttall Oak - Sugarberry Bottomland Forest*** **(CEGL004619)**
.....[A3709 *West Gulf Coastal Plain Elm - Sugarberry Floodplain Forest Alliance*
.....in G759 *Southern Ash - Elm - Willow Floodplain Forest Group*]
19b. Forests codominated by some combination of Sugarberry (*Celtis laevigata*), Green Ash *(Fraxinus pennsylvanica*), and American Elm (*Ulmus americana*); often with other associated hydrophytic tree species. ..... ***Southern Green Ash - Elm - Sugarberry Floodplain Forest*** **(CEGL002427)**
.....[A3700 *Ozark-Ouachita Green Ash - Sycamore - Silver Maple Forest Alliance*
.....in G673 *Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group*]

20a. Mixed evergreen and deciduous forest with greater than 25% canopy cover of Loblolly Pine (*Pinus taeda*) codominant with hardwoods 27
20b. Forest of broadleaf trees, Loblolly Pine (*Pinus taeda*) absent or present at low (<25%) cover 21

21a. Successional forest dominated by Sweetgum (*Liquidambar styraciflua*) and/or Tuliptree (*Liriodendron tulipifera*) without codominant Oaks (*Quercus* spp.) ..... ***Ruderal Sweetgum Wet Forest* (CEGL007330)** .....[A3343 *Southern Deciduous Ruderal Wetland Forest Alliance* ..... in G553 *Southeastern Native Ruderal Flooded & Swamp Forest Group*]

21b. Forest dominated by Sweetgum (*Liquidambar styraciflua*) and/or Tuliptree (*Liriodendron tulipifera*) with Oaks (*Quercus* spp.) being codominant 22

22a. Forest canopy consists of some combination of American Beech (*Fagus grandifolia*), Basswood (*Tilia americana* var. *heterophylla* or var. *caroliniana*), Southern Shagbark Hickory (*Carya carolinae-septentrionalis*), Red Hickory (*Carya ovalis*), Pignut Hickory (*Carya glabra*), Box-elder (*Acer negundo*), Hop Hornbeam (*Ostrya virginiana*), Sweetgum (*Liquidambar styraciflua*), and/or Bigleaf Magnolia (*Magnolia macrophylla*)..... ***East Gulf Coastal Plain Beech Floodplain Forest* (CEGL004745)**
..... [A2059 *Mesic Southern Coastal Plain Deciduous Forest Alliance* ..... in G166 *Southern Mesic Beech - Oak - Mixed Deciduous Forest Group*]

22b. Forest dominated or codominated by Oaks (*Quercus* spp.) 23

23a. Canopy codominated by Swamp Chestnut Oak (*Quercus michauxii*), Sweetgum *(Liquidambar styraciflua*), Kingnut Hickory (*Carya laciniosa*) and/or Shumard's Oak (*Quercus shumardii*)..... ***Swamp Chestnut Oak - Sweetgum Mesic Floodplain Forest* (CEGL002099)** .....[A3630 *Interior Swamp Chestnut Oak Bottomland Forest Alliance* ..... in G034 *Oak - Sweetgum Floodplain Forest Group*]

23b. Canopy not dominated or codominated by Swamp Chestnut Oak (*Quercus michauxii*)..... 24

24a. Codominated by Willow Oak (*Quercus phellos*) or Water Oak (*Quercus nigra*)..... 25

24b. Cherrybark Oak (*Quercus pagoda*) is dominant or codominant..... 26
..... [A3631 *Coastal Plain Swamp Chestnut Oak Bottomland Forest Alliance* .....in G034 Oak - Sweetgum Floodplain Forest Group]

25a. Seasonally flooded bottomlands or floodplains, dominant trees include Willow Oak (*Quercus phellos)*, Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica*), and American Elm (*Ulmus americana*). In addition, Overcup Oak (*Quercus lyrata*) and Nuttall Oak (*Quercus texana*) may sometimes occur ..... ***Willow Oak Bottomland Flatwoods Forest* (CEGL002102)**
..... [A3429 *Interior Oak Pond & Flatwoods Alliance* ..... in G654 *South-Central Flatwoods & Pond Forest Group*]

25b. Temporarily flooded bottomlands dominated by Willow Oak (*Quercus phellos)* and/or Water Oak (*Quercus nigra*), and sometimes Sweetgum (*Liquidambar styraciflua*) and/or White Oak (*Quercus alba*) ..... ***East Gulf Coastal Plain Oak-Sweetgum Small Stream Floodplain Forest* (CEGL004771)**
..... [A3632 *Coastal Plain Willow Oak - Water Oak - Laurel Oak Forest Alliance* ..... in G034 *Oak - Sweetgum Floodplain Forest Group*]

26a. Bottomland forest dominated by some combination of Cherrybark Oak (*Quercus pagoda*), Water Oak (*Quercus nigra*), Sweetgum (*Liquidambar styraciflua*), Swamp Chestnut Oak (*Quercus michauxii*), Loblolly Pine (*Pinus taeda*), and/or Laurel Oak (*Quercus laurifolia*) ..... ***Southern Coastal Plain Oak Bottomland Forest*** **(CEGL007354)**

26b. Canopy is dominated by Sweetgum (*Liquidambar styraciflua*), Cherrybark Oak (*Quercus pagoda*), and usually some combination of Shagbark Hickory (*Carya ovata*), Kingnut Hickory (*Carya laciniosa),* and /or Red Hickory (*Carya ovalis*) ..... ***Sweetgum - Cherrybark Oak Floodplain Forest*** **(CEGL007353)**

27a. Mixed evergreen - deciduous forest with Loblolly Pine (*Pinus taeda*) codominant with Water Oak (*Quercus nigra*) and other oaks such as Cherrybark Oak (*Quercus pagoda*), Willow Oak (*Quercus phellos*), Laurel Oak (*Quercus laurifolia*), Swamp Chestnut Oak (*Quercus michauxii*), and Sweetgum (*Liquidambar styraciflua*). This forest may result from the decline of Loblolly Pine (*Pinus taeda*) plantation or successional forests in wet areas, but is otherwise a natural forest association of bottomlands and floodplains..... ***Piedmont Loblolly Pine - Mixed Oak Floodplain Forest*** **(CEGL007551)**

..... [A3633 *Piedmont Willow Oak Floodplain Forest Alliance* ..... in G034 *Oak - Sweetgum Floodplain Forest Group*]

27b. Mixed evergreen and deciduous forest with Loblolly Pine (*Pinus taeda*) codominant with mostly successional hardwoods other than Oaks (*Quercus sp.*)..... 28

..... [A3345 *Southern Pine - Sweetgum Ruderal Wetland Forest Alliance* ..... in G553 *Southeastern Native Ruderal Flooded & Swamp Forest Group*]

28a. Mixed evergreen – deciduous forest of seepage or saturated wetland sites with >25% cover of Loblolly Pine (*Pinus taeda*), with hardwoods typical of saturated acidic wetlands such as Sweetbay *(Magnolia virginiana*), Red Maple *(Acer rubrum*), Swamp Tupelo *(Nyssa biflora*), and Sweetgum (*Liquidambar styraciflua*), this could be found in the portion of Natchez Trace Parkway south of Tupelo, MS..... ***Ruderal Loblolly Pine - Sweetgum Wet Forest*** **(CEGL007560)**

28b. Common mixed evergreen – deciduous successional forest on river floodplain alluvial terraces and along streams following major disturbances such as blowdowns, logging, and agriculture. Dominated by Loblolly Pine (*Pinus taeda*) and Tuliptree (*Liriodendron tulipifera*) with other successional hardwood trees such as Sweetgum (*Liquidambar styraciflua*), Sycamore *(Platanus occidentalis*), Red Maple *(Acer rubrum*), Swamp Tupelo *(Nyssa biflora*), Red Mulberry (*Morus rubra)*, River Birch (*Betula nigra*), and American Holly (*Ilex opaca*). Spicebush *(Lindera benzoin*) is a typical shrub, and Fringed Sedge (*Carex crinita*) is a typical herb ..... ***Ruderal Loblolly Pine - Tuliptree Wet Forest*** **(CEGL007546)**

KEY F – SHRUBLANDS

1a. Semi-evergreen shrublands dominated by Giant Cane (*Arundinaria gigantea*), a native bamboo-type tall grass..... ***Floodplain Canebrake*** **(CEGL003836)**
.....[A0795 *Canebrake Floodplain Alliance*
..... in G167 *Eastern North American Shrub Swamp Group*]

1b. Shrublands not dominated by Giant Cane (*Arundinaria gigantea*), a native bamboo-type tall grass 2

2a. Evergreen shrublands dominated by Eastern Baccharis (*Baccharis halimifolia*), possibly with some Wax Myrtle (*Morella cerifera*) intermixed .....***Ruderal Groundsel-tree Shrubland*** **(CEGL004657)**
..... [A3322 *Eastern Ruderal Native Shrubland Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

2b. Deciduous, semi-evergreen, or evergreen shrublands, not dominated by Eastern Baccharis (*Baccharis halimifolia*) 3

3a. Shrublands or ground covering vine areas in wetlands (including ponds, lakes, floodplains or temporarily flooded bottomland areas of rivers or creeks)..... 4

3b. Upland shrublands (generally not subject to flooding), includes ground covering vine areas 8

4a. Bottomland or floodplain area dominated by ground covering native vines such as Muscadine (*Vitis rotundifolia*), Peppervine (*Ampelopsis arborea*), and/or Trumpetvine (*Campsis radicans*), Virginia Creeper (*Parthenocissus quinquefolia*), Eastern Poison-ivy (*Toxicodendron radicans ssp. radicans*), Crossvine (*Bignonia capreolata*), or Roundleaf Greenbrier (*Smilax rotundifolia*) .....
..... ***Grapevine - Peppervine - Trumpet Creeper Wet Thicket*** **(CEGL004620)**
.....[A4151 *Coastal Plain Floodplain Vine-Shrubland Alliance*
.....in G557 *Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group*]

4b. Dominated by shrubs rather than vines..... 5

5a. Semi-evergreen or tardily deciduous vegetation dominated by Chinese Privet (*Ligustrum sinense*), with few or no trees; in bottomlands, floodplains, and other wetlands .....
.....***Ruderal Chinese Privet Wet Shrubland*** **(CEGL003837)**
..... [A3409 *Southern Exotic Species Shrub Wetland Alliance*
..... in G557 *Southeastern Ruderal Wet Meadow & Marsh Group*]

5b. Shrubland dominated by native shrubs 6

6a. Shrubland dominated by Buttonbush (*Cephalanthus occidentalis*) .....
.....***Southern Buttonbush Pond*** **(CEGL002191)**
.....[A3670 *Buttonbush - Swamp-loosestrife Shrub Swamp Alliance*
..... in G167 *Eastern North American Shrub Swamp Group*]

6b. Shrubland dominated by Black Willow (*Salix nigra*), Smooth Alder (*Alnus serrulata*), or Planertree (*Planera aquatica*) 7

7a. (one of 3 choices) Shrubland dominated by Black Willow (*Salix nigra*); may be riparian or palustrine. .....***Black Willow Riverbank Shrubland*** **(CEGL003901)**
..... [A0948 *Black Willow Riverwash Scrub Alliance*
..... in G755 *Eastern North American Riverine Wetland Vegetation Group*]
....(for Black Willow >5 m, see Key E [4a] Interior Low Plateau Willow Pond Forest [CEGL007703])
7b. (one of 3 choices) Shrubland dominated by Smooth Alder (*Alnus serrulata*).....
.....***Southeastern Alder Swamp*** **(CEGL008474)**
.....[A3685 *Lakeshore & Depression Alder - Willow Swamp Alliance*
..... in G167 *Eastern North American Shrub Swamp Group*]
7c. (one of 3 choices) Seasonally flooded swamp dominated by Planertree (*Planera aquatica*).....
..... ***Coastal Plain Planertree Floodplain Swamp Forest*** **(CEGL007394)**
.....[A3594 *Bald-cypress - Tupelo Southern Floodplain Forest Alliance*
..... in G033 *Bald-cypress - Tupelo Floodplain Forest Group*]

8a. Semi-evergreen or tardily deciduous vegetation dominated by Chinese Privet (*Ligustrum sinense*), with few or no trees; known to invade wet, unsaturated areas. .....
..... ***Ruderal Chinese Privet Upland Shrubland*** **(CEGL003807)**
.....[A4084 *Eastern Exotic Shrubland Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]
8b. Deciduous shrub or vine dominated vegetation, not dominated by Chinese Privet (*Ligustrum sinense*)9

9a. Vegetation dominated by exotic vines 10
9b. Vegetation dominated by deciduous native shrubs and tree saplings 11

10a. Vegetation dominated by the exotic vine; Kudzu (*Pueraria montana* var. *lobata*), with few or no trees not smothered by it..... ***Ruderal Kudzu Vineland*** **(CEGL003882)**
.....[A4082 *Eastern Ruderal Exotic Vine-Shrubland Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]
10a. Vegetation dominated by exotic Wisteria vines (*Wisteria sinensis* or *Wisteria floribunda*, or most often hybrids of the two), fast-growing vines native to Asia, with few or no trees not smothered by the vines ..... ***Ruderal Wisteria Vineland*** **(CEGL008568)**
.....[A4082 *Eastern Exotic Ruderal Vine-Shrubland Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

11a. Rocky slopes or cliffs dominated by Hydrangea (*Hydrangea arborescens*) and Orange Jewelweed (*Impatiens capensis)*.....***Highland Rim Limestone Cliff/Talus Seep*** **(CEGL004708)**
.....[A2073 *Ozarkian Circumneutral Seepage Cliff Alliance*
.....in G841 *Central Midwest-Interior Cliff & Rock Vegetation Group*]
11b. Upland deciduous shrublands not dominated by Hydrangea (*Hydrangea arborescens*)..... 12

12a. Shrubland or very young forest dominated by a variable mixture of Redbud (*Cercis canadensis*), Red Maple (*Acer rubrum*), Winged Elm (*Ulmus alata*), Eastern Redcedar (*Juniperus virginiana*), Osage-orange (*Maclura pomifera*), and/or Sugar Maple (*Acer saccharum*) with potentially some Tuliptree and Sweetgum, but at less than 25% relative combined cover. This is a catch-all placeholder for highly disturbed early successional vegetation found along dry to mesic uplands along the Parkway (a park special, not a recognized USNVC type)..... **Ruderal Mixed Deciduous Forest (CEPS004809)**
.....[in G031 *Southeastern Native Ruderal Forest Group*]

12b. Upland deciduous shrublands dominated by Blackberries or Dewberries (*Rubus* spp.), Greenbrier (*Smilax* spp.), Sumac (*Rhus* spp.), or Black Locust (*Robinia pseudoacacia*), may include grasses and small trees), occurring on disturbed or successional sites..... 13

13a. Upland deciduous shrublands dominated thorny plants such as Blackberries or Dewberries (*Rubus* spp.), Greenbrier (*Smilax* spp.), or Black Locust (*Robinia pseudoacacia*)..... 14

13b. Upland deciduous shrublands dominated by Sumac (*Rhus* spp.) species (may include grasses and small trees), occurring on disturbed or successional sites.....
.....***Ruderal Winged Sumac - Broomsedge Grassland*** **(CEGL004035)**
.....[A3321 *Eastern Herbaceous Ruderal Vegetation Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

14a. Upland deciduous shrublands dominated thorny plants such as Blackberries or Dewberries (*Rubus* spp.) and Greenbrier (*Smilax* spp.).....
.....***Ruderal Blackberry - Greenbrier Shrub Thicket*** **(CEGL004732)**
..... [A3322 *Eastern Ruderal Native Shrubland Alliance*
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

14b. Upland deciduous shrublands dominated by Black Locust (*Robinia pseudoacacia*).....
.....***Ruderal Black Locust Forest*** **(CEGL007279)**
.....[A3228 *Ruderal Tuliptree - Black Walnut - Black Locust Forest Alliance*
.....in G030 *Eastern North American Native Ruderal Forest Group*]

KEY G – GRAMINOID VEGETATION

1a. Vegetation of perennial grasses (or grasses mixed with forbs) in pastures, old fields, powerline right of ways, and lawns that may be kept open by grazing, mowing, herbicides, or bush hogging 2

1b. Vegetation of habitats mainly dominated by native plants, including natural barrens, prairies, graminoid depression wetlands, beaver ponds, floodplain marshes, and ecological restoration sites, generally not kept open by grazing, mowing or bush hogging. Many of these sites have become encroached with trees due to lack of disturbance such as fire. 7

2a. Mainly upland dry or mesic grassland pastures, hayfields, lawns and roadsides more-or-less cultural, but may no longer be actively maintained 3

2b. Floodplain or low pastures, disturbed open grasslands and old fields dominated by Carpetgrass (*Axonopus sp.)*; (a park special, not a recognized USNVC type) ..... ***Ruderal Carpetgrass Grassland* (CEPS004833)** ..... [A3321 *Eastern Herbaceous Ruderal Vegetation Alliance* ..... in G583 *Southeastern Ruderal Grassland & Shrubland Vegetation Group*]

3a. Old field grasslands or powerline rights of way dominated by native warm season grasses, Little Bluestem (*Schizachyrium scoparium*) or Common Broomsedge (*Andropogon virginicus* var. *virginicus*) 6

3b. Pastures, roadsides, utility corridors, lawns or weedy fields dominated by exotic grasses ..(3 choices) 4 ..... [A3321 *Eastern Herbaceous Ruderal Vegetation Alliance* .....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

4a. (couplet has 3 choices) Weedy fields or other weedy grasslands dominated by Johnson grass (*Sorghum halepense*) ..... ***Ruderal Johnson Grass Grassland* (CEGL004108)**

4b. (couplet has 3 choices) Grassland dominated by Cogongrass (*Imperata cylindrica*)… ..... ***Ruderal Cogongrass Grassland* (CEGL004673)**

4c. (couplet has 3 choices) Pastures, lawns or roadsides dominated by exotic grasses including Fescue (*Lolium* spp.) and Bahia grass (*Paspalum notatum*), and more or less maintained ..... 5 ..... [A3321 *Eastern Herbaceous Ruderal Vegetation Alliance* .....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

5a. Dominated by European Tall Fescue or Meadow Fescue (*Lolium arundinaceum or Lolium pratense*) .. .. ***Cultivated Meadow* (CEGL004048)**

5b. Grass pastures, lawns, roadsides or other frequently mowed areas with Bahia grass (*Paspalum notatum*) ..... ***Ruderal Bahia Grass Grassland* (CEGL004700)**

6a. Vegetation dominated by Common Broomsedge (*Andropogon virginicus* var. *virginicus*), a blond colored grass that gets about 1 m tall ..... ***Broomsedge Old-field Grassland* (CEGL004044)** ..... [A3321 *Eastern Herbaceous Ruderal Vegetation Alliance* .....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

6b. Vegetation dominated by Little Bluestem (*Schizachyrium scoparium*), a similar but more delicate grass than Common Broomsedge ..... ***Little Bluestem Old-field Grassland* (CEGL006333)** ..... [A3934 *Northern & Central Dry Old-field Grassland & Shrubland Alliance* ..... in G059 *Eastern North American Ruderal Meadow & Shrubland Group*]

7a. Vegetation on wet-mesic sites, dominated by some combination of Little Bluestem (*Schizachyrium scoparium*), Florida Paspalum (*Paspalum floridanum*), Broom Witchgrass (*Dichanthelium scoparium*), and Clustered Beaksedge (*Rhynchospora glomerata*), Big Bluestem (*Andropogon gerardii*)..... ***Highland Rim Wet-Mesic Prairie* (CEGL004006)** [A3889 *South-Central Mesic Patch Prairie Alliance* in G174 *South-Central Patch Prairie Group*]

7b. Vegetation (upland or wetland) not having the above combination of characteristics 8

8a. Wetland vegetation characterized by temporary or seasonal flooding, or by saturation, this most evident in winter or early spring..... 9

8b. Upland vegetation, not characterized by saturation or flooding 10

9a. Vegetation dominated by Soft Rush (*Juncus effusus*), including marshes..... ***Common Rush Marsh* (CEGL004112)** [A3412 *Southern Ruderal Marsh Alliance* in G557 *Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group*]

9b. Vegetation not dominated by Soft Rush (*Juncus effusus*) 14

10a. Restored vegetation of ecological restoration sites, vegetation characterized by a wide variety of grasses, forbs and vines, mainly native ..... ***Ecological Restoration Site***

10b. Natural vegetation of prairies or barrens, dominated by native perennial grasses and sometimes scattered trees (<60% total canopy cover of trees, and usually <25% total canopy cover of trees)..... 11

11a. Natural vegetation of prairies in the Black Belt or Loess Plains regions of Mississippi 12

11b. Open canopied grassy woodlands (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Post Oak (*Quercus stellata*) and/or Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*). In rare instances, both post oak and blackjack oak are rare or not present, but other trees are present in enough quantity to consider this a woodland type (>25% but <60% total canopy cover of trees)..... 13

12a. Natural vegetation on chalk in the Black Belt region (Mississippi); may be characterized by scattered Eastern Redcedar (*Juniperus virginiana*). Perennial grasses such as Little Bluestem (*Schizachyrium scoparium)* are characteristic. However, most stands are being encroached by trees (5-10 m) and shrubs (1-5 m), mostly notably Eastern Redcedar (*Juniperus virginiana*), with up to 25% cover ..... ***Black Belt Prairie* (CEGL004664)** [A3318 *Coastal Plain Little Bluestem Prairie Alliance* in G175 *Southeastern Coastal Plain Patch Prairie Group*]

12b. Natural vegetation in the Loess Plains region near Jackson, Mississippi (documented on the Natchez Trace in Hinds County, south of about milepost 105), dominated by Little Bluestem (*Schizachyrium scoparium)*..... ***Mississippi Jackson Calcareous Clay Prairie* (CEGL004020)** [A3318 *Coastal Plain Little Bluestem Prairie Alliance* in G175 *Southeastern Coastal Plain Patch Prairie Group*]

13a. Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) with Little Bluestem (*Schizachyrium scoparium*) and Post Oak (*Quercus stellata*), and/or Blackjack Oak (*Quercus marilandica*)... ***Western Highland Rim (Post Oak) Barrens*** **(CEGL004686)** ..... [A3291 *Interior Low Plateau Mixed Oak Woodland Alliance* ..... in G159 *South-Central Interior Oak Forest & Woodland Group*]

13b. Open canopied grassy woodland (in the Western Highland Rim part of Tennessee's Interior Low Plateau) without Post Oak (*Quercus stellata*), but with Blackjack Oak (*Quercus marilandica*) and Little Bluestem (*Schizachyrium scoparium*) ..... ***Western Highland Rim Blackjack Oak Barrens*** **(CEGL004756)** ..... [A3315 *Clay/Loess Oak Woodland Alliance* ..... in G651 *South-Central Interior Oak Savanna & Barrens Group*]

14a. Seepage slope fen wetland in the Interior Low Plateau, especially the Highland Rim in Lewis County, Tennessee, with Largeleaf Grass of Parnassus (*Parnassia grandifolia*) ..... ***Highland Rim Parnassia Seepage Fen*** **(CEGL004161)** ..... [A3390 *Southern Interior Circumneutral Seepage Fen Alliance* ..... in G182 *Central Interior Seepage Fen Group*]

14b. Ponds, impoundments, floodplains, and depressions, not seepage slope fens 15

15a. Pond, impoundment, or slough dominated by Giant Cutgrass (*Zizaniopsis miliacea*) ..... ***Giant Cutgrass Slough Marsh*** **(CEGL004139)** ..... [A3404 *Southeastern Floodplain Marsh Alliance* ..... in G188 *Coastal Plain River & Basin Freshwater Marsh Group*]

15b. Floodplain, depression, or other open wetland not dominated by Giant Cutgrass (*Zizaniopsis miliacea*) ..... (3 choices) 16

16a. (one of 3 choices) Pond edge dominated by a mix of graminoids, such as Redtop Panicgrass (*Panicum rigidulum*) or Bulrush (*Scirpus cyperinus*), occurs at NATR only in Alabama and Tennessee ..... ***Highland Rim Pond (Woolgrass Bulrush - Threeway Sedge Type)*** **(CEGL004719)** ..... [A3412 *Southern Ruderal Marsh Alliance* ..... in G557 *Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group*]

16b. (one of 3 choices) Floodplain vegetation dominated by Savanna Panicgrass (*Phanopyrum gymnocarpon*) or Smartweed species (*Polygonum* spp.) with Savanna Panicgrass (*Phanopyrum gymnocarpon*)..... ***Smartweed - Savanna Panicgrass Southern Flooded Marsh*** **(CEGL008555)** ..... [A1881 Eastern Knotweed Palustrine Vegetation Alliance ..... in G756 *Eastern North American Wet Shoreline Group*]

16c. (one of 3 choices) Herbaceous pond (includes ruderal wetland marsh) dominated by Bulrush (*Scirpus cyperinus*), Fog-fruit (*Phyla nodiflora*), Marsh Seedbox (*Ludwigia palustris*), Rice Cutgrass *(Leersia oryzoides),* or Broadleaf Cattail (*Typha latifolia).* This is a widespread southern association, which is not limited to a certain section of the Natchez Trace Parkway ..... ***Ruderal Southern Woolgrass Marsh*** **(CEGL003866)** ..... [A3412 *Southern Ruderal Marsh Alliance* ..... in G557 *Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group*]

KEY H – FORB (BROADLEAF) VEGETATION

1a. Upland vegetation found on the walls of rockhouses or cave openings (e.g., at Cave Spring site), or on calcareous rocks and cliff exposures (e.g., a vertical cliff near the base of a steep slope overlooking a small tributary of the Swan River) 2
..... [A3915 *Appalachian Seepage Cliff Alliance*
.....in G840 *Appalachian Cliff & Rock Vegetation Group*]

1b. Wetland vegetation not at rockhouses, cave openings, or on calcareous rocks and cliff exposures.....
.....(3 choices) 3

2a. Upland vegetation found on the walls of rockhouses or cave openings (e.g., at Cave Spring site); this occurrence represents a range extension for this type .....
..... ***Cumberland Plateau Rockhouse*** **(CEGL004301)**

2b. Upland vegetation found on calcareous rocks and cliff exposures (this too small to be mapped) .....
..... ***Appalachian Wet Limestone Cliff*** **(CEGL004394)**

3a. (one of 3 choices) Vegetation permanently or semi-permanently flooded (i.e., dominated by emergent or floating aquatic plants)..... 7

3b. (on of 3 choices) Vegetation flooded temporarily or seasonally, especially in winter and spring, but not permanently or semi-permanently flooded (i.e., vegetation can dry out during a normal summer and early fall).....(3 choices) 4

3c. (one of 3 choices) Pastures, roadsides, utility corridors, lawns or weedy fields that are forb dominated and may have exotic grasses.....[**A3321** ***Eastern Herbaceous Ruderal Vegetation Alliance***
.....in G583 *Southeastern Ruderal Grassland & Shrubland Group*]

4a. (one of 3 choices) Rocky bar or shore of river or creek dominated by Common Water-willow (*Justicia americana*)..... ***Water-willow Rocky Bar and Shore*** **(CEGL004286)**
.....[A1657 Water-willow Riverscour Alliance
..... in G755 *Eastern North American Riverine Wetland Vegetation Group*]

4b. (one of 3 choices) Floodplain vegetation dominated by Smartweed species (*Polygonum* spp.) and/or Savanna Panicgrass (*Phanopyrum gymnocarpon*) 5
.....[A1881 Eastern Knotweed Palustrine Vegetation Alliance
..... in G756 Eastern North American Wet Shoreline Vegetation Group]

4c. (one of 3 choices) Herbaceous pond (including ruderal wetland marshes) dominated by Bulrush (*Scirpus cyperinus*), Fog-fruit (*Phyla nodiflora),* Marsh Seedbox *(Ludwigia palustris),* Rice Cutgrass *(Leersia oryzoides),* or Broadleaf Cattail (*Typha latifolia).* This is a widespread southern association, which is not limited to a particular section of the Natchez Trace Parkway .....
..... ***Ruderal Southern Woolgrass Marsh*** **(CEGL003866)**
..... [A3412 *Southern Ruderal Marsh Alliance*
.....in G557 *Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group*]

5a. Floodplain vegetation dominated by Savanna Panicgrass (*Phanopyrum gymnocarpon*) or Smartweed species (*Polygonum* spp.) with Savanna Panicgrass ..... ***Smartweed - Savanna Panicgrass Southern Flooded Marsh* (CEGL008555)**

5b. Floodplain vegetation dominated by Smartweed species (*Polygonum* spp.) without Savanna Panicgrass (*Phanopyrum gymnocarpon*), the two associations in couplet 5 might not be separable when Swamp Smartweed (*Polygonum hydropiperoides*) is the only species present. 6
..... [A3412 *Eastern Knotweed Palustrine Vegetation Alliance*
..... in G756 *Eastern North American Wet Shoreline Vegetation Group*]

6a. Impoundment vegetation dominated by *Polygonum punctatum* (Dotted Smartweed), *Polygonum hydropiperoides* (Swamp Smartweed), or *Mikania scandens* (Climbing Hempvine)..... ***Smartweed - Cutgrass Beaver Pond* (CEGL004290)**

6b. Vegetation dominated by *Juncus effusus* (Common Rush), *Leersia oryzoides* (Rice Cutgrass), and/or *Polygonum hydropiperoides* (Swamp Smartweed)..... ***Smartweed Pond* (CEGL004699)**

7a. Vegetation dominated by Pickerelweed (*Pontederia cordata*) and Green Arrow-arum (*Peltandra virginica*). These are emergent wetland plants growing in semi-permanently flooded wetlands, which can dry out during dry periods..... ***Pickerelweed Marsh* (CEGL004291)**
..... [A3669 Green Arrow-arum - Pickerelweed Rivershore & Lakeshore Alliance
..... in G125 *Eastern North American Freshwater Marsh Group*]

7b. Vegetation dominated by floating aquatic plants (note: this couplet has 3 choices) .....(3 choices) 8

8a. (one of 3 choices) Vegetation dominated by the native Floating Marsh-pennywort (*Hydrocotyle ranunculoides*) or by Floating Primrose-willow (*Ludwigia peploides*), native or introduced 9

8b. (one of 3 choices) Vegetation dominated by other exotic (nonnative) floating aquatic plants..... 10
..... [A4219 *Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation Alliance*
..... in G595 Eastern North American Ruderal Aquatic Vegetation Group]

8c. (one of 3 choices) Vegetation dominated by submerged aquatic species such as Pondweed species (*Potamogeton* spp.), Coontail species (*Ceratophyllum* spp.), Waterweed species (*Elodea* spp.), and/or Fanwort (*Cabomba caroliniana*); or by native, rooted, floating-leaved species including American Lotus (*Nelumbo lutea*), Pond-lily (*Nuphar* spp.), Water-lily (*Nymphaea* spp.)..... 11

9a. Vegetation dominated by Floating Primrose-willow (*Ludwigia peploides)* that may be native or introduced, the origin of these plants in the southeastern United States is uncertain..... ***Floating Water-primrose Aquatic Marsh* (CEGL007835)**
..... [A1928 *Floating Water-primrose Ruderal Marsh Alliance*
..... in G595 *Eastern North American Ruderal Aquatic Vegetation Group*]

9b. Vegetation dominated by the native Floating Marsh-pennywort (*Hydrocotyle ranunculoides*), with American Cupscale (*Sacciolepis striata*) evident later in the season..... ***Coastal Plain Riverine Floating Mat* (CEGL004305)**
..... [A4064 *Water-lily - Pond-lily Marsh Alliance*
..... in G114 *Eastern North American Freshwater Aquatic Vegetation Group*

10a. Vegetation dominated by Water hyacinth (*Eichhornia crassipes*)..... ***Ruderal Water-hyacinth Aquatic Vegetation*** **(CEGL007671)**
.....[A4219 *Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation Alliance*
.....in G595 *Eastern North American Ruderal Aquatic Vegetation Group*]

10b. Vegetation dominated by Alligator-weed (*Alternanthera philoxeroides*) ..... ***Ruderal Alligator-weed Exotic Emergent Vegetation*** **(CEGL003858)**
.....[A4219 *Common Water-hyacinth - Alligator-weed Ruderal Aquatic Vegetation Alliance*
.....in G595 *Eastern North American Ruderal Aquatic Vegetation Group*]

11a. Vegetation dominated by submerged aquatic species such as Pondweed species (*Potamogeton* spp.), Coontail species (*Ceratophyllum* spp.), Waterweed species (*Elodea* spp.), and/or Fanwort (*Cabomba caroliniana*)..... ***Pondweed - Hornwort- Waterweed Submersed Aquatic Vegetation*** **(CEGL004725)**
.....[A4066 *Pondweed - Hornwort - Waterweed Aquatic Vegetation Alliance*
.....in G114 *Eastern North American Freshwater Aquatic Vegetation Group*]

11b. Vegetation dominated by native, rooted, floating-leaved species including American Lotus (*Nelumbo lutea*), Pond-lily (*Nuphar* spp.), Water-lily (*Nymphaea* spp.)..... 12
.....[A4064 *Water-lily - Pond-lily Marsh Alliance*
.....in G114 *Eastern North American Freshwater Aquatic Vegetation Group*]

12a. Vegetation dominated by American Lotus (*Nelumbo lutea*)..... ***American Lotus Aquatic Wetland*** **(CEGL004323)**

12b. Vegetation dominated by rooted, floating-leaved aquatic species, generally Broadleaf Pond-lily (*Nuphar lutea* ssp. *advena*) and White Water-lily (*Nymphaea odorata*), but can include small patches of other native floating leaved aquatic species, such as Floating Marsh-pennywort (*Hydrocotyle ranunculoides*) and Watershield (*Brasenia schreberi*)..... ***Water-lily Aquatic Wetland*** **(CEGL002386)**

LIST OF INDICATOR SPECIES FOR DIFFERENT HABITAT TYPES

Adapted from National Capitol Region Keys; some of the listed species may not occur in the NATR area. Exotic plants are indicated with an asterisk*.

Warm-season Grasses

Andropogon gerardii, Andropogon virginicus, Eragrostis spectabilis, Panicum anceps, Panicum virgatum, Schizachyrium scoparium, Sorghastrum nutans, Tridens flavus, Tripsacum dactyloides

Cool-season Grasses

Agrostis hyemalis, Danthonia spicata, Lolium arundinaceum (= Festuca arundinacea), Lolium pratense* (= Festuca pratensis), Phleum pratense**

Successional Old-field Forbs

Ambrosia artemisiifolia, Asclepias syriaca, Cirsium discolor, Daucus carota, Desmodium spp., Erechtites hieraciifolia, Hypericum spp., Lespedeza cuneata*, Lespedeza spp., Oxalis stricta, Perilla frutescens, Pseudognaphalium obtusifolium, Pycnanthemum tenuifolium, Solanum carolinense, Solidago spp., Trifolium spp.**

Hydrophytic / Alluvial Herbs (not reviewed, this list is from NCR parks)

Arthraxon hispidus, Boehmeria cylindrica, Carex grayi, C. lupulina, C. lurida, C. normalis, C. radiata, C. scoparia, C. squarrosa, C. stipata, C. stricta, C. vulpinoidea, C. tribuloides, C. typhina, Cinna arundinacea, Eleocharis tenuis, Elymus riparius, E. virginicus, E. villosus, Glyceria septentrionalis, G. striata, Holcus lanatus*, Impatiens capensis, Juncus acuminatus, J. effusus, Justicia americana, Leersia spp., Panicum rigidulum var. elongatum, Phalaris arundinacea, Pilea pumila, Polygonum spp., Saururus cernuus, Scirpus cyperinus, S. georgianus, S. polyphyllus, Typha spp., Verbesina alternifolia, Vernonia noveboracensis*

Hydrophytic / Alluvial Trees and Shrubs

Acer negundo, A. saccharinum, Alnus serrulata, Betula nigra, Carpinus caroliniana, Carya aquatica, Carya cordiformis, Carya laciniosa, Carya myristiciformis, Cephalanthus occidentalis, Cornus amomum ssp. amomum, Fraxinus pennsylvanica, Ilex verticillata, Itea virginica, Liquidambar styraciflua, Nyssa aquatica, Nyssa biflora, Platanus occidentalis, Populus deltoides, Quercus lyrata, Q. michauxii, Q. pagoda, Q. palustris, Q. phellos, Ulmus americana, Vaccinium corymbosum, V. formosum, V. fuscatum
(***NOTE:** Acer rubrum, Celtis occidentalis, Juglans nigra, Platanus occidentalis, Quercus pagoda, Q. phellos, and Liriodendron tulipifera* are common in hydrophytic / alluvial situations but also occur commonly on uplands, especially early to mid-successional upland communities)

Upland Oaks and Hickories

Carya glabra, C. ovalis, Carya pallida, C. alba/tomentosa, Quercus alba, Q. coccinea, Q. falcata, Q. marilandica, Q. muehlenbergii, Q. pagoda (south of ILP), Q. prinus, Q. rubra, Q. stellata, Q. velutina

Mesophytic Trees

Acer saccharum, Carya cordiformis, Celtis occidentalis, Fagus grandifolia, Fraxinus americana, Juglans nigra, Liriodendron tulipifera, Magnolia grandiflora, Prunus serotina, Tilia americana var. heterophylla, Ulmus rubra

Upland Ericaceous Shrubs

Kalmia latifolia, Rhododendron periclymenoides, Vaccinium arboreum, Vaccinium elliottii, Vaccinium pallidum, Vaccinium stamineum

Weedy, Early-successional Trees

Ailanthus altissima, Albizia julibrissin, Celtis occidentalis/laevigata, Fraxinus americana, Juglans nigra, Liriodendron tulipifera, Morus alba*, Paulownia tomentosa*, Prunus avium*, Prunus serotina, Prunus subhirtella*, Robinia pseudoacacia, Ulmus americana*

(**NOTE**: The characteristic alluvial trees *Acer negundo, Acer rubrum, Liquidambar styraciflua, Platanus occidentalis, Quercus nigra,* and *Quercus phellos* occasionally occur in upland mixtures with the above species, particularly on highly disturbed successional uplands. The upland oaks *Quercus falcata* and *Quercus pagoda* can sometimes dominate extremely disturbed, successional stands as well.)

Exotic Shrubs

Albizia julibrissin, Elaeagnus umbellata*, Euonymus alatus*, Lespedeza bicolor*, Ligustrum obtusifolium*, Ligustrum sinense*, Lonicera maackii*, Lonicera morrowii*, Lonicera tatarica*, Rosa multiflora*, Rubus phoenicolasius**

Exotic Vines

Ampelopsis brevipedunculata, Celastrus orbiculatus*, Clematis ternifolia*, Euonymus fortunei*, Hedera helix*, Lonicera japonica*, Polygonum perfoliatum*, Pueraria lobata*, Vinca minor*, Wisteria floribunda*, Wisteria sinensis**

Native Vines

Campsis radicans, Parthenocissus quinquefolia, Smilax glauca, Smilax rotundifolia, Smilax tamnoides, Toxicodendron radicans, Vitis aestivalis, Vitis riparia, Vitis vulpina

Nutrient-enriched soil indicators

Acer saccharum, Acer nigrum, Carya cordiformis, Celtis occidentalis, Cercis canadensis, Fraxinus americana, Lindera benzoin, Quercus muehlenbergii, Staphylea trifolia, Ulmus rubra

Calciphilic Herbs

Allium tricoccum, Carex albursina, Carex careyana, Caulophyllum thalictroides, Cystopteris protrusa, Dicentra canadensis, Dicentra cucullaria, Deparia acrostichoides, Diplazium pycnocarpon, Erigenia bulbosa, Floerkea proserpinacoides, Hydrophyllum canadense, Jeffersonia diphylla, Matteuccia struthiopteris, Mertensia virginica, Trillium sessile

Mid- to Late-season Floodplain Herbs

Ageratina altissima, Boehmeria cylindrica, Cryptotaenia canadensis, Impatiens capensis, Laportea canadensis, Polygonum virginianum, Rudbeckia laciniata, Teucrium canadense, Urtica dioica ssp. dioica, Verbesina alternifolia*

Appendix D: List of Plant Species

Explanation of the Species List

Plant taxa were identified and documented from vegetation plots in which the plots were used to characterize vegetation associations in the U.S. National Vegetation Classification of the Natchez Trace Parkway. Plant taxa were also identified and documented from accuracy assessment sites in which the sites were used to assess the accuracy of the vegetation map layer produced for the Natchez Trace Parkway vegetation mapping project. Plant taxa from vegetation plots, along with other plot sample data, were entered into the National Park Service PLOTS Database Version 2.0 (NatureServe 2005). Plant taxa from accuracy assessment sites, along with other site and environmental data, were entered into the PLOTS version 4.0 (National Park Service 2015) database according to National Park Service specifications.

Table D–1 is an export of all plant taxa generated from the PLOTS database for this project. This list includes taxa identified to the genus, species, and subspecies level. This list is not intended to be a comprehensive list of every taxon at the Parkway. The plant taxa list is organized alphabetically by scientific name and all taxa names were standardized to the U.S. Department of Agriculture PLANTS 3.5 database (U.S. Department of Agriculture, Natural Resource Conservation Service 2011), which is in accordance with the NatureServe Ecology vascular plant taxonomic standard (Kartesz 1999).

Table D–1. Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Acalypha	copperleaf	Euphorbiaceae
Acalypha deamii	Deam's threeseed mercury	Euphorbiaceae
Acalypha gracilens	slender threeseed mercury	Euphorbiaceae
Acalypha ostryifolia	pineland threeseed mercury	Euphorbiaceae
Acalypha rhomboidea	common threeseed mercury	Euphorbiaceae
Acer barbatum	southern sugar maple	Aceraceae
Acer negundo	boxelder	Aceraceae
Acer nigrum	black maple	Aceraceae
Acer rubrum	red maple	Aceraceae
Acer rubrum var. *drummondii*	Drummond's maple	Aceraceae
Acer rubrum var. *rubrum*	red maple	Aceraceae
Acer rubrum var. *trilobum*	red maple	Aceraceae
Acer saccharinum	silver maple	Aceraceae
Acer saccharum	sugar maple	Aceraceae
Actaea pachypoda	white baneberry	Ranunculaceae
Adiantum pedatum	northern maidenhair	Pteridaceae
Aesculus	buckeye	Hippocastanaceae
Aesculus flava	yellow buckeye	Hippocastanaceae
Aesculus glabra	Ohio buckeye	Hippocastanaceae
Aesculus pavia	red buckeye	Hippocastanaceae
Agalinis	false foxglove	Scrophulariaceae
Agalinis aphylla	scaleleaf false foxglove	Scrophulariaceae
Agalinis fasciculata	beach false foxglove	Scrophulariaceae
Agalinis heterophylla	prairie false foxglove	Scrophulariaceae
Agalinis obtusifolia	tenlobe false foxglove	Scrophulariaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Agalinis oligophylla	ridgestem false foxglove	Scrophulariaceae
Agalinis tenuifolia	slenderleaf false foxglove	Scrophulariaceae
Ageratina	snakeroot	Asteraceae
Ageratina altissima	white snakeroot	Asteraceae
Ageratina altissima var. *altissima*	white snakeroot	Asteraceae
Ageratina aromatica	lesser snakeroot	Asteraceae
Agrimonia	agrimony	Rosaceae
Agrimonia parviflora	harvestlice	Rosaceae
Agrimonia rostellata	beaked agrimony	Rosaceae
Agrostis	bentgrass	Poaceae
Agrostis hyemalis	winter bentgrass	Poaceae
Agrostis perennans	upland bentgrass	Poaceae
Agrostis stolonifera	creeping bentgrass	Poaceae
Ailanthus altissima	tree of heaven	Simaroubaceae
Albizia julibrissin	silktree	Fabaceae
Allium	onion	Liliaceae
Allium canadense	meadow garlic	Liliaceae
Allium canadense var. *canadense*	meadow garlic	Liliaceae
Allium tricoccum	ramp	Liliaceae
Allium vineale	wild garlic	Liliaceae
Alnus serrulata	hazel alder	Betulaceae
Alternanthera philoxeroides	alligatorweed	Amaranthaceae
Amaranthus	pigweed	Amaranthaceae
Amaranthus retroflexus	redroot amaranth	Amaranthaceae
Ambrosia artemisiifolia	annual ragweed	Asteraceae
Ambrosia trifida	great ragweed	Asteraceae
Amelanchier	serviceberry	Rosaceae
Amelanchier arborea	common serviceberry	Rosaceae
Amorpha fruticosa	desert false indigo	Fabaceae
Ampelopsis arborea	peppervine	Vitaceae
Ampelopsis cordata	heartleaf peppervine	Vitaceae
Amphicarpaea bracteata	American hogpeanut	Fabaceae
Andropogon	bluestem	Poaceae
Andropogon gerardii	big bluestem	Poaceae
Andropogon glomeratus	bushy bluestem	Poaceae
Andropogon gyrans	Elliott's bluestem	Poaceae
Andropogon ternarius	splitbeard bluestem	Poaceae
Andropogon virginicus	broomsedge bluestem	Poaceae
Anemone virginiana	tall thimbleweed	Ranunculaceae
Angelica	angelica	Apiaceae
Angelica venenosa	hairy angelica	Apiaceae
Anomodon rostratus	anomodon moss	Anomodontaceae
Antennaria	pussytoes	Asteraceae
Antennaria plantaginifolia	woman's tobacco	Asteraceae
Apios americana	groundnut	Fabaceae
Apios priceana	traveler's delight	Fabaceae
Apocynum cannabinum	Indianhemp	Apocynaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Aquilegia canadensis	red columbine	Ranunculaceae
Arabis	rockcress	Brassicaceae
Aralia spinosa	devil's walkingstick	Araliaceae
Arisaema dracontium	green dragon	Araceae
Arisaema triphyllum	Jack in the pulpit	Araceae
Arisaema triphyllum ssp. *pusillum*	Jack in the pulpit	Araceae
Aristida	threeawn	Poaceae
Aristida dichotoma	churchmouse threeawn	Poaceae
Aristida oligantha	prairie threeawn	Poaceae
Aristida purpurascens	arrowfeather threeawn	Poaceae
Aristida tuberculosa	seaside threeawn	Poaceae
Aristolochia serpentaria	Virginia snakeroot	Aristolochiaceae
Aristolochia tomentosa	woolly dutchman's pipe	Aristolochiaceae
Arnoglossum	Indian plantain	Asteraceae
Arnoglossum atriplicifolium	pale Indian plantain	Asteraceae
Arnoglossum plantagineum	groovestem Indian plantain	Asteraceae
Arundinaria gigantea	giant cane	Poaceae
Asarum canadense	Canadian wildginger	Aristolochiaceae
Asclepias	milkweed	Asclepiadaceae
Asclepias amplexicaulis	clasping milkweed	Asclepiadaceae
Asclepias tuberosa	butterfly milkweed	Asclepiadaceae
Asclepias variegata	redring milkweed	Asclepiadaceae
Asclepias viridiflora	green comet milkweed	Asclepiadaceae
Asclepias viridis	green antelopehorn	Asclepiadaceae
Asimina triloba	pawpaw	Annonaceae
Asplenium platyneuron	ebony spleenwort	Aspleniaceae
Asplenium resiliens	blackstem spleenwort	Aspleniaceae
Asplenium rhizophyllum	walking fern	Aspleniaceae
Athyrium	ladyfern	Dryopteridaceae
Athyrium filix-femina	common ladyfern	Dryopteridaceae
Athyrium filix-femina ssp. *asplenioides*	asplenium ladyfern	Dryopteridaceae
Atrichum	atrichum moss	Polytrichaceae
Aureolaria	false foxglove	Scrophulariaceae
Aureolaria pectinata	combleaf yellow false foxglove	Scrophulariaceae
Axonopus fissifolius	common carpetgrass	Poaceae
Baccharis halimifolia	eastern baccharis	Asteraceae
Bartonia paniculata	twining screwstem	Gentianaceae
Berberis thunbergii	Japanese barberry	Berberidaceae
Berchemia scandens	Alabama supplejack	Rhamnaceae
Betula nigra	river birch	Betulaceae
Bidens	beggarticks	Asteraceae
Bidens aristosa	bearded beggarticks	Asteraceae
Bidens bipinnata	Spanish needles	Asteraceae
Bidens frondosa	devil's beggartick	Asteraceae
Bidens laevis	smooth beggartick	Asteraceae
Bignonia capreolata	crossvine	Bignoniaceae
Blephilia ciliata	downy pagoda-plant	Lamiaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Boehmeria cylindrica	smallspike false nettle	Urticaceae
Boltonia	doll's daisy	Asteraceae
Boltonia asteroides	white doll's daisy	Asteraceae
Boltonia diffusa	smallhead doll's daisy	Asteraceae
Botrychium	grapefern	Ophioglossaceae
Botrychium biternatum	sparselobe grapefern	Ophioglossaceae
Botrychium dissectum	cutleaf grapefern	Ophioglossaceae
Botrychium virginianum	rattlesnake fern	Ophioglossaceae
Bouteloua curtipendula	sideoats grama	Poaceae
Brachyelytrum erectum	bearded shorthusk	Poaceae
Brickellia eupatorioides	false boneset	Asteraceae
Brickellia eupatorioides var. *eupatorioides*	false boneset	Asteraceae
Bromus	brome	Poaceae
Bromus pubescens	hairy woodland brome	Poaceae
Bromus tectorum	cheatgrass	Poaceae
Broussonetia papyrifera	paper mulberry	Moraceae
Brunnichia ovata	American buckwheat vine	Polygonaceae
Bryoandersonia	bryoandersonia moss	Brachytheciaceae
Bryoandersonia illecebra	bryoandersonia moss	Brachytheciaceae
Buchnera americana	American bluehearts	Scrophulariaceae
Cabomba caroliniana	Carolina fanwort	Cabombaceae
Callicarpa americana	American beautyberry	Verbenaceae
Calycocarpum lyonii	cupseed	Menispermaceae
Calypogeia		Calypogeiaceae
Campanulastrum americanum	American bellflower	Campanulaceae
Campsis radicans	trumpet creeper	Bignoniaceae
Cardamine bulbosa	bulbous bittercress	Brassicaceae
Cardamine diphylla	crinkleroot	Brassicaceae
Cardamine hirsuta	hairy bittercress	Brassicaceae
Carex	sedge	Cyperaceae
Carex albursina	white bear sedge	Cyperaceae
Carex atlantica	prickly bog sedge	Cyperaceae
Carex blanda	eastern woodland sedge	Cyperaceae
Carex bromoides	brome-like sedge	Cyperaceae
Carex cherokeensis	Cherokee sedge	Cyperaceae
Carex comosa	longhair sedge	Cyperaceae
Carex complanata	hirsute sedge	Cyperaceae
Carex crinita	fringed sedge	Cyperaceae
Carex debilis	white edge sedge	Cyperaceae
Carex digitalis	slender woodland sedge	Cyperaceae
Carex frankii	Frank's sedge	Cyperaceae
Carex gigantea	giant sedge	Cyperaceae
Carex glaucescens	southern waxy sedge	Cyperaceae
Carex glaucodea	blue sedge	Cyperaceae
Carex grayi	Gray's sedge	Cyperaceae
Carex impressinervia	ravine sedge	Cyperaceae
Carex intumescens	greater bladder sedge	Cyperaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Carex laxiflora	broad looseflower sedge	Cyperaceae
Carex leptalea	bristlystalked sedge	Cyperaceae
Carex louisianica	Louisiana sedge	Cyperaceae
Carex lupuliformis	false hop sedge	Cyperaceae
Carex lupulina	hop sedge	Cyperaceae
Carex lurida	shallow sedge	Cyperaceae
Carex nigromarginata	black edge sedge	Cyperaceae
Carex oxylepis	sharpscale sedge	Cyperaceae
Carex picta	Boott's sedge	Cyperaceae
Carex rosea	rosy sedge	Cyperaceae
Carex tribuloides	blunt broom sedge	Cyperaceae
Carex vulpinoidea	fox sedge	Cyperaceae
Carpinus caroliniana	American hornbeam	Betulaceae
Carya	hickory	Juglandaceae
Carya alba	mockernut hickory	Juglandaceae
Carya aquatica	water hickory	Juglandaceae
Carya carolinae-septentrionalis	southern shagbark hickory	Juglandaceae
Carya cordiformis	bitternut hickory	Juglandaceae
Carya glabra	pignut hickory	Juglandaceae
Carya illinoinensis	pecan	Juglandaceae
Carya laciniosa	shellbark hickory	Juglandaceae
Carya myristiciformis	nutmeg hickory	Juglandaceae
Carya ovalis	red hickory	Juglandaceae
Carya ovata	shagbark hickory	Juglandaceae
Carya pallida	sand hickory	Juglandaceae
Carya texana	black hickory	Juglandaceae
Castanea dentata	American chestnut	Fagaceae
Castanea pumila	chinkapin	Fagaceae
Castilleja coccinea	scarlet Indian paintbrush	Scrophulariaceae
Catalpa speciosa	northern catalpa	Bignoniaceae
Caulophyllum	cohosh	Berberidaceae
Ceanothus americanus	New Jersey tea	Rhamnaceae
Celastrus orbiculata	oriental bittersweet	Celastraceae
Celtis laevigata	sugarberry	Ulmaceae
Celtis occidentalis	common hackberry	Ulmaceae
Celtis tenuifolia	dwarf hackberry	Ulmaceae
Centrosema	butterfly pea	Fabaceae
Centrosema virginianum	spurred butterfly pea	Fabaceae
Cephalanthus occidentalis	common buttonbush	Rubiaceae
Ceratophyllum demersum	coon's tail	Ceratophyllaceae
Cercis canadensis	eastern redbud	Fabaceae
Chamaecrista fasciculata	partridge pea	Fabaceae
Chamaelirium luteum	fairywand	Liliaceae
Chamaesyce	sandmat	Euphorbiaceae
Chamaesyce maculata	spotted sandmat	Euphorbiaceae
Chamaesyce nutans	eyebane	Euphorbiaceae
Chasmanthium	woodoats	Poaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Chasmanthium latifolium	Indian woodoats	Poaceae
Chasmanthium laxum	slender woodoats	Poaceae
Chasmanthium sessiliflorum	longleaf woodoats	Poaceae
Chelone glabra	white turtlehead	Scrophulariaceae
Chimaphila maculata	striped prince's pine	Pyrolaceae
Chionanthus virginicus	white fringetree	Oleaceae
Chrysopsis mariana	Maryland goldenaster	Asteraceae
Cicuta maculata	spotted water hemlock	Apiaceae
Cinna arundinacea	sweet woodreed	Poaceae
Circaea lutetiana ssp. *canadensis*	broadleaf enchanter's nightshade	Onagraceae
Cirsium	thistle	Asteraceae
Cirsium carolinianum	soft thistle	Asteraceae
Cirsium discolor	field thistle	Asteraceae
Cirsium horridulum	yellow thistle	Asteraceae
Cirsium virginianum	Virginia thistle	Asteraceae
Cladina rangiferina	greygreen reindeer lichen	Cladoniaceae
Cladina subtenuis	reindeer lichen	Cladoniaceae
Cladonia	cup lichen	Cladoniaceae
Cladrastis kentukea	Kentucky yellowwood	Fabaceae
Clematis reticulata	netleaf leather flower	Ranunculaceae
Clematis terniflora	sweet autumn virginsbower	Ranunculaceae
Clematis virginiana	devil's darning needles	Ranunculaceae
Climacium americanum	American climacium moss	Climaciaceae
Clinopodium gracile	slender wild basil	Lamiaceae
Clitoria mariana	Atlantic pigeonwings	Fabaceae
Cocculus carolinus	Carolina coralbead	Menispermaceae
Collinsonia	horsebalm	Lamiaceae
Collinsonia canadensis	richweed	Lamiaceae
Collinsonia serotina	Blue Ridge horsebalm	Lamiaceae
Collinsonia tuberosa	deepwoods horsebalm	Lamiaceae
Colocasia esculenta	coco yam	Araceae
Commelina virginica	Virginia dayflower	Commelinaceae
Conium maculatum	poison hemlock	Apiaceae
Conoclinium coelestinum	blue mistflower	Asteraceae
Conopholis americana	American cancer-root	Orobanchaceae
Convolvulus	bindweed	Convolvulaceae
Conyza canadensis	Canadian horseweed	Asteraceae
Corallorrhiza odontorhiza	autumn coralroot	Orchidaceae
Coreopsis	tickseed	Asteraceae
Coreopsis auriculata	lobed tickseed	Asteraceae
Coreopsis major	greater tickseed	Asteraceae
Coreopsis tripteris	tall tickseed	Asteraceae
Cornus	dogwood	Cornaceae
Cornus amomum	silky dogwood	Cornaceae
Cornus drummondii	roughleaf dogwood	Cornaceae
Cornus florida	flowering dogwood	Cornaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Cornus foemina	stiff dogwood	Cornaceae
Cornus racemosa	gray dogwood	Cornaceae
Corylus	hazelnut	Betulaceae
Corylus americana	American hazelnut	Betulaceae
Corylus cornuta	beaked hazelnut	Betulaceae
Crataegus	hawthorn	Rosaceae
Crataegus marshallii	parsley hawthorn	Rosaceae
Crataegus spathulata	littlehip hawthorn	Rosaceae
Crataegus uniflora	dwarf hawthorn	Rosaceae
Crataegus viridis	green hawthorn	Rosaceae
Croton capitatus	hogwort	Euphorbiaceae
Croton glandulosus	vente conmigo	Euphorbiaceae
Croton monanthogynus	prairie tea	Euphorbiaceae
Cruciata pedemontana	piedmont bedstraw	Rubiaceae
Cryptotaenia canadensis	Canadian honewort	Apiaceae
Cunila origanoides	common dittany	Lamiaceae
Cuscuta	dodder	Cuscutaceae
Cynanchum laeve	honeyvine	Asclepiadaceae
Cynodon dactylon	Bermudagrass	Poaceae
Cynoglossum	hound's tongue	Boraginaceae
Cynoglossum virginianum	wild comfrey	Boraginaceae
Cyperus	flatsedge	Cyperaceae
Cyperus erythrorhizos	redroot flatsedge	Cyperaceae
Cyperus esculentus	yellow nutsedge	Cyperaceae
Cyperus odoratus	fragrant flatsedge	Cyperaceae
Cyperus pseudovegetus	marsh flatsedge	Cyperaceae
Cyperus strigosus	strawcolored flatsedge	Cyperaceae
Cypripedium pubescens var. *pubescens*	greater yellow lady's slipper	Orchidaceae
Cyrtomium fortunei	Asian netvein hollyfern	Dryopteridaceae
Cystopteris	bladderfern	Dryopteridaceae
Cystopteris bulbifera	bulblet bladderfern	Dryopteridaceae
Cystopteris fragilis	brittle bladderfern	Dryopteridaceae
Cystopteris protrusa	lowland bladderfern	Dryopteridaceae
Dalea candida	white prairie clover	Fabaceae
Dalea purpurea	purple prairie clover	Fabaceae
Danthonia	oatgrass	Poaceae
Danthonia sericea	downy danthonia	Poaceae
Danthonia spicata	poverty oatgrass	Poaceae
Daucus	wild carrot	Apiaceae
Daucus carota	Queen Anne's lace	Apiaceae
Decumaria barbara	woodvamp	Hydrangeaceae
Dennstaedtia punctilobula	eastern hayscented fern	Dennstaedtiaceae
Deparia acrostichoides	silver false spleenwort	Dryopteridaceae
Desmanthus illinoensis	Illinois bundleflower	Fabaceae
Desmodium	ticktrefoil	Fabaceae
Desmodium canescens	hoary ticktrefoil	Fabaceae
Desmodium ciliare	hairy small-leaf ticktrefoil	Fabaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Desmodium glabellum	Dillenius' ticktrefoil	Fabaceae
Desmodium glutinosum	pointedleaf ticktrefoil	Fabaceae
Desmodium illinoense	Illinois ticktrefoil	Fabaceae
Desmodium marilandicum	smooth small-leaf ticktrefoil	Fabaceae
Desmodium nudiflorum	nakedflower ticktrefoil	Fabaceae
Desmodium paniculatum	panicledleaf ticktrefoil	Fabaceae
Desmodium pauciflorum	fewflower ticktrefoil	Fabaceae
Desmodium perplexum	perplexed ticktrefoil	Fabaceae
Desmodium rotundifolium	prostrate ticktrefoil	Fabaceae
Desmodium viridiflorum	velvetleaf ticktrefoil	Fabaceae
Diarrhena americana	American beakgrain	Poaceae
Dichanthelium	rosette grass	Poaceae
Dichanthelium acuminatum	tapered rosette grass	Poaceae
Dichanthelium boscii	Bosc's panicgrass	Poaceae
Dichanthelium clandestinum	deertongue	Poaceae
Dichanthelium commutatum	variable panicgrass	Poaceae
Dichanthelium dichotomum	cypress panicgrass	Poaceae
Dichanthelium dichotomum var. *dichotomum*	cypress panicgrass	Poaceae
Dichanthelium laxiflorum	openflower rosette grass	Poaceae
Dichanthelium linearifolium	slimleaf panicgrass	Poaceae
Dichanthelium oligosanthes	Heller's rosette grass	Poaceae
Dichanthelium scabriusculum	woolly rosette grass	Poaceae
Dichanthelium scoparium	velvet panicum	Poaceae
Dichanthelium sphaerocarpon var. *isophyllum*	roundseed panicgrass	Poaceae
Dichondra carolinensis	Carolina ponysfoot	Convolvulaceae
Dicliptera brachiata	branched foldwing	Acanthaceae
Dicranum scoparium	dicranum moss	Dicranaceae
Digitaria	crabgrass	Poaceae
Digitaria filiformis	slender crabgrass	Poaceae
Digitaria ischaemum	smooth crabgrass	Poaceae
Digitaria sanguinalis	hairy crabgrass	Poaceae
Dioclea multiflora	Boykin's clusterpea	Fabaceae
Diodia teres	poorjoe	Rubiaceae
Diodia virginiana	Virginia buttonweed	Rubiaceae
Dioscorea	yam	Dioscoreaceae
Dioscorea oppositifolia	Chinese yam	Dioscoreaceae
Dioscorea quaternata	fourleaf yam	Dioscoreaceae
Dioscorea villosa	wild yam	Dioscoreaceae
Diospyros virginiana	common persimmon	Ebenaceae
Diphyscium cumberlandianum	Cumberland diphyscium moss	Buxbaumiaceae
Diplazium pycnocarpon	glade fern	Dryopteridaceae
Diplophyllum apiculatum		Scapaniaceae
Dirca palustris	eastern leatherwood	Thymelaeaceae
Dodecatheon meadia	pride of Ohio	Primulaceae
Dryopteris celsa	log fern	Dryopteridaceae
Dulichium arundinaceum	threeway sedge	Cyperaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Dumortiera hirsuta		Marchantiaceae
Echinochloa colona	jungle rice	Poaceae
Echinochloa crus-galli	barnyardgrass	Poaceae
Eichhornia crassipes	common water hyacinth	Pontederiaceae
Elaeagnus umbellata	autumn olive	Elaeagnaceae
Eleocharis ovata	ovate spikerush	Cyperaceae
Elephantopus	elephantsfoot	Asteraceae
Elephantopus carolinianus	Carolina elephantsfoot	Asteraceae
Elephantopus tomentosus	devil's grandmother	Asteraceae
Eleusine indica	Indian goosegrass	Poaceae
Elymus	wildrye	Poaceae
Elymus hystrix	eastern bottlebrush grass	Poaceae
Elymus virginicus	Virginia wildrye	Poaceae
Epifagus virginiana	beechdrops	Orobanchaceae
Epigaea repens	trailing arbutus	Ericaceae
Epilobium coloratum	purpleleaf willowherb	Onagraceae
Equisetum hyemale	scouringrush horsetail	Equisetaceae
Equisetum hyemale var. *affine*	scouringrush horsetail	Equisetaceae
Eragrostis	lovegrass	Poaceae
Eragrostis hirsuta	bigtop lovegrass	Poaceae
Eragrostis spectabilis	purple lovegrass	Poaceae
Erechtites hieraciifolia	American burnweed	Asteraceae
Erigeron	fleabane	Asteraceae
Erigeron annuus	eastern daisy fleabane	Asteraceae
Erigeron philadelphicus	Philadelphia fleabane	Asteraceae
Erigeron strigosus	prairie fleabane	Asteraceae
Eryngium yuccifolium	button eryngo	Apiaceae
Erythrina herbacea	redcardinal	Fabaceae
Euonymus alata	burningbush	Celastraceae
Euonymus americana	bursting-heart	Celastraceae
Euonymus atropurpurea	burningbush	Celastraceae
Eupatorium	thoroughwort	Asteraceae
Eupatorium album	white thoroughwort	Asteraceae
Eupatorium altissimum	tall thoroughwort	Asteraceae
Eupatorium capillifolium	dogfennel	Asteraceae
Eupatorium fistulosum	trumpetweed	Asteraceae
Eupatorium hyssopifolium	hyssopleaf thoroughwort	Asteraceae
Eupatorium leucolepis	justiceweed	Asteraceae
Eupatorium perfoliatum	common boneset	Asteraceae
Eupatorium purpureum	sweetscented joe pye weed	Asteraceae
Eupatorium rotundifolium	roundleaf thoroughwort	Asteraceae
Eupatorium rotundifolium var. *rotundifolium*	roundleaf thoroughwort	Asteraceae
Eupatorium serotinum	lateflowering thoroughwort	Asteraceae
Euphorbia	spurge	Euphorbiaceae
Euphorbia corollata	flowering spurge	Euphorbiaceae
Euphorbia dentata	toothed spurge	Euphorbiaceae
Euphorbia mercurialina	mercury spurge	Euphorbiaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Eurybia hemispherica	southern prairie aster	Asteraceae
Eurybia paludosa	southern swamp aster	Asteraceae
Euthamia tenuifolia var. *tenuifolia*	slender goldentop	Asteraceae
Fagus grandifolia	American beech	Fagaceae
Fagus sylvatica	European beech	Fagaceae
Fimbristylis	fimbry	Cyperaceae
Firmiana simplex	Chinese parasoltree	Sterculiaceae
Fissidens ravenelii	Ravenel's fissidens moss	Fissidentaceae
Flakea papillata		
Fleischmannia incarnata	pink thoroughwort	Asteraceae
Forestiera acuminata	eastern swampprivet	Oleaceae
Forestiera ligustrina	upland swampprivet	Oleaceae
Fragaria virginiana	Virginia strawberry	Rosaceae
Frangula caroliniana	Carolina buckthorn	Rhamnaceae
Frasera caroliniensis	American columbo	Gentianaceae
Fraxinus	ash	Oleaceae
Fraxinus americana	white ash	Oleaceae
Fraxinus pennsylvanica	green ash	Oleaceae
Fraxinus quadrangulata	blue ash	Oleaceae
Galactia	milkpea	Fabaceae
Galactia volubilis	downy milkpea	Fabaceae
Galearis spectabilis	showy orchid	Orchidaceae
Galium	bedstraw	Rubiaceae
Galium aparine	stickywilly	Rubiaceae
Galium circaezans	licorice bedstraw	Rubiaceae
Galium pilosum	hairy bedstraw	Rubiaceae
Galium tinctorium	stiff marsh bedstraw	Rubiaceae
Galium triflorum	fragrant bedstraw	Rubiaceae
Galium uniflorum	oneflower bedstraw	Rubiaceae
Gamochaeta purpurea	spoonleaf purple everlasting	Asteraceae
Gaura filipes	slenderstalk beeblossom	Onagraceae
Gelsemium sempervirens	evening trumpetflower	Loganiaceae
Gentiana villosa	striped gentian	Gentianaceae
Geranium carolinianum	Carolina geranium	Geraniaceae
Geranium maculatum	spotted geranium	Geraniaceae
Geum	avens	Rosaceae
Geum canadense	white avens	Rosaceae
Geum canadense var. *brevipes*	white avens	Rosaceae
Geum virginianum	cream avens	Rosaceae
Glechoma hederacea	ground ivy	Lamiaceae
Gleditsia triacanthos	honeylocust	Fabaceae
Glyceria striata	fowl mannagrass	Poaceae
Glycine max	soybean	Fabaceae
Gnaphalium	cudweed	Asteraceae
Goodyera pubescens	downy rattlesnake plantain	Orchidaceae
Gymnocladus dioicus	Kentucky coffeetree	Fabaceae
Hackelia virginiana	beggarslice	Boraginaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Halesia	silverbell	Styracaceae
Halesia carolina	Carolina silverbell	Styracaceae
Halesia diptera	two-wing silverbell	Styracaceae
Halesia tetraptera	mountain silverbell	Styracaceae
Hamamelis virginiana	American witchhazel	Hamamelidaceae
Hasteola suaveolens	false Indian plantain	Asteraceae
Hedera helix	English ivy	Araliaceae
Hedyotis nigricans	diamond-flowers	Rubiaceae
Helenium autumnale	common sneezeweed	Asteraceae
Helenium flexuosum	purplehead sneezeweed	Asteraceae
Helianthus	sunflower	Asteraceae
Helianthus angustifolius	swamp sunflower	Asteraceae
Helianthus atrorubens	purpledisk sunflower	Asteraceae
Helianthus decapetalus	thinleaf sunflower	Asteraceae
Helianthus divaricatus	woodland sunflower	Asteraceae
Helianthus giganteus	giant sunflower	Asteraceae
Helianthus hirsutus	hairy sunflower	Asteraceae
Helianthus microcephalus	small woodland sunflower	Asteraceae
Helianthus mollis	ashy sunflower	Asteraceae
Hepatica nobilis var. *acuta*	sharplobe hepatica	Ranunculaceae
Hepatica nobilis var. *obtusa*	roundlobe hepatica	Ranunculaceae
Heuchera	alumroot	Saxifragaceae
Heuchera villosa	hairy alumroot	Saxifragaceae
Hexastylis arifolia	littlebrownjug	Aristolochiaceae
Hibiscus moscheutos	crimsoneyed rosemallow	Malvaceae
Hieracium gronovii	queendevil	Asteraceae
Hookeria	hookeria moss	Hookeriaceae
Hookeria acutifolia	sharpleaf hookeria moss	Hookeriaceae
Houstonia canadensis	Canadian summer bluet	Rubiaceae
Houstonia purpurea	Venus' pride	Rubiaceae
Huperzia lucidula	shining clubmoss	Lycopodiaceae
Hybanthus concolor	eastern greenviolet	Violaceae
Hydrangea arborescens	wild hydrangea	Hydrangeaceae
Hydrangea cinerea	ashy hydrangea	Hydrangeaceae
Hydrangea quercifolia	oakleaf hydrangea	Hydrangeaceae
Hydrocotyle	hydrocotyle	Apiaceae
Hydrocotyle ranunculoides	floating marshpennywort	Apiaceae
Hydrolea uniflora	oneflower false fiddleleaf	Hydrophyllaceae
Hydrophyllum	waterleaf	Hydrophyllaceae
Hydrophyllum canadense	bluntleaf waterleaf	Hydrophyllaceae
Hymenocallis	spiderlily	Liliaceae
Hymenocallis caroliniana	Carolina spiderlily	Liliaceae
Hypericum	St. Johnswort	Clusiaceae
Hypericum crux-andreae	St. Peterswort	Clusiaceae
Hypericum denticulatum	coppery St. Johnswort	Clusiaceae
Hypericum drummondii	nits and lice	Clusiaceae
Hypericum hypericoides	St. Andrew's cross	Clusiaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Hypericum hypericoides ssp. *multicaule*	St. Andrew's cross	Clusiaceae
Hypericum mutilum	dwarf St. Johnswort	Clusiaceae
Hypericum punctatum	spotted St. Johnswort	Clusiaceae
Hypericum sphaerocarpum	roundseed St. Johnswort	Clusiaceae
Hypochaeris radicata	hairy cat's ear	Asteraceae
Hypoxis hirsuta	common goldstar	Iridaceae
Ilex	holly	Aquifoliaceae
Ilex ambigua	Carolina holly	Aquifoliaceae
Ilex amelanchier	sarvis holly	Aquifoliaceae
Ilex decidua	possumhaw	Aquifoliaceae
Ilex longipes	Georgia holly	Aquifoliaceae
Ilex opaca	American holly	Aquifoliaceae
Ilex verticillata	common winterberry	Aquifoliaceae
Ilex vomitoria	yaupon	Aquifoliaceae
Illicium floridanum	Florida anisetree	Illiciaceae
Impatiens	touch-me-not	Balsaminaceae
Impatiens capensis	jewelweed	Balsaminaceae
Impatiens pallida	pale touch-me-not	Balsaminaceae
Ionactis linariifolius	flaxleaf whitetop aster	Asteraceae
Ipomoea lacunosa	whitestar	Convolvulaceae
Ipomoea pandurata	man of the earth	Convolvulaceae
Ipomoea purpurea	tall morning-glory	Convolvulaceae
Iresine rhizomatosa	Juda's bush	Amaranthaceae
Iris	iris	Iridaceae
Iris cristata	dwarf crested iris	Iridaceae
Iris verna	dwarf violet iris	Iridaceae
Isotria verticillata	large whorled pogonia	Orchidaceae
Itea virginica	Virginia sweetspire	Grossulariaceae
Iva annua	annual marsh elder	Asteraceae
Jacquemontia tamnifolia	hairy clustervine	Convolvulaceae
Juglans cinerea	butternut	Juglandaceae
Juglans nigra	black walnut	Juglandaceae
Juncus	rush	Juncaceae
Juncus biflorus	bog rush	Juncaceae
Juncus coriaceus	leathery rush	Juncaceae
Juncus dudleyi	Dudley's rush	Juncaceae
Juncus effusus	common rush	Juncaceae
Juncus marginatus	grassleaf rush	Juncaceae
Juncus polycephalus	manyhead rush	Juncaceae
Juncus tenuis	poverty rush	Juncaceae
Juniperus virginiana	eastern redcedar	Cupressaceae
Juniperus virginiana var. *virginiana*	eastern redcedar	Cupressaceae
Justicia americana	American water-willow	Acanthaceae
Justicia ovata	looseflower water-willow	Acanthaceae
Kalmia latifolia	mountain laurel	Ericaceae
Krigia dandelion	potato dwarfdandelion	Asteraceae
Kummerowia	kummerowia	Fabaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Kummerowia striata	Japanese clover	Fabaceae
Kyllinga pumila	low spikesedge	Cyperaceae
Lactuca	lettuce	Asteraceae
Lactuca canadensis	Canada lettuce	Asteraceae
Lactuca floridana	woodland lettuce	Asteraceae
Lactuca serriola	prickly lettuce	Asteraceae
Lamium amplexicaule	henbit deadnettle	Lamiaceae
Laportea canadensis	Canadian woodnettle	Urticaceae
Lechea	pinweed	Cistaceae
Leersia	cutgrass	Poaceae
Leersia lenticularis	catchfly grass	Poaceae
Leersia oryzoides	rice cutgrass	Poaceae
Leersia virginica	whitegrass	Poaceae
Lemna	duckweed	Lemnaceae
Lemna minor	common duckweed	Lemnaceae
Lespedeza	lespedeza	Fabaceae
Lespedeza cuneata	sericea lespedeza	Fabaceae
Lespedeza hirta	hairy lespedeza	Fabaceae
Lespedeza procumbens	trailing lespedeza	Fabaceae
Lespedeza repens	creeping lespedeza	Fabaceae
Lespedeza violacea	violet lespedeza	Fabaceae
Lespedeza virginica	slender lespedeza	Fabaceae
Leucobryum	leucobryum moss	Leucobryaceae
Leucobryum albidum	leucobryum moss	Leucobryaceae
Liatris	blazing star	Asteraceae
Liatris spicata	dense blazing star	Asteraceae
Liatris squarrosa	scaly blazing star	Asteraceae
Liatris squarrulosa	Appalachian blazing star	Asteraceae
Lichenochora	lichenochora lichen	Phyllachoraceae
Ligusticum canadense	Canadian licorice-root	Apiaceae
Ligustrum japonicum	Japanese privet	Oleaceae
Ligustrum sinense	Chinese privet	Oleaceae
Ligustrum vulgare	European privet	Oleaceae
Lindera benzoin	northern spicebush	Lauraceae
Linum	flax	Linaceae
Linum striatum	ridged yellow flax	Linaceae
Linum sulcatum	grooved flax	Linaceae
Liparis liliifolia	brown widelip orchid	Orchidaceae
Liquidambar styraciflua	sweetgum	Hamamelidaceae
Liriodendron tulipifera	tuliptree	Magnoliaceae
Lithospermum tuberosum	tuberous stoneseed	Boraginaceae
Lobelia cardinalis	cardinalflower	Campanulaceae
Lobelia inflata	Indian-tobacco	Campanulaceae
Lobelia puberula	downy lobelia	Campanulaceae
Lobelia siphilitica	great blue lobelia	Campanulaceae
Lobelia spicata	palespike lobelia	Campanulaceae
Lobelia spicata var. *leptostachys*	palespike lobelia	Campanulaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Lolium arundinaceum	tall fescue	Poaceae
Lolium perenne	perennial ryegrass	Poaceae
Lolium pratense	meadow fescue	Poaceae
Lonicera japonica	Japanese honeysuckle	Caprifoliaceae
Lonicera maackii	Amur honeysuckle	Caprifoliaceae
Lonicera sempervirens	trumpet honeysuckle	Caprifoliaceae
Ludwigia	primrose-willow	Onagraceae
Ludwigia alternifolia	seedbox	Onagraceae
Ludwigia decurrens	wingleaf primrose-willow	Onagraceae
Ludwigia glandulosa	cylindricfruit primrose-willow	Onagraceae
Ludwigia leptocarpa	anglestem primrose-willow	Onagraceae
Ludwigia octovalvis	Mexican primrose-willow	Onagraceae
Ludwigia palustris	marsh seedbox	Onagraceae
Ludwigia peploides	floating primrose-willow	Onagraceae
Luziola	watergrass	Poaceae
Lycopodium digitatum	fan clubmoss	Lycopodiaceae
Lycopus	waterhorehound	Lamiaceae
Lycopus rubellus	taperleaf water horehound	Lamiaceae
Lycopus virginicus	Virginia water horehound	Lamiaceae
Lygodium japonicum	Japanese climbing fern	Lygodiaceae
Lyonia	staggerbush	Ericaceae
Lysimachia	yellow loosestrife	Primulaceae
Lysimachia ciliata	fringed loosestrife	Primulaceae
Lysimachia lanceolata	lanceleaf loosestrife	Primulaceae
Lysimachia quadrifolia	whorled yellow loosestrife	Primulaceae
Lythrum alatum	winged lythrum	Lythraceae
Maclura pomifera	osage orange	Moraceae
Macrothelypteris torresiana	swordfern	Thelypteridaceae
Magnolia acuminata	cucumber-tree	Magnoliaceae
Magnolia grandiflora	southern magnolia	Magnoliaceae
Magnolia macrophylla	bigleaf magnolia	Magnoliaceae
Magnolia tripetala	umbrella-tree	Magnoliaceae
Magnolia virginiana	sweetbay	Magnoliaceae
Maianthemum racemosum	feathery false lily of the valley	Liliaceae
Maianthemum racemosum ssp. *racemosum*	feathery false lily of the valley	Liliaceae
Malaxis	adder's-mouth orchid	Orchidaceae
Malaxis unifolia	green adder's-mouth orchid	Orchidaceae
Malus coronaria	sweet crab apple	Rosaceae
Manfreda virginica	false aloe	Agavaceae
Marshallia trinervia	broadleaf Barbara's buttons	Asteraceae
Matelea	milkvine	Asclepiadaceae
Matelea gonocarpos	angularfruit milkvine	Asclepiadaceae
Mecardonia acuminata	axilflower	Scrophulariaceae
Medeola virginiana	Indian cucumber	Liliaceae
Melia azedarach	Chinaberrytree	Meliaceae
Melica mutica	twoflower melicgrass	Poaceae
Melothria pendula	Guadeloupe cucumber	Cucurbitaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Menispermum canadense	common moonseed	Menispermaceae
Microstegium vimineum	Nepalese browntop	Poaceae
Mikania cordifolia	Florida Keys hempvine	Asteraceae
Mikania scandens	climbing hempvine	Asteraceae
Mimosa microphylla	littleleaf sensitive-briar	Fabaceae
Mimulus alatus	sharpwing monkeyflower	Scrophulariaceae
Mitchella repens	partridgeberry	Rubiaceae
Mitreola petiolata	lax hornpod	Loganiaceae
Mnium	mnium calcareous moss	Mniaceae
Monarda	beebalm	Lamiaceae
Monarda bradburiana	eastern beebalm	Lamiaceae
Monarda clinopodia	white bergamot	Lamiaceae
Monarda fistulosa	wild bergamot	Lamiaceae
Monotropa uniflora	Indianpipe	Monotropaceae
Monotropsis	pygmypipes	Monotropaceae
Morella cerifera	wax myrtle	Myricaceae
Morus	mulberry	Moraceae
Morus alba	white mulberry	Moraceae
Morus rubra	red mulberry	Moraceae
Muhlenbergia schreberi	nimblewill	Poaceae
Muhlenbergia sobolifera	rock muhly	Poaceae
Murdannia keisak	wartremoving herb	Commelinaceae
Myriophyllum spicatum	Eurasian watermilfoil	Haloragaceae
Nandina domestica	sacred bamboo	Berberidaceae
Narcissus	daffodil	Liliaceae
Nelumbo lutea	American lotus	Nelumbonaceae
Nemophila aphylla	smallflower baby blue eyes	Hydrophyllaceae
Nothoscordum bivalve	crowpoison	Liliaceae
Nuphar lutea	yellow pond-lily	Nymphaeaceae
Nuttallanthus canadensis	Canada toadflax	Scrophulariaceae
Nymphaea odorata	American white waterlily	Nymphaeaceae
Nyssa	tupelo	Nyssaceae
Nyssa aquatica	water tupelo	Nyssaceae
Nyssa biflora	swamp tupelo	Nyssaceae
Nyssa sylvatica	blackgum	Nyssaceae
Oenothera laciniata	cutleaf evening primrose	Onagraceae
Oligoneuron	goldenrod	Asteraceae
Oligoneuron rigidum	stiff goldenrod	Asteraceae
Oligoneuron rigidum var. *rigidum*	stiff goldenrod	Asteraceae
Onoclea sensibilis	sensitive fern	Dryopteridaceae
Onosmodium virginianum	wild Job's tears	Boraginaceae
Ophioglossum vulgatum	southern adderstongue	Ophioglossaceae
Oplismenus hirtellus	basketgrass	Poaceae
Oplismenus hirtellus ssp. *setarius*	basketgrass	Poaceae
Opuntia humifusa	devil's-tongue	Cactaceae
Orbexilum pedunculatum	Sampson's snakeroot	Fabaceae
Osmorhiza	sweetroot	Apiaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Osmorhiza claytonii	Clayton's sweetroot	Apiaceae
Osmorhiza longistylis	longstyle sweetroot	Apiaceae
Osmunda cinnamomea	cinnamon fern	Osmundaceae
Osmunda regalis	royal fern	Osmundaceae
Osmunda regalis var. *spectabilis*	royal fern	Osmundaceae
Ostrya virginiana	hophornbeam	Betulaceae
Ostrya virginiana var. *virginiana*	hophornbeam	Betulaceae
Oxalis	woodsorrel	Oxalidaceae
Oxalis corniculata	creeping woodsorrel	Oxalidaceae
Oxalis dillenii	slender yellow woodsorrel	Oxalidaceae
Oxalis stricta	common yellow oxalis	Oxalidaceae
Oxalis violacea	violet woodsorrel	Oxalidaceae
Oxydendrum arboreum	sourwood	Ericaceae
Oxypolis rigidior	stiff cowbane	Apiaceae
Pachysandra procumbens	Allegheny-spurge	Buxaceae
Packera anonyma	Small's ragwort	Asteraceae
Packera glabella	butterweed	Asteraceae
Packera obovata	roundleaf ragwort	Asteraceae
Pallavicinia lyellii		Pallaviciniaceae
Panax quinquefolius	American ginseng	Araliaceae
Panicum	panicgrass	Poaceae
Panicum anceps	beaked panicgrass	Poaceae
Panicum capillare	witchgrass	Poaceae
Panicum dichotomiflorum	fall panicgrass	Poaceae
Panicum flexile	wiry panicgrass	Poaceae
Panicum gattingeri	Gattinger's panicgrass	Poaceae
Panicum rigidulum	redtop panicgrass	Poaceae
Panicum rigidulum var. *elongatum*	redtop panicgrass	Poaceae
Panicum virgatum	switchgrass	Poaceae
Parietaria floridana	Florida pellitory	Urticaceae
Parietaria pensylvanica	Pennsylvania pellitory	Urticaceae
Parthenocissus quinquefolia	Virginia creeper	Vitaceae
Paspalum	crowngrass	Poaceae
Paspalum dilatatum	dallisgrass	Poaceae
Paspalum floridanum	Florida paspalum	Poaceae
Paspalum laeve	field paspalum	Poaceae
Paspalum notatum	bahiagrass	Poaceae
Paspalum praecox	early paspalum	Poaceae
Paspalum pubiflorum	hairyseed paspalum	Poaceae
Paspalum setaceum	thin paspalum	Poaceae
Paspalum urvillei	Vasey's grass	Poaceae
Passiflora incarnata	purple passionflower	Passifloraceae
Passiflora lutea	yellow passionflower	Passifloraceae
Paulownia tomentosa	princesstree	Scrophulariaceae
Pedicularis canadensis	Canadian lousewort	Scrophulariaceae
Pellaea atropurpurea	purple cliffbrake	Pteridaceae
Pellia appalachiana		Pelliaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Peltandra virginica	green arrow arum	Araceae
Pennisetum glaucum	pearl millet	Poaceae
Penstemon	beardtongue	Scrophulariaceae
Penstemon tenuis	sharpsepal beardtongue	Scrophulariaceae
Penthorum sedoides	ditch stonecrop	Crassulaceae
Perilla frutescens	beefsteakplant	Lamiaceae
Phanopyrum gymnocarpon	savannah-panicgrass	Poaceae
Phaseolus polystachios var. *polystachios*	thicket bean	Fabaceae
Phegopteris hexagonoptera	broad beechfern	Thelypteridaceae
Philadelphus	mock orange	Hydrangeaceae
Philadelphus inodorus	scentless mock orange	Hydrangeaceae
Philadelphus pubescens	hoary mock orange	Hydrangeaceae
Phleum pratense	timothy	Poaceae
Phlox	phlox	Polemoniaceae
Phlox amoena	hairy phlox	Polemoniaceae
Phlox amplifolia	largeleaf phlox	Polemoniaceae
Phlox divaricata	wild blue phlox	Polemoniaceae
Phlox glaberrima	smooth phlox	Polemoniaceae
Phlox paniculata	fall phlox	Polemoniaceae
Photinia melanocarpa	black chokeberry	Rosaceae
Photinia pyrifolia	red chokeberry	Rosaceae
Phryma leptostachya	American lopseed	Verbenaceae
Phyla nodiflora	turkey tangle fogfruit	Verbenaceae
Phyllanthus caroliniensis	Carolina leaf-flower	Euphorbiaceae
Phyllostachys aurea	golden bamboo	Poaceae
Physalis angulata	cutleaf groundcherry	Solanaceae
Physalis heterophylla	clammy groundcherry	Solanaceae
Physalis longifolia	longleaf groundcherry	Solanaceae
Physostegia virginiana	obedient plant	Lamiaceae
Phytolacca americana	American pokeweed	Phytolaccaceae
Pilea pumila	Canadian clearweed	Urticaceae
Pinus echinata	shortleaf pine	Pinaceae
Pinus glabra	spruce pine	Pinaceae
Pinus strobus	eastern white pine	Pinaceae
Pinus taeda	loblolly pine	Pinaceae
Pinus virginiana	Virginia pine	Pinaceae
Piptochaetium avenaceum	blackseed speargrass	Poaceae
Pityopsis graminifolia	narrowleaf silkgrass	Asteraceae
Plagiochila porelloides		Plagiochilaceae
Planera aquatica	planertree	Ulmaceae
Plantago lanceolata	narrowleaf plantain	Plantaginaceae
Plantago major	common plantain	Plantaginaceae
Platanthera	fringed orchid	Orchidaceae
Platanthera clavellata	small green wood orchid	Orchidaceae
Platanthera flava	palegreen orchid	Orchidaceae
Platanus occidentalis	American sycamore	Platanaceae
Pleopeltis polypodioides	resurrection fern	Polypodiaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Pleopeltis polypodioides ssp. *michauxiana*	resurrection fern	Polypodiaceae
Pleopeltis polypodioides ssp. *polypodioides*	resurrection fern	Polypodiaceae
Pluchea	camphorweed	Asteraceae
Pluchea odorata	sweetscent	Asteraceae
Poa	bluegrass	Poaceae
Poa autumnalis	autumn bluegrass	Poaceae
Podophyllum peltatum	mayapple	Berberidaceae
Polemonium reptans	Greek valerian	Polemoniaceae
Polemonium reptans var. *reptans*	Greek valerian	Polemoniaceae
Polygonatum biflorum	smooth Solomon's seal	Liliaceae
Polygonatum biflorum var. *commutatum*	smooth Solomon's seal	Liliaceae
Polygonatum pubescens	hairy Solomon's seal	Liliaceae
Polygonum	knotweed	Polygonaceae
Polygonum caespitosum	Oriental lady's thumb	Polygonaceae
Polygonum convolvulus	black bindweed	Polygonaceae
Polygonum densiflorum	denseflower knotweed	Polygonaceae
Polygonum glaucum	seaside knotweed	Polygonaceae
Polygonum hydropiper	marshpepper knotweed	Polygonaceae
Polygonum hydropiperoides	swamp smartweed	Polygonaceae
Polygonum lapathifolium	curlytop knotweed	Polygonaceae
Polygonum pensylvanicum	Pennsylvania smartweed	Polygonaceae
Polygonum punctatum	dotted smartweed	Polygonaceae
Polygonum sagittatum	arrowleaf tearthumb	Polygonaceae
Polygonum virginianum	jumpseed	Polygonaceae
Polymnia canadensis	whiteflower leafcup	Asteraceae
Polystichum acrostichoides	Christmas fern	Dryopteridaceae
Polytrichum	polytrichum moss	Polytrichaceae
Polytrichum commune	polytrichum moss	Polytrichaceae
Poncirus trifoliata	hardy orange	Rutaceae
Pontederia cordata	pickerelweed	Pontederiaceae
Ponthieva racemosa	hairy shadow witch	Orchidaceae
Populus deltoides	eastern cottonwood	Salicaceae
Populus deltoides ssp. *deltoides*	eastern cottonwood	Salicaceae
Porteranthus stipulatus	American ipecac	Rosaceae
Porteranthus trifoliatus	Bowman's root	Rosaceae
Potamogeton	pondweed	Potamogetonaceae
Potentilla	cinquefoil	Rosaceae
Potentilla canadensis	dwarf cinquefoil	Rosaceae
Potentilla simplex	common cinquefoil	Rosaceae
Prenanthes	rattlesnakeroot	Asteraceae
Prenanthes altissima	tall rattlesnakeroot	Asteraceae
Proserpinaca	mermaidweed	Haloragaceae
Prunella vulgaris	common selfheal	Lamiaceae
Prunus	plum	Rosaceae
Prunus americana	American plum	Rosaceae
Prunus angustifolia	Chickasaw plum	Rosaceae
Prunus caroliniana	Carolina laurelcherry	Rosaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Prunus mexicana	Mexican plum	Rosaceae
Prunus serotina	black cherry	Rosaceae
Prunus serotina var. *serotina*	black cherry	Rosaceae
Prunus umbellata	hog plum	Rosaceae
Pseudognaphalium	cudweed	Asteraceae
Pseudognaphalium obtusifolium	rabbit-tobacco	Asteraceae
Ptelea trifoliata	common hoptree	Rutaceae
Pteridium aquilinum	western brackenfern	Dennstaedtiaceae
Pueraria montana var. *lobata*	kudzu	Fabaceae
Pycnanthemum loomisii	Loomis' mountainmint	Lamiaceae
Pycnanthemum tenuifolium	narrowleaf mountainmint	Lamiaceae
Pyrus	pear	Rosaceae
Pyrus calleryana	Callery pear	Rosaceae
Quercus	oak	Fagaceae
Quercus alba	white oak	Fagaceae
Quercus coccinea	scarlet oak	Fagaceae
Quercus falcata	southern red oak	Fagaceae
Quercus imbricaria	shingle oak	Fagaceae
Quercus laurifolia	laurel oak	Fagaceae
Quercus lyrata	overcup oak	Fagaceae
Quercus marilandica	blackjack oak	Fagaceae
Quercus michauxii	swamp chestnut oak	Fagaceae
Quercus muehlenbergii	chinkapin oak	Fagaceae
Quercus nigra	water oak	Fagaceae
Quercus pagoda	cherrybark oak	Fagaceae
Quercus palustris	pin oak	Fagaceae
Quercus phellos	willow oak	Fagaceae
Quercus prinus	chestnut oak	Fagaceae
Quercus rubra	northern red oak	Fagaceae
Quercus shumardii	Shumard's oak	Fagaceae
Quercus sinuata	bastard oak	Fagaceae
Quercus stellata	post oak	Fagaceae
Quercus texana	Texas red oak	Fagaceae
Quercus velutina	black oak	Fagaceae
Quercus virginiana	live oak	Fagaceae
Ranunculus	buttercup	Ranunculaceae
Ranunculus hispidus	bristly buttercup	Ranunculaceae
Ranunculus recurvatus	blisterwort	Ranunculaceae
Ranunculus sardous	hairy buttercup	Ranunculaceae
Ranunculus sceleratus	cursed buttercup	Ranunculaceae
Ratibida pinnata	pinnate prairie coneflower	Asteraceae
Rhexia	meadowbeauty	Melastomataceae
Rhexia mariana	Maryland meadowbeauty	Melastomataceae
Rhexia virginica	handsome Harry	Melastomataceae
Rhododendron	rhododendron	Ericaceae
Rhododendron alabamense	Alabama azalea	Ericaceae
Rhododendron canescens	mountain azalea	Ericaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Rhus aromatica	fragrant sumac	Anacardiaceae
Rhus copallinum	winged sumac	Anacardiaceae
Rhus glabra	smooth sumac	Anacardiaceae
Rhus typhina	staghorn sumac	Anacardiaceae
Rhynchosia	snoutbean	Fabaceae
Rhynchospora	beaksedge	Cyperaceae
Rhynchospora corniculata	shortbristle horned beaksedge	Cyperaceae
Rhynchospora inexpansa	nodding beaksedge	Cyperaceae
Ribes	currant	Grossulariaceae
Robinia pseudoacacia	black locust	Fabaceae
Rosa	rose	Rosaceae
Rosa bracteata	Macartney rose	Rosaceae
Rosa carolina	Carolina rose	Rosaceae
Rosa multiflora	multiflora rose	Rosaceae
Rosa palustris	swamp rose	Rosaceae
Rubus	blackberry	Rosaceae
Rubus argutus	sawtooth blackberry	Rosaceae
Rubus cuneifolius	sand blackberry	Rosaceae
Rubus flagellaris	northern dewberry	Rosaceae
Rubus ictus	savannah dewberry	Rosaceae
Rubus trivialis	southern dewberry	Rosaceae
Rudbeckia	coneflower	Asteraceae
Rudbeckia fulgida	orange coneflower	Asteraceae
Rudbeckia hirta	blackeyed Susan	Asteraceae
Rudbeckia laciniata	cutleaf coneflower	Asteraceae
Rudbeckia triloba	browneyed Susan	Asteraceae
Rudbeckia triloba var. *triloba*	browneyed Susan	Asteraceae
Ruellia	wild petunia	Acanthaceae
Ruellia caroliniensis	Carolina wild petunia	Acanthaceae
Ruellia humilis	fringeleaf wild petunia	Acanthaceae
Ruellia strepens	limestone wild petunia	Acanthaceae
Rumex	dock	Polygonaceae
Rumex acetosella	common sheep sorrel	Polygonaceae
Rumex crispus	curly dock	Polygonaceae
Rumex hastatulus	heartwing sorrel	Polygonaceae
Rumex obtusifolius	bitter dock	Polygonaceae
Sabal minor	dwarf palmetto	Arecaceae
Sabatia angularis	rosepink	Gentianaceae
Saccharum	sugarcane	Poaceae
Saccharum alopecuroidum	silver plumegrass	Poaceae
Saccharum giganteum	sugarcane plumegrass	Poaceae
Sacciolepis striata	American cupscale	Poaceae
Sagittaria latifolia	broadleaf arrowhead	Alismataceae
Salix nigra	black willow	Salicaceae
Salvia lyrata	lyreleaf sage	Lamiaceae
Salvia urticifolia	nettleleaf sage	Lamiaceae
Sambucus nigra ssp. *canadensis*	American black elderberry	Caprifoliaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Sambucus racemosa	red elderberry	Caprifoliaceae
Sanguinaria canadensis	bloodroot	Papaveraceae
Sanicula	sanicle	Apiaceae
Sanicula canadensis	Canadian blacksnakeroot	Apiaceae
Sanicula marilandica	Maryland sanicle	Apiaceae
Sanicula odorata	clustered blacksnakeroot	Apiaceae
Sanicula smallii	Small's blacksnakeroot	Apiaceae
Sassafras albidum	sassafras	Lauraceae
Saururus cernuus	lizard's tail	Saururaceae
Saxifraga virginiensis	early saxifrage	Saxifragaceae
Schizachyrium scoparium	little bluestem	Poaceae
Scirpus atrovirens	green bulrush	Cyperaceae
Scirpus cyperinus	woolgrass	Cyperaceae
Scleria	nutrush	Cyperaceae
Scleria oligantha	littlehead nutrush	Cyperaceae
Scutellaria	skullcap	Lamiaceae
Scutellaria elliptica	hairy skullcap	Lamiaceae
Scutellaria incana	hoary skullcap	Lamiaceae
Scutellaria integrifolia	helmet flower	Lamiaceae
Scutellaria lateriflora	blue skullcap	Lamiaceae
Scutellaria ovata	heartleaf skullcap	Lamiaceae
Sebastiania fruticosa	Gulf Sebastian-bush	Euphorbiaceae
Sedum ternatum	woodland stonecrop	Crassulaceae
Senecio	ragwort	Asteraceae
Senna	senna	Fabaceae
Senna hebecarpa	American senna	Fabaceae
Senna obtusifolia	Java-bean	Fabaceae
Sericocarpus	whitetop aster	Asteraceae
Sericocarpus linifolius	narrowleaf whitetop aster	Asteraceae
Setaria	bristlegrass	Poaceae
Setaria faberi	Japanese bristlegrass	Poaceae
Setaria parviflora	marsh bristlegrass	Poaceae
Setaria pumila	yellow foxtail	Poaceae
Sida spinosa	prickly fanpetals	Malvaceae
Sideroxylon	bully	Sapotaceae
Sideroxylon lanuginosum	gum bully	Sapotaceae
Sideroxylon lycioides	buckthorn bully	Sapotaceae
Silene stellata	widowsfrill	Caryophyllaceae
Silphium	rosinweed	Asteraceae
Silphium integrifolium	wholeleaf rosinweed	Asteraceae
Silphium perfoliatum	cup plant	Asteraceae
Silphium terebinthinaceum	prairie rosinweed	Asteraceae
Silphium trifoliatum var. *latifolium*	whorled rosinweed	Asteraceae
Sisyrinchium	blue-eyed grass	Iridaceae
Smallanthus uvedalius	hairy leafcup	Asteraceae
Smilax	greenbrier	Smilacaceae
Smilax bona-nox	saw greenbrier	Smilacaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Smilax glauca	cat greenbrier	Smilacaceae
Smilax herbacea	smooth carrionflower	Smilacaceae
Smilax hugeri	Huger's carrionflower	Smilacaceae
Smilax laurifolia	laurel greenbrier	Smilacaceae
Smilax pumila	sarsparilla vine	Smilacaceae
Smilax rotundifolia	roundleaf greenbrier	Smilacaceae
Smilax smallii	lanceleaf greenbrier	Smilacaceae
Smilax tamnoides	bristly greenbrier	Smilacaceae
Smilax walteri	coral greenbrier	Smilacaceae
Solanum	nightshade	Solanaceae
Solanum carolinense	Carolina horsenettle	Solanaceae
Solanum ptychanthum	West Indian nightshade	Solanaceae
Solidago	goldenrod	Asteraceae
Solidago altissima	Canada goldenrod	Asteraceae
Solidago caesia	wreath goldenrod	Asteraceae
Solidago caesia var. *curtisii*	mountain decumbent goldenrod	Asteraceae
Solidago canadensis	Canada goldenrod	Asteraceae
Solidago canadensis var. *scabra*	Canada goldenrod	Asteraceae
Solidago flaccidifolia	mountain goldenrod	Asteraceae
Solidago flexicaulis	zigzag goldenrod	Asteraceae
Solidago gigantea	giant goldenrod	Asteraceae
Solidago hispida	hairy goldenrod	Asteraceae
Solidago nemoralis	gray goldenrod	Asteraceae
Solidago odora	anisescented goldenrod	Asteraceae
Solidago patula	roundleaf goldenrod	Asteraceae
Solidago rugosa	wrinkleleaf goldenrod	Asteraceae
Solidago rugosa ssp. *aspera*	wrinkleleaf goldenrod	Asteraceae
Solidago speciosa var. *erecta*	showy goldenrod	Asteraceae
Solidago sphacelata	autumn goldenrod	Asteraceae
Solidago ulmifolia	elmleaf goldenrod	Asteraceae
Sorghastrum nutans	Indiangrass	Poaceae
Sorghum halepense	Johnsongrass	Poaceae
Sparganium americanum	American bur-reed	Sparganiaceae
Sphagnum	sphagnum	Sphagnaceae
Spigelia marilandica	woodland pinkroot	Loganiaceae
Spiranthes	lady's tresses	Orchidaceae
Spiranthes magnicamporum	Great Plains lady's tresses	Orchidaceae
Spiranthes ovalis	October lady's tresses	Orchidaceae
Sporobolus vaginiflorus	poverty dropseed	Poaceae
Staphylea trifolia	American bladdernut	Staphyleaceae
Steinchisma hians	gaping grass	Poaceae
Stellaria fontinalis	American water starwort	Caryophyllaceae
Stellaria media	common chickweed	Caryophyllaceae
Stellaria pubera	star chickweed	Caryophyllaceae
Strophostyles umbellata	pink fuzzybean	Fabaceae
Stylosanthes biflora	sidebeak pencilflower	Fabaceae
Styrax americanus	American snowbell	Styracaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Styrax grandifolius	bigleaf snowbell	Styracaceae
Symphoricarpos orbiculatus	coralberry	Caprifoliaceae
Symphyotrichum	aster	Asteraceae
Symphyotrichum cordifolium	common blue wood aster	Asteraceae
Symphyotrichum dumosum	rice button aster	Asteraceae
Symphyotrichum dumosum var. *dumosum*	rice button aster	Asteraceae
Symphyotrichum ericoides	white heath aster	Asteraceae
Symphyotrichum lateriflorum	calico aster	Asteraceae
Symphyotrichum novae-angliae	New England aster	Asteraceae
Symphyotrichum ontarione	bottomland aster	Asteraceae
Symphyotrichum patens	late purple aster	Asteraceae
Symphyotrichum pilosum	hairy white oldfield aster	Asteraceae
Symphyotrichum puniceum	purplestem aster	Asteraceae
Symphyotrichum shortii	Short's aster	Asteraceae
Symplocos tinctoria	common sweetleaf	Symplocaceae
Syrrhopodon texanus	Texan syrrhopodon moss	Calymperaceae
Taxodium distichum	bald cypress	Taxodiaceae
Tephrosia spicata	spiked hoarypea	Fabaceae
Tephrosia virginiana	Virginia tephrosia	Fabaceae
Tetrodontium	tetrodontium moss	Tetraphidaceae
Tetrodontium brownianum	Brown's tetrodontium moss	Tetraphidaceae
Thalictrum	meadow-rue	Ranunculaceae
Thalictrum revolutum	waxyleaf meadow-rue	Ranunculaceae
Thaspium barbinode	hairyjoint meadowparsnip	Apiaceae
Thaspium trifoliatum	purple meadowparsnip	Apiaceae
Thelypteris hispidula	roughhairy maiden fern	Thelypteridaceae
Thelypteris kunthii	Kunth's maiden fern	Thelypteridaceae
Thelypteris noveboracensis	New York fern	Thelypteridaceae
Thuidium	thuidium moss	Thuidiaceae
Thuidium delicatulum	delicate thuidium moss	Thuidiaceae
Tilia americana	American basswood	Tiliaceae
Tilia americana var. *caroliniana*	Carolina basswood	Tiliaceae
Tilia americana var. *heterophylla*	American basswood	Tiliaceae
Tillandsia usneoides	Spanish moss	Bromeliaceae
Tipularia discolor	crippled cranefly	Orchidaceae
Toxicodendron radicans	eastern poison ivy	Anacardiaceae
Toxicodendron vernix	poison sumac	Anacardiaceae
Trachelospermum difforme	climbing dogbane	Apocynaceae
Tradescantia	spiderwort	Commelinaceae
Tradescantia fluminensis	small-leaf spiderwort	Commelinaceae
Tradescantia virginiana	Virginia spiderwort	Commelinaceae
Tragia cordata	heartleaf noseburn	Euphorbiaceae
Triadenum	marsh St. Johnswort	Clusiaceae
Triadenum virginicum	Virginia marsh St. Johnswort	Clusiaceae
Triadenum walteri	greater marsh St. Johnswort	Clusiaceae
Triadica sebifera	Chinese tallow	Euphorbiaceae
Trichomanes boschianum	Appalachian bristle fern	Hymenophyllaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Trichostema dichotomum	forked bluecurls	Lamiaceae
Tridens flavus	purpletop tridens	Poaceae
Trifolium	clover	Fabaceae
Trifolium campestre	field clover	Fabaceae
Trifolium pratense	red clover	Fabaceae
Trillium	trillium	Liliaceae
Trillium cuneatum	little sweet Betsy	Liliaceae
Trillium flexipes	nodding wakerobin	Liliaceae
Triosteum angustifolium	yellowfruit horse-gentian	Caprifoliaceae
Triphora trianthophora	threebirds	Orchidaceae
Tripsacum dactyloides	eastern gamagrass	Poaceae
Typha latifolia	broadleaf cattail	Typhaceae
Ulmus	elm	Ulmaceae
Ulmus alata	winged elm	Ulmaceae
Ulmus americana	American elm	Ulmaceae
Ulmus rubra	slippery elm	Ulmaceae
Ulmus serotina	September elm	Ulmaceae
Urtica chamaedryoides	heartleaf nettle	Urticaceae
Utricularia gibba	humped bladderwort	Lentibulariaceae
Uvularia grandiflora	largeflower bellwort	Liliaceae
Uvularia perfoliata	perfoliate bellwort	Liliaceae
Uvularia sessilifolia	sessileleaf bellwort	Liliaceae
Vaccinium	blueberry	Ericaceae
Vaccinium arboreum	farkleberry	Ericaceae
Vaccinium corymbosum	highbush blueberry	Ericaceae
Vaccinium elliottii	Elliott's blueberry	Ericaceae
Vaccinium formosum	southern blueberry	Ericaceae
Vaccinium fuscatum	black highbush blueberry	Ericaceae
Vaccinium pallidum	Blue Ridge blueberry	Ericaceae
Vaccinium stamineum	deerberry	Ericaceae
Verbena	vervain	Verbenaceae
Verbena bracteata	bigbract verbena	Verbenaceae
Verbena brasiliensis	Brazilian vervain	Verbenaceae
Verbena urticifolia	white vervain	Verbenaceae
Verbesina	crownbeard	Asteraceae
Verbesina alternifolia	wingstem	Asteraceae
Verbesina occidentalis	yellow crownbeard	Asteraceae
Verbesina virginica	white crownbeard	Asteraceae
Verbesina virginica var. *laciniata*	white crownbeard	Asteraceae
Vernonia	ironweed	Asteraceae
Vernonia gigantea	giant ironweed	Asteraceae
Vernonia missurica	Missouri ironweed	Asteraceae
Viburnum dentatum	southern arrowwood	Caprifoliaceae
Viburnum nudum	possumhaw	Caprifoliaceae
Viburnum prunifolium	blackhaw	Caprifoliaceae
Viburnum rufidulum	rusty blackhaw	Caprifoliaceae
Vicia	vetch	Fabaceae

Table D–1 (continued). Plant species list from the Natchez Trace Parkway vegetation mapping project.

Scientific Name	Common Name	Family
Vicia minutiflora	pygmyflower vetch	Fabaceae
Vinca major	bigleaf periwinkle	Apocynaceae
Viola	violet	Violaceae
Viola affinis	sand violet	Violaceae
Viola canadensis	Canadian white violet	Violaceae
Viola cucullata	marsh blue violet	Violaceae
Viola palmata	early blue violet	Violaceae
Viola pedata	birdfoot violet	Violaceae
Viola pubescens	downy yellow violet	Violaceae
Viola rostrata	longspur violet	Violaceae
Viola rotundifolia	roundleaf yellow violet	Violaceae
Viola sororia	common blue violet	Violaceae
Viola walteri	prostrate blue violet	Violaceae
Vitis	grape	Vitaceae
Vitis aestivalis	summer grape	Vitaceae
Vitis cinerea	graybark grape	Vitaceae
Vitis palmata	catbird grape	Vitaceae
Vitis rotundifolia	muscadine	Vitaceae
Vitis vulpina	frost grape	Vitaceae
Vittaria appalachiana	Appalachian shoestring fern	Vittariaceae
Wisteria	wisteria	Fabaceae
Wisteria frutescens	American wisteria	Fabaceae
Wisteria sinensis	Chinese wisteria	Fabaceae
Woodsia obtusa	bluntlobe cliff fern	Dryopteridaceae
Woodwardia areolata	netted chainfern	Blechnaceae
Woodwardia virginica	Virginia chainfern	Blechnaceae
Xanthium strumarium	rough cocklebur	Asteraceae
Xanthorhiza simplicissima	yellowroot	Ranunculaceae
Yeatesia viridiflora	yellow bractspike	Acanthaceae
Youngia japonica	Oriental false hawksbeard	Asteraceae
Yucca aloifolia	aloe yucca	Agavaceae
Yucca filamentosa	Adam's needle	Agavaceae
Zannichellia	horned pondweed	Zannichelliaceae
Zizaniopsis miliacea	giant cutgrass	Poaceae
Zizia aurea	golden zizia	Apiaceae

Appendix E: Descriptions of Map Classes

Explanation of Map-Class Descriptions

This appendix provides descriptions of the 63 map classes used to map the Natchez Trace Parkway (NATR) for the National Park Service (NPS) Vegetation Mapping Inventory (VMI) Program. Of these 63 map classes, 54 represent 114 of the 122 U.S. National Vegetation Classification (USNVC) associations identified with this vegetation mapping project; 8 associations were determined always less than a minimum mapping unit (MMU), and several map classes represent more than one association while others represent a single association. Another five map classes represent cultural vegetation types (agricultural and developed) in the USNVC, three map classes represent nonvegetation open water (non-USNVC), and one map class represents landscapes that had received tornado damage only a few months prior to the time of aerial imagery collection; the remnant vegetation could not be classified to the USNVC.

For those map classes representing vegetation associations in the USNVC, "Appendix B: Descriptions of Vegetation Associations" and "Appendix C: Field Key to Vegetation Associations" should be used to complement the map-class descriptions in this appendix.

Each map-class description provides the formal map-class code and name used for mapping. For those map classes representing a single vegetation association in the USNVC, the association's colloquial name was used (e.g., East Gulf Coastal Plain Beech Floodplain Forest). For those map classes representing more than one association in the USNVC, a comparable name (e.g., the Northern Chestnut Oak Forest map class for the collective associations of Lower Piedmont Chestnut Oak Forest and the Interior Low Plateau Chestnut Oak - Mixed Oak Forest) was derived. For those map classes representing cultural vegetation, either the colloquial name at the lowest level mapped in the USNVC (e.g., Loblolly Pine Plantation) was used or a generic name (e.g., Developed Area) was derived. For those map classes representing nonvegetation features, a generic name (e.g., Open Water Lake) was derived.

The USNVC classification name(s) and code(s) that the map class represents are provided at the beginning of each map-class description, with the exception of nonvegetated open water bodies. Each map class is described with a focus on how it presents in the NATR landscape, noting that this may not reflect how the various USNVC types present across their range. Descriptions are from a mapping, rather than an ecological, perspective, but ecological concepts relevant to the mapping effort were integrated into the map-class description. Full ecological descriptions of each vegetation association are available in "Appendix B: Descriptions of Vegetation Associations."

Throughout the map-class descriptions, "MMU" refers to minimum mapping unit and "AA" refers to accuracy assessment. Tree species, such as northern red oak (*Quercus rubra*), eastern redcedar (*Juniperus virginiana*), and sweetgum (*Liquidambar styraciflua*) are assumed to be of heights >5 m, unless otherwise specified (e.g., shrub-height trees) in the description. Hardwood trees refer to all deciduous tree species. The term "tree species" includes general references to trees as conifers and hardwoods. Furthermore, unless otherwise noted, the herbaceous types have >10% herbaceous cover and <25% total tree and shrub canopy closure, shrubland types have >25% shrub canopy closure and <25% tree canopy closure, woodlands have >25% tree canopy closure, and forests typically have >60% tree canopy closure.

When map class signatures or presentations are discussed, unless otherwise specified, they are in reference to the color-infrared component of the 4-band aerial imagery used during the mapping process, unless otherwise specified.

When AA results are reported in the map class description, two views are discussed—mapped too aggressively and mapped too conservatively. The view of "mapped too aggressively" refers to errors in the users' accuracy. The users' accuracy reports on the probability that an AA site in the tested map class does not have a vegetation type that is represented by the map class. This is an error of commission indicating where too much of the park was mapped as the tested map class. The lower the users' accuracy for a map class, the higher the likelihood that the map class was overmapped (i.e., mapped too aggressively). The view of "mapped too conservatively" refers to errors in the producers' accuracy. The producers' accuracy reports on the probability that an AA site in a different map class has a vegetation type that is represented by the tested map class. This is an error of omission indicating where too little of the park was mapped as the tested map class. The lower the producers' accuracy for a map class, the higher the likelihood that the map class was undermapped (i.e., mapped too conservatively).

Straight accuracies are listed for both users' and producers' in the reporting of AA results. When straight accuracies are below 80%, the 90% confidence intervals are provided to present where the interval range is in regards to the 80% accuracy standard set by the NPS VMI Program. The 90% confidence intervals to users' and producers' accuracies for all map classes that were included in the AA study are provided in "Appendix I: Accuracy Assessment Contingency Table."

Along with text descriptions of the map classes, ground pictures are provided when possible to visually depict the vegetation types and nonvegetation features that the map classes represent. Worth noting is that the pictures are a partial representation; capturing all variations within a map class would not be possible.

Map-classification codes, names, and their crosswalk (cross-reference) to vegetation types in the USNVC, are listed in Table E–1. Map classes that represent nonvegetation open-water bodies are not included in the USNVC are also included in Table E–1. Table E–2 lists the map classification set within the hierarchy of the USNVC. In Table E–2, map classes that represent more than one vegetation association are noted with an asterisk (*). Of note, these map classes may represent vegetation associations in more than one location in the USNVC. The map classification is listed alphabetically by map-class code in Table E–3 at the end of this appendix.

Minimum Mapping Units

The NPS VMI Program's standard MMU of 0.5 hectares (ha) was applied to mapping forest and cultural types. For woodland, shrubland, and herbaceous vegetation types, as well as nonvegetated open water, a MMU of 0.25 ha was applied. This smaller MMU was applied to woodland types because they were comparatively rare throughout NATR. The smaller MMU was also applied to shrubland and herbaceous vegetation types because of their frequent interface with the Parkway's road system. Furthermore, when forest types represented by the same map class were intersected by

road structures, a MMU of 0.25 ha was applied to each side of the road to reach at least a 0.5 ha MMU collectively.

An allowance was also made for polygons that represent vegetation units crossing outside the Parkway boundary—and there are many—to be mapped less than the MMU if the vegetation continued across the boundary, was contiguous, and covered at least the standard MMU for that map class. In these instances, map classes with a 0.5 ha MMU were mapped down to 0.1 ha, and map classes with a 0.25 ha MMU were mapped down to 0.05 ha. For example, a 0.18 ha polygon of the Northern Oak - (Hickory) Forest (FNOH) map class would be mapped inside the boundary if there was at least 0.32 ha of contiguous connected FNOH outside the boundary.

No Map Class

Eight vegetation associations in the USNVC that were not defined by any one map class. These associations were observed always below the MMU. The eight associations are as follows:

- *Andropogon gerardii - Schizachyrium scoparium - Dichanthelium scoparium - Rhynchospora glomerata* Grassland (CEGL004006),
- *Carex lurida - Carex leptalea - Parnassia grandifolia - Juncus brachycephalus* - (*Xyris tennesseensis*) Seepage Fen (CEGL004161),
- *Justicia americana* Riverbed Vegetation (CEGL004286),
- *Pontederia cordata - Peltandra virginica* Marsh (CEGL004291),
- *Heuchera parviflora* var. *parviflora - Trichomanes boschianum - Thalictrum mirabile* - (*Ageratina luciae-brauniae*, *Solidago albopilosa*) Cliff Vegetation (CEGL004301),
- *Cystopteris bulbifera* - (*Asplenium rhizophyllum*) Cliff Sparse Vegetation (CEGL004394),
- *Hydrangea arborescens* / *Impatiens* (*capensis*, *pallida*) - *Heuchera villosa* Cliff Shrubland (CEGL004708), and
- *Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata* - (*Dulichium arundinaceum*) Marsh (CEGL004719).

To expect small clumps (inclusions) of each of the eight associations listed above is realistic within appropriate habitats along the Parkway. As with each association that is represented by the various map classes described in this appendix, the eight associations also are described in “Appendix B: Descriptions of Vegetation Associations” and also are included in “Appendix C: Field Key to Vegetation Associations.”

Table E–1. Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Oak & Conifer Woodland	
WBBC - Black Belt Prairie Cedar Woodland	*Juniperus virginiana* var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland (CEGL007747)
WCOB - Chinquapin Oak Unglaciated Bluff Woodland	*Quercus muehlenbergii* - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland (CEGL004267)
WHRO - Western Highland Rim Oak Woodland	*Quercus stellata* / *Viburnum rufidulum* / *Schizachyrium scoparium* - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686)
	Quercus marilandica / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756)
Yellow Pine - Oak/Beech Forest	
FSLO - Shortleaf Pine - Oak Forest	*Pinus echinata* - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050)
	Pinus echinata - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052)
	Pinus echinata - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053)
	Pinus (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834)
FLWO - East Gulf Coastal Plain Loblolly - White Oak Forest	*Pinus taeda* - *Quercus alba* / *Chasmanthium sessiliflorum* Forest (CEGL004763)
FLBM - East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest	*Fagus grandifolia* - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest (CEGL007460)
Northern Oak - (Hardwood) Forest	
FNCO - Northern Chestnut Oak Forest	*Quercus prinus* - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261)
	Quercus prinus - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700)
FNOH - Northern Oak - (Hickory) Forest	*Quercus alba* - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067)
	Quercus alba - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070)
	Acer barbatum - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671)
	Quercus alba - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225)
	Quercus falcata - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest (CEGL007244)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Quercus falcata - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246)
	Quercus alba - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795)
	Quercus muehlenbergii - *Quercus shumardii* - *Carya* (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808)
	Quercus shumardii - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442)
FHOT - Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest	
	Quercus alba - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest (CEGL007709)
Southern Oak - (Hardwood) Forest	
FSOH - Southern Oak - (Hardwood) Forest	
	Quercus pagoda - *Quercus nigra* Forest (CEGL004109)
	Liquidambar styraciflua - *Carya illinoinensis* - *Quercus nigra* Loess Bluff Forest (CEGL004122)
Beech - Hardwood Forest	
FBNC - Northern & Central Beech Forest	
	Fagus grandifolia - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
	Fagus grandifolia - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)
	Fagus grandifolia - *Quercus alba* / *Cornus florida* Forest (CEGL007881)
FBMS - Southern Beech - Magnolia Forest	
	Fagus grandifolia - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963)
	Fagus grandifolia - *Quercus alba* - *Liquidambar styraciflua* / *Magnolia grandiflora* / *Smilax pumila* Forest (CEGL007210)
	Fagus grandifolia - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458)
Ruderal Conifer - (Hardwood) Forest	
FXRC - Ruderal Eastern Red-cedar Forest	
	Juniperus virginiana var. *virginiana* - (*Quercus* spp.) Ruderal Forest (CEGL007124)
FXWP - Ruderal Eastern White Pine Forest	
	Pinus strobus Ruderal Forest (CEGL007944)
FXPN - Ruderal Pine - (Hardwood) Forest	
	Pinus virginiana Ruderal Forest (CEGL002591)
	Pinus taeda / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011)
	Pinus echinata Ruderal Forest (CEGL006327)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Pinus taeda - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Ruderal Wet Forest (CEGL007546)
	Pinus taeda - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551)
	Pinus taeda - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560)
	Pinus taeda - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450)
	Pinus taeda - *Liquidambar styraciflua* Ruderal Forest (CEGL008462)
Ruderal Hardwood Forest	
FXHC - Ruderal Hardwood Forest Complex	
	Paulownia tomentosa Ruderal Woodland (CEGL003687)
	Melia azedarach Ruderal Forest [Park Special] (CEPS004837)
	Triadica sebifera Ruderal Forest (CEGL007037)
	Ailanthus altissima Ruderal Forest (CEGL007191)
	Robinia pseudoacacia Ruderal Forest (CEGL007279)
FXMH - Ruderal Mixed Hardwood Forest	
	Gleditsia triacanthos - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686)
	Celtis (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697)
	Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809)
FXSO - Ruderal Sweetgum - (Oak) Forest	
	Liquidambar styraciflua Ruderal Forest (CEGL007216)
	Liquidambar styraciflua - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217)
FXTT - Ruderal Tuliptree Forest	
	Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220)
	Liriodendron tulipifera - *Quercus* spp. Ruderal Forest (CEGL007221)
FXWO - Ruderal Water Oak Forest	
	Quercus nigra Ruderal Forest (CEGL004638)
Oak Bottomland & Floodplain Forest	
FFRO - Southern Red Oak Flatwoods Forest	
	Quercus falcata Wet Flatwoods Forest (CEGL004412)
FOBF - Oak Bottomland & Floodplain Forest	
	Quercus michauxii - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099)
	Quercus phellos - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102)
	Quercus lyrata - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
	Quercus phellos - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771)
	Quercus laurifolia / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348)
	Liquidambar styraciflua - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353)
	Quercus pagoda - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354)
Hardwood Bottomland & Floodplain Forest	
FCBF - East Gulf Coastal Plain Beech Floodplain Forest	
	Fagus grandifolia - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest (CEGL004745)
FBLF - River Birch Levee Forest	
	Betula nigra - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest (CEGL007312)
FMHF - Mixed Hardwood Floodplain Forest	
	Fraxinus pennsylvanica - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427)
	Acer saccharinum - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431)
	Quercus texana - *Celtis laevigata* - *Ulmus* (*americana, crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619)
	Acer negundo - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690)
	Acer negundo Ruderal Floodplain Forest (CEGL005033)
FCSF - Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest	
	Platanus occidentalis - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest (CEGL007335)
FSSF - Sycamore - Silver Maple Calcareous Floodplain Forest	
	Platanus occidentalis - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Floodplain Forest (CEGL007334)
FBWS - Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest	
	Salix nigra - *Acer* (*rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest (CEGL007703)
Swamp Forest	
FBCP - East Gulf Coastal Plain Bald-cypress Pondshore	
	Taxodium distichum East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)
FBCS - Bald-cypress Swamp	
	Taxodium distichum / *Lemna minor* Floodplain Forest (CEGL002420)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
FWTS - Water Tupelo Swamp Forest	*Nyssa aquatica* Swamp Forest (CEGL002419)
FCPS - Southern Upper East Gulf Coastal Plain Seepage Forest	*Nyssa biflora* - *Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana* - *Viburnum nudum* Swamp Forest (CEGL008477)
FPFS - Coastal Plain Planertree Floodplain Swamp Forest	*Planera aquatica* Floodplain Forest (CEGL007394)
FIAS - Interior Forested Acidic Seep	*Acer rubrum* var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest (CEGL004425)
Ruderal Hardwood Flooded Forest	
FXMF - Ruderal Mixed Floodplain Forest	*Liquidambar styraciflua* - (*Liriodendron tulipifera*) Ruderal Wet Forest (CEGL007330)
	Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest (CEGL007380)
FXTW - Ruderal Chinese Tallow Wet Forest	*Triadica sebifera* Ruderal Wet Forest (CEGL007412)
Herbaceous Prairie	
HPBB - Black Belt Prairie	*Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland (CEGL004664)
HJCP - Mississippi Jackson Calcareous Clay Prairie	*Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland (CEGL004020)
Ruderal Shrubland	
SXBB - Ruderal Blackberry - Greenbrier Shrub Thicket	*Rubus* (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland (CEGL004732)
SXGS - Ruderal Groundsel-tree Shrubland	*Baccharis halimifolia* Ruderal Shrubland (CEGL004657)
SXPU - Ruderal Chinese Privet Upland Shrubland	*Ligustrum sinense* Ruderal Upland Shrubland (CEGL003807)
SXVL - Ruderal Vine-Shrubland	*Pueraria montana* var. *lobata* Ruderal Vine-Shrubland (CEGL003882)
	Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620)
	Wisteria sinensis Ruderal Vine-Shrubland (CEGL008568)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Ruderal Herbaceous	
HXMG - Ruderal Mixed Grassland	*Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland Alliance (A3321)
	Scirpus cyperinus Southern Ruderal Marsh (CEGL003866)
	Rhus copallinum - *Andropogon virginicus* Ruderal Grassland (CEGL004035)
	Andropogon virginicus var. *virginicus* Ruderal Grassland (CEGL004044)
	Lolium (*arundinaceum*, *pratense*) Ruderal Grassland (CEGL004048)
	Sorghum halepense Ruderal Grassland (CEGL004108)
	Imperata cylindrica Ruderal Grassland (CEGL004673)
	Paspalum notatum Ruderal Grassland (CEGL004700)
	Axonopus fissifolius Ruderal Herbaceous Vegetation [Park Special] (CEPS004833)
	Schizachyrium scoparium - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333)
Herbaceous Shoreline & Canebrake	
SCBF - Floodplain Canebrake	*Arundinaria gigantea* ssp. *gigantea* Shrub Swamp (CEGL003836)
HSFP - Smartweed Floodplain & Pond	*Polygonum* (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290)
	Polygonum amphibium - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699)
	Polygonum spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555)
Shrub & Herbaceous Marsh	
SBWR - Black Willow Riverbank Shrubland	*Salix nigra* Wet Shrubland (CEGL003901)
SSAS - Southeastern Alder Swamp	*Alnus serrulata* Southeastern Shrub Swamp (CEGL008474)
SSBP - Southern Buttonbush Pond	*Cephalanthus occidentalis* / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp (CEGL002191)
HCRM - Common Rush Marsh	*Juncus effusus* Marsh (CEGL004112)
HGCM - Giant Cutgrass Slough Marsh	*Zizaniopsis miliacea* Coastal Plain Slough Marsh (CEGL004139)
Ruderal Shrub Wetland	
SXPW - Ruderal Chinese Privet Wet Shrubland	*Ligustrum sinense* Ruderal Wet Shrubland (CEGL003837)

Table E–1 (continued). Map classification and crosswalk to vegetation types in the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[The bold headings within the table (above the map classes) are categories to organize the map classes. All map classes except for those under the Open Water category represent vegetation types within the U.S. National Vegetation Classification. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Map Class Code - Name	USNVC Association Scientific Name* (Code)
Floating Aquatic Vegetation	
HAFV - Aquatic Floating Herbaceous Vegetation	*Nuphar advena* - *Nymphaea odorata* Aquatic Vegetation (CEGL002386)
	Hydrocotyle ranunculoides - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305)
	Potamogeton spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation (CEGL004725)
HAAL - American Lotus Aquatic Wetland	*Nelumbo lutea* Aquatic Vegetation (CEGL004323)
Ruderal Floating Aquatic Vegetation	
HXAV - Aquatic Ruderal Herbaceous Vegetation	*Alternanthera philoxeroides* Ruderal Aquatic Vegetation (CEGL003858)
	Eichhornia crassipes Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671)
	Ludwigia peploides Aquatic Vegetation (CEGL007835)
Ruderal Catastrophic Vegetation	
MXTR - Modified Ruderal Tornado Regeneration Vegetation	Not applicable
Cultural Agriculture	
CPLP - Loblolly Pine Plantation	*Pinus taeda* Forest Plantation Cultural Subtype (CST007179)
CPSH - Native Southern Hardwood Plantation	Native Southern Hardwood Plantation Cultural Type (CTY017)
CRCC - Row & Close Grain Crop	Row & Close Grain Crop Cultural Formation (CFO04)
Cultural Developed	
CDVA - Developed Area	Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03)
CBRN - Barren Land	Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03)
Open Water (Non-USNVC)	
NOSR - Open Water Stream & River	Not applicable
NOWL - Open Water Lake	Not applicable
NOWP - Open Water Pond	Not applicable

*Or the classification name of the lowest hierarchical level mapped in the USNVC.

Table E–2. Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
1. FOREST & WOODLAND CLASS	
1.B. Temperate & Boreal Forest & Woodland Subclass	
1.B.1. Warm Temperate Forest & Woodland Formation	
1.B.1.Na. Southeastern North American Forest & Woodland Division	
M305. Southeastern North American Ruderal Forest Macrogroup	
G029. Southeastern Exotic Ruderal Forest Group	
A3233. *Albizia julibrissin* - *Broussonetia papyrifera* - *Triadica sebifera* Ruderal Forest Alliance	
Melia azedarach Ruderal Forest [Park Special] (CEPS004837)	
FXHC*	Ruderal Hardwood Forest Complex
Triadica sebifera Ruderal Forest (CEGL007037)	
FXHC*	Ruderal Hardwood Forest Complex
G031. Southeastern Native Ruderal Forest Group	
Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809)	
FXMH*	Ruderal Mixed Hardwood Forest
A3232. *Liquidambar styraciflua* - *Celtis laevigata* - *Quercus nigra* Ruderal Forest Alliance	
Liquidambar styraciflua - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217)	
FXSO*	Ruderal Sweetgum - (Oak) Forest
Liquidambar styraciflua Ruderal Forest (CEGL007216)	
FXSO*	Ruderal Sweetgum - (Oak) Forest
Quercus nigra Ruderal Forest (CEGL004638)	
FXWO	Ruderal Water Oak Forest
A3231. *Pinus taeda* - *Liriodendron tulipifera* - *Liquidambar styraciflua* Ruderal Forest Alliance	
Pinus taeda - *Liquidambar styraciflua* Ruderal Forest (CEGL008462)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011)	
FXPN*	Ruderal Pine - (Hardwood) Forest
M008. Southern Mesic Mixed Broadleaf Forest Macrogroup	
G007. Southern Mesic Beech - Magnolia - Oak Forest Group	
A0369. *Fagus grandifolia* - *Magnolia grandiflora* Forest Alliance	
Fagus grandifolia - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458)	
FBMS*	Southern Beech - Magnolia Forest
Fagus grandifolia - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest (CEGL007460)	
FLBM	East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest
Fagus grandifolia - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963)	
FBMS*	Southern Beech - Magnolia Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	G166. Southern Mesic Beech - Oak - Mixed Deciduous Forest Group
	A3236. *Acer barbatum* - *Quercus shumardii* - *Fraxinus americana* Coastal Plain Forest Alliance
	Acer barbatum - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671)
FNOH*	Northern Oak - (Hickory) Forest
	A2059. *Fagus grandifolia* - *Quercus alba* - *Quercus nigra* Coastal Plain Forest Alliance
	Fagus grandifolia - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest (CEGL004745)
FCBF	East Gulf Coastal Plain Beech Floodplain Forest
	Fagus grandifolia - *Quercus alba* - *Liquidambar styraciflua* / *Magnolia grandiflora* / *Smilax pumila* Forest (CEGL007210)
FBMS*	Southern Beech - Magnolia Forest
	Pinus taeda - *Quercus alba* / *Chasmanthium sessiliflorum* Forest (CEGL004763)
FLWO	East Gulf Coastal Plain Loblolly - White Oak Forest
	A3234. *Quercus alba* - *Carya alba* Mesic Coastal Plain Forest Alliance
	Liquidambar styraciflua - *Carya illinoinensis* - *Quercus nigra* Loess Bluff Forest (CEGL004122)
FSOH*	Southern Oak - (Hardwood) Forest
	Quercus alba - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225)
FNOH*	Northern Oak - (Hickory) Forest
	A3235. *Quercus shumardii* - *Quercus pagoda* - *Fraxinus americana* Coastal Plain Forest Alliance
	Quercus pagoda - *Quercus nigra* Forest (CEGL004109)
FSOH*	Southern Oak - (Hardwood) Forest
1.B.2. Cool Temperate Forest & Woodland Formation	
1.B.2.Na. Eastern North American Forest & Woodland Division	
	M883. Appalachian-Interior-Northeastern Mesic Forest Macrogroup
	G020. Appalachian-Central Interior Mesic Forest Group
	A2033. *Fagus grandifolia* - *Liriodendron tulipifera* - *Carya cordiformis* Forest Alliance
	Fagus grandifolia - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
FBNC*	Northern & Central Beech Forest
	Fagus grandifolia - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)
FBNC*	Northern & Central Beech Forest
	Fagus grandifolia - *Quercus alba* / *Cornus* florida Forest (CEGL007881)
FBNC*	Northern & Central Beech Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M013. Eastern North American Ruderal Forest Macrogroup	
G032. Eastern North American Exotic Ruderal Forest Group	
A3230. *Acer platanoides* - *Ailanthus altissima* - *Pinus* spp. Exotic Ruderal Forest Alliance	
Ailanthus altissima Ruderal Forest (CEGL007191)	
FXHC*	Ruderal Hardwood Forest Complex
Paulownia tomentosa Ruderal Woodland (CEGL003687)	
FXHC*	Ruderal Hardwood Forest Complex
G030. Eastern North American Native Ruderal Forest Group	
A3227. *Juniperus virginiana* - *Pinus virginiana* - *Pinus echinata* Ruderal Forest Alliance	
Juniperus virginiana var. *virginiana* - (*Quercus* spp.) Ruderal Forest (CEGL007124)	
FXRC	Ruderal Eastern Red-cedar Forest
Pinus echinata Ruderal Forest (CEGL006327)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus strobus Ruderal Forest (CEGL007944)	
FXWP	Ruderal Eastern White Pine Forest
Pinus virginiana Ruderal Forest (CEGL002591)	
FXPN*	Ruderal Pine - (Hardwood) Forest
A3228. *Liriodendron tulipifera* - *Juglans nigra* - *Robinia pseudoacacia* Ruderal Forest Alliance	
Celtis (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697)	
FXMH*	Ruderal Mixed Hardwood Forest
Gleditsia triacanthos - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686)	
FXMH*	Ruderal Mixed Hardwood Forest
Liriodendron tulipifera - *Quercus* spp. Ruderal Forest (CEGL007221)	
FXTT*	Ruderal Tuliptree Forest
Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220)	
FXTT*	Ruderal Tuliptree Forest
Robinia pseudoacacia Ruderal Forest (CEGL007279)	
FXHC*	Ruderal Hardwood Forest Complex
M016. Southern & South-Central Oak - Pine Forest & Woodland Macrogroup	
G601. Chinquapin Oak - Shumard Oak - Blue Ash Alkaline Forest & Woodland Group	
A2060. *Quercus muehlenbergii* - *Acer saccharum* - *Fraxinus americana* Forest Alliance	
Quercus alba - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070)	
FNOH*	Northern Oak - (Hickory) Forest
Quercus muehlenbergii - *Quercus shumardii* - *Carya* (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808)	
FNOH*	Northern Oak - (Hickory) Forest
Quercus shumardii - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442)	
FNOH*	Northern Oak - (Hickory) Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3273. *Quercus muehlenbergii* - *Fraxinus quadrangulata* - *Juniperus virginiana* Woodland Alliance
	Juniperus virginiana var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland (CEGL007747)
WBBC	Black Belt Prairie Cedar Woodland
	Quercus muehlenbergii - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland (CEGL004267)
WCOB	Chinquapin Oak Unglaciated Bluff Woodland
	G165. Piedmont-Central Atlantic Coastal Plain Oak Forest Group
	A3294. *Quercus stellata* - *Carya* spp. - *Pinus echinata* Piedmont Woodland Alliance
	Quercus falcata - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246)
FNOH*	Northern Oak - (Hickory) Forest
	G012. Shortleaf Pine - Oak Forest & Woodland Group
	A3270. *Pinus echinata* - *Quercus falcata* Upper Coastal Plain Alliance
	Pinus (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052)
FSLO*	Shortleaf Pine - Oak Forest
	Pinus echinata - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053)
FSLO*	Shortleaf Pine - Oak Forest
	G159. South-Central Interior Oak Forest & Woodland Group
	A3288. *Quercus alba* - *Quercus falcata* - *Quercus stellata* Ozark-Ouachita Forest Alliance
	Quercus alba - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067)
FNOH*	Northern Oak - (Hickory) Forest
	A3289. *Quercus prinus* - *Quercus falcata* Forest Alliance
	Quercus prinus - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261)
FNCO*	Northern Chestnut Oak Forest
	Quercus prinus - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700)
FNCO*	Northern Chestnut Oak Forest
	A3291. *Quercus stellata* - *Quercus falcata* - *Quercus alba* Interior Low Plateau Woodland Alliance
	Quercus alba - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795)
FNOH*	Northern Oak - (Hickory) Forest
	Quercus alba - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest (CEGL007709)
FHOT	Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	Quercus falcata - *Quercus alba* - *Carya alba* / *Oxydendrum arboreum* / *Vaccinium stamineum* Forest (CEGL007244)
FNOH*	Northern Oak - (Hickory) Forest
	Quercus stellata / *Viburnum rufidulum* / *Schizachyrium scoparium* - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686)
WHRO*	Western Highland Rim Oak Woodland
	G651. South-Central Interior Oak Savanna & Barrens Group
	A3315. *Quercus marilandica* - *Quercus stellata* Clay/Loess Woodland Alliance
	Quercus marilandica / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756)
WHRO*	Western Highland Rim Oak Woodland
1.B.3. Temperate Flooded & Swamp Forest Formation	
1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest Division	
	M029. Central Hardwood Floodplain Forest Macrogroup
	G652. Silver Maple - Green Ash - Sycamore Floodplain Forest Group
	A3712. *Platanus occidentalis* - *Betula nigra* Floodplain Forest Alliance
	Platanus occidentalis - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Floodplain Forest (CEGL007334)
FSSF	Sycamore - Silver Maple Calcareous Floodplain Forest
	G673. Silver Maple - Sugarberry - Sweetgum Floodplain Forest Group
	A3699. *Betula nigra* - *Platanus occidentalis* Appalachian-Piedmont Floodplain Forest Alliance
	Betula nigra - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest (CEGL007312)
FBLF	River Birch Levee Forest
	A3700. *Fraxinus pennsylvanica* - *Platanus occidentalis* - *Acer saccharinum* Ozark-Ouachita Floodplain Forest Alliance
	Acer negundo - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690)
FMHF*	Mixed Hardwood Floodplain Forest
	Acer saccharinum - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431)
FMHF*	Mixed Hardwood Floodplain Forest
	Fraxinus pennsylvanica - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427)
FMHF*	Mixed Hardwood Floodplain Forest
	M503. Central Hardwood Swamp Forest Macrogroup
	G044. Central Interior-Appalachian Seepage Swamp Group
	A3359. *Acer rubrum* - *Nyssa sylvatica* Ozark-Interior Seepage Forest Alliance
	Acer rubrum var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest (CEGL004425)
FIAS	Interior Forested Acidic Seep
	G654. South-Central Flatwoods & Pond Forest Group
	A3429. *Quercus phellos* - *Quercus lyrata* - *Quercus nigra* Interior Pond Forest Alliance
	Quercus phellos - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102)
FOBF*	Oak Bottomland & Floodplain Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M302. Eastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G552. Eastern North American Ruderal Flooded & Swamp Forest Group	
A4099. *Acer negundo* - *Betula nigra* / *Alliaria petiolata* Ruderal Floodplain Forest Alliance	
Acer negundo Ruderal Floodplain Forest (CEGL005033)	
FMHF*	Mixed Hardwood Floodplain Forest
1.B.3.Nb. Southeastern North American Flooded & Swamp Forest Division	
M161. Pond-cypress Basin Swamp Macrogroup	
G036. Pond-cypress Basin Swamp Group	
A0652. *Taxodium distichum* - *Taxodium ascendens* / *Panicum hemitomon* Lakeshore Swamp Forest Alliance	
Taxodium distichum East Gulf Coastal Plain Pondshore Swamp Woodland (CEGL004046)	
FBCP	East Gulf Coastal Plain Bald-cypress Pondshore
M310. Southeastern North American Ruderal Flooded & Swamp Forest Macrogroup	
G762. Southeastern Exotic Ruderal Flooded & Swamp Forest Group	
A3339. *Triadica sebifera* - *Melaleuca quinquenervia* - *Schinus terebinthifolius* Ruderal Flooded & Swamp Forest Alliance	
Triadica sebifera Ruderal Wet Forest (CEGL007412)	
FXTW	Ruderal Chinese Tallow Wet Forest
G553. Southeastern Native Ruderal Flooded & Swamp Forest Group	
A3343. *Acer rubrum* - *Liriodendron tulipifera* Ruderal Flooded & Swamp Forest Alliance	
Liquidambar styraciflua - (*Liriodendron tulipifera*) Ruderal Wet Forest (CEGL007330)	
FXMF*	Ruderal Mixed Floodplain Forest
A3345. *Pinus taeda* - *Liquidambar styraciflua* Ruderal Flooded & Swamp Forest Alliance	
Pinus taeda - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Ruderal Wet Forest (CEGL007546)	
FXPN*	Ruderal Pine - (Hardwood) Forest
Pinus taeda - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560)	
FXPN*	Ruderal Pine - (Hardwood) Forest
M033. Southern Coastal Plain Basin Swamp & Flatwoods Macrogroup	
G130. Hardwood - Loblolly Pine Nonriverine Wet Flatwoods Group	
A3445. *Quercus stellata* - *Quercus falcata* Wet Flatwoods Forest Alliance	
Quercus falcata Wet Flatwoods Forest (CEGL004412)	
FFRO	Southern Red Oak Flatwoods Forest
M032. Southern Coastal Plain Evergreen Hardwood - Conifer Swamp Macrogroup	
G037. Coastal Plain Mixed Evergreen Swamp Group	
A0378. *Magnolia virginiana* - *Nyssa biflora* - *Quercus laurifolia* Swamp Forest Alliance	
Nyssa biflora - *Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana* - *Viburnum nudum* Swamp Forest (CEGL008477)	
FCPS	Southern Upper East Gulf Coastal Plain Seepage Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M031. Southern Coastal Plain Floodplain Forest Macrogroup	
G033. Bald-cypress - Tupelo Floodplain Forest Group	
A0345. *Nyssa aquatica* Swamp Forest Alliance	
Nyssa aquatica Swamp Forest (CEGL002419)	
FWTS	Water Tupelo Swamp Forest
A3594. *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* Floodplain Forest Alliance	
Planera aquatica Floodplain Forest (CEGL007394)	
FPFS	Coastal Plain Planertree Floodplain Swamp Forest
Taxodium distichum / *Lemna minor* Floodplain Forest (CEGL002420)	
FBCS	Bald-cypress Swamp
G034. Oak - Sweetgum Floodplain Forest Group	
A3625. *Liquidambar styraciflua* - *Fraxinus pennsylvanica* - *Acer rubrum* Flooded & Swamp Forest Alliance	
Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest (CEGL007380)	
FXMF*	Ruderal Mixed Floodplain Forest
Platanus occidentalis - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest (CEGL007335)	
FCSF	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest
A3628. *Quercus laurifolia* - *Quercus phellos* - *Pinus taeda* Coastal Plain Riparian Forest Alliance	
Quercus laurifolia / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348)	
FOBF*	Oak Bottomland & Floodplain Forest
A3629. *Quercus lyrata* - *Quercus phellos* - *Carya aquatica* Swamp Forest Alliance	
Quercus lyrata - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424)	
FOBF*	Oak Bottomland & Floodplain Forest
A3630. *Quercus michauxii* - *Carya laciniosa* - *Liquidambar styraciflua* Interior Floodplain Forest Alliance	
Quercus michauxii - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099)	
FOBF*	Oak Bottomland & Floodplain Forest
A3631. *Quercus michauxii* - *Quercus pagoda* Coastal Plain Floodplain Forest Alliance	
Liquidambar styraciflua - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353)	
FOBF*	Oak Bottomland & Floodplain Forest
Quercus pagoda - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354)	
FOBF*	Oak Bottomland & Floodplain Forest
A3632. *Quercus phellos* - *Quercus nigra* Coastal Plain Floodplain Forest Alliance	
Quercus phellos - *Quercus nigra* - *Quercus alba* / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771)	
FOBF*	Oak Bottomland & Floodplain Forest

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3633. *Quercus phellos* Piedmont Floodplain Forest Alliance
	Pinus taeda - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551)
FXPN*	Ruderal Pine - (Hardwood) Forest
	G759. Southern Ash - Elm - Willow Floodplain Forest Group
	A1914. *Salix caroliniana* - *Salix nigra* Coastal Plain Swamp Forest Alliance
	Salix nigra - *Acer (rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest (CEGL007703)
FBWS	Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest
	A3709. *Ulmus americana* - *Ulmus crassifolia* - *Celtis laevigata* West Gulf Coastal Plain Floodplain Forest Alliance
	Quercus texana - *Celtis laevigata* - *Ulmus* (*americana*, *crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619)
FMHF*	Mixed Hardwood Floodplain Forest
2. SHRUB & HERB VEGETATION CLASS	
2.B. Temperate & Boreal Grassland & Shrubland Subclass	
2.B.2. Temperate Grassland & Shrubland Formation	
2.B.2.Nc. Eastern North American Grassland & Shrubland Division	
	M508. Central Interior Calcareous Scrub & Grassland Macrogroup
	G174. South-Central Patch Prairie Group
	A3889. *Andropogon gerardii* - *Panicum virgatum* - *Sporobolus clandestinus* Southeastern Patch Prairie Alliance
	Andropogon gerardii - *Schizachyrium scoparium* - *Dichanthelium scoparium* - *Rhynchospora glomerata* Grassland (CEGL004006)
N/A	
	M123. Eastern North American Ruderal Grassland & Shrubland Macrogroup
	G059. Eastern North American Ruderal Meadow & Shrubland Group
	A3934. *Poa compressa* - *Solidago nemoralis* - *Centaurea biebersteinii* Ruderal Dry Meadow & Shrubland Alliance
	Schizachyrium scoparium - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333)
HXMG*	Ruderal Mixed Grassland
2.B.2.Ne. Southeastern North American Grassland & Shrubland Division	
	M309. Southeastern Coastal Plain Patch Prairie Macrogroup
	G175. Southeastern Coastal Plain Patch Prairie Group
	A3318. *Schizachyrium scoparium* - *Sorghastrum nutans* Coastal Plain Prairie Alliance
	Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland (CEGL004664)
HPBB	Black Belt Prairie
	Schizachyrium scoparium - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland (CEGL004020)
HJCP	Mississippi Jackson Calcareous Clay Prairie

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M307. Southeastern Ruderal Grassland & Shrubland Macrogroup	
G583. Southeastern Ruderal Grassland & Shrubland Group	
A3321. *Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland Alliance	
HXMG*	Ruderal Mixed Grassland
Andropogon virginicus var. *virginicus* Ruderal Grassland (CEGL004044)	
HXMG*	Ruderal Mixed Grassland
Axonopus fissifolius Ruderal Herbaceous Vegetation [Park Special] (CEPS004833)	
HXMG*	Ruderal Mixed Grassland
Imperata cylindrica Ruderal Grassland (CEGL004673)	
HXMG*	Ruderal Mixed Grassland
Lolium (*arundinaceum*, *pratense*) Ruderal Grassland (CEGL004048)	
HXMG*	Ruderal Mixed Grassland
Paspalum notatum Ruderal Grassland (CEGL004700)	
HXMG*	Ruderal Mixed Grassland
Rhus copallinum - *Andropogon virginicus* Ruderal Grassland (CEGL004035)	
HXMG*	Ruderal Mixed Grassland
Sorghum halepense Ruderal Grassland (CEGL004108)	
HXMG*	Ruderal Mixed Grassland
A4084. *Ligustrum* spp. Eastern Exotic Ruderal Shrubland Alliance	
Ligustrum sinense Ruderal Upland Shrubland (CEGL003807)	
SXPU	Ruderal Chinese Privet Upland Shrubland
A4082. *Pueraria montana* - *Wisteria sinensis* Exotic Ruderal Vine-Shrubland Alliance	
Pueraria montana var. *lobata* Ruderal Vine-Shrubland (CEGL003882)	
SXVL*	Ruderal Vine-Shrubland
Wisteria sinensis Ruderal Vine-Shrubland (CEGL008568)	
SXVL*	Ruderal Vine-Shrubland
A3322. *Rubus* spp. - *Prunus* spp. - *Cornus drummondii* Eastern Ruderal Shrubland Alliance	
Baccharis halimifolia Ruderal Shrubland (CEGL004657)	
SXGS	Ruderal Groundsel-tree Shrubland
Rubus (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland (CEGL004732)	
SXBB	Ruderal Blackberry - Greenbrier Shrub Thicket
2.C. Shrub & Herb Wetland Subclass	
2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland Formation	
2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division	
M061. Eastern North American Cool Temperate Seep Macrogroup	
G182. Central Interior Seepage Fen Group	
A3390. *Carex lurida* - *Carex interior* - *Parnassia grandifolia* Southern Interior Seepage Fen Alliance	
Carex lurida - *Carex leptalea* - *Parnassia grandifolia* - *Juncus brachycephalus* - (*Xyris tennesseensis*) Seepage Fen (CEGL004161)	
N/A	

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
M069. Eastern North American Marsh, Wet Meadow & Shrubland Macrogroup	
G125. Eastern North American Freshwater Marsh Group	
A3669. *Peltandra virginica* - *Pontederia cordata* - *Sagittaria* spp. Marsh Alliance	
Pontederia cordata - *Peltandra virginica* Marsh (CEGL004291)	
N/A	
G167. Eastern North American Shrub Swamp Group	
A3685. *Alnus* spp. - *Salix* spp. Lakeshore & Depression Shrub Swamp Alliance	
Alnus serrulata Southeastern Shrub Swamp (CEGL008474)	
SSAS	Southeastern Alder Swamp
A0795. *Arundinaria gigantea* Shrub Swamp Alliance	
Arundinaria gigantea ssp. *gigantea* Shrub Swamp (CEGL003836)	
SCBF	Floodplain Canebrake
A3670. *Cephalanthus occidentalis* - *Decodon verticillatus* Shrub Swamp Alliance	
Cephalanthus occidentalis / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp (CEGL002191)	
SSBP	Southern Buttonbush Pond
M880. Eastern North American Wet Shoreline Vegetation Macrogroup	
G755. Eastern North American Riverine Wetland Vegetation Group	
A1657. *Justicia americana* Riverbed Alliance	
Justicia americana Riverbed Vegetation (CEGL004286)	
N/A	
A0948. *Salix nigra* Riverscour Scrub Alliance	
Salix nigra Wet Shrubland (CEGL003901)	
SBWR	Black Willow Riverbank Shrubland
G756. Eastern North American Wet Shoreline Vegetation Group	
A1881. *Polygonum* spp. Wet Meadow Shoreline Alliance	
Polygonum (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290)	
HSFP*	Smartweed Floodplain & Pond
Polygonum amphibium - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699)	
HSFP*	Smartweed Floodplain & Pond
Polygonum spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555)	
HSFP*	Smartweed Floodplain & Pond
M303. Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup	
G557. Southeastern Ruderal Marsh, Wet Meadow & Shrubland Group	
A3412. *Juncus effusus* - *Andropogon glomeratus* var. *pumilus* - *Saccharum giganteum* Ruderal Marsh Alliance	
Juncus effusus Marsh (CEGL004112)	
HCRM	Common Rush Marsh
Scirpus cyperinus - *Panicum rigidulum* - *Rhynchospora corniculata* - (*Dulichium arundinaceum*) Marsh (CEGL004719)	
N/A	
Scirpus cyperinus Southern Ruderal Marsh (CEGL003866)	
HXMG*	Ruderal Mixed Grassland

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
	A3409. *Ligustrum sinense* - *Tamarix* spp. Southern Ruderal Wet Shrubland Alliance
	Ligustrum sinense Ruderal Wet Shrubland (CEGL003837)
SXPW	Ruderal Chinese Privet Wet Shrubland
	A4151. *Vitis rotundifolia* - *Ampelopsis arborea* - *Campsis radicans* Ruderal Vine-Shrubland Alliance
	Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620)
SXVL*	Ruderal Vine-Shrubland
2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division	
	M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup
	G188. Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh Group
	A3404. *Zizaniopsis miliacea* - *Zizania aquatica* - *Pontederia cordata* Southeastern Floodplain Marsh Alliance
	Zizaniopsis miliacea Coastal Plain Slough Marsh (CEGL004139)
HGCM	Giant Cutgrass Slough Marsh
5. AQUATIC VEGETATION CLASS	
5.B. Freshwater Aquatic Vegetation Subclass	
5.B.2. Temperate & Boreal Freshwater Aquatic Vegetation Formation	
5.B.2.Na. North American Freshwater Aquatic Vegetation Division	
	M108. Eastern North American Freshwater Aquatic Vegetation Macrogroup
	G114. Eastern North American Freshwater Aquatic Vegetation Group
	A4064. *Nymphaea odorata* - *Nuphar* spp. - *Brasenia schreberi* Aquatic Vegetation Alliance
	Hydrocotyle ranunculoides - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305)
HAFV*	Aquatic Ruderal Herbaceous Vegetation
	Nelumbo lutea Aquatic Vegetation (CEGL004323)
HAAL	American Lotus Aquatic Wetland
	Nuphar advena - *Nymphaea odorata* Aquatic Vegetation (CEGL002386)
HAFV*	Aquatic Floating Herbaceous Vegetation
	A4066. *Potamogeton* spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation Alliance
	Potamogeton spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation (CEGL004725)
HAFV*	Aquatic Floating Herbaceous Vegetation
	M401. North American Temperate Ruderal Aquatic Vegetation Macrogroup
	G595. Eastern North American Ruderal Aquatic Vegetation Group
	A4219. *Eichhornia crassipes* - *Alternanthera philoxeroides* Ruderal Aquatic Vegetation Alliance
	Alternanthera philoxeroides Ruderal Aquatic Vegetation (CEGL003858)
HXAV*	Aquatic Ruderal Herbaceous Vegetation
	Eichhornia crassipes Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671)
HXAV*	Aquatic Ruderal Herbaceous Vegetation
	Ludwigia peploides Aquatic Vegetation (CEGL007835)
HXAV*	Aquatic Ruderal Herbaceous Vegetation

Table E–2 (continued). Map classification set into the hierarchy of the U.S. National Vegetation Classification for the Natchez Trace Parkway vegetation mapping project.

[CEPS, Community Element Park Special; CEGL, Community Element Global; USNVC, U.S. National Vegetation Classification]

Map-Class Code	Map-Class Name
6. OPEN ROCK VEGETATION CLASS	
6.B. Temperate & Boreal Open Rock Vegetation Subclass	
6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation Formation	
6.B.1.Na. Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation Division	
M111. Eastern North American Cliff & Rock Vegetation Macrogroup	
G840. Appalachian Cliff & Rock Vegetation Group	
A2076. *Pellaea atropurpurea* - *Cystopteris bulbifera* Appalachian Circumneutral Cliff Alliance	
Cystopteris bulbifera - (*Asplenium rhizophyllum*) Cliff Sparse Vegetation (CEGL004394)	
N/A	
A3915. Appalachian Wet Cliff Alliance	
Heuchera parviflora var. *parviflora* - *Trichomanes boschianum* - *Thalictrum mirabile* - (*Ageratina luciae-brauniae*, *Solidago albopilosa*) Cliff Vegetation (CEGL004301)	
N/A	
G841. Central Midwest-Interior Cliff & Rock Vegetation Group	
A2073. *Hydrangea arborescens* / *Heuchera villosa* Interior Circumneutral Cliff Alliance	
Hydrangea arborescens / *Impatiens* (*capensis*, *pallida*) - *Heuchera villosa* Cliff Shrubland (CEGL004708)	
N/A	
7. AGRICULTURAL & DEVELOPED VEGETATION	
7.A. Woody Agricultural Vegetation Cultural Subclass	
7.A.2. Forest Plantation & Agroforestry Cultural Formation	
7.A.2.1. Forest Plantation Cultural Subformation	
CGR007. Temperate & Boreal Plantation Cultural Group	
CSG005. Eastern North American Temperate Forest Plantation Cultural Subgroup	
CTY012. Native Southern Pine Plantation Cultural Type	
Pinus taeda Forest Plantation (CST007179)	
CPLP	Loblolly Pine Plantation
CTY017. Native Southern Hardwood Plantation Cultural Type	
CPSH	Native Southern Hardwood Plantation
7.B. Herbaceous Agricultural Vegetation Cultural Subclass	
7.B.1. Row & Close Grain Crop Cultural Formation	
CRCC	Row & Close Grain Crop
7.C. Herbaceous & Woody Developed Vegetation Cultural Subclass	
CDVA	Developed Area
CBRN	Barren Land
MOSAIC RUDERAL VEGETATION	
Ruderal Catastrophic Vegetation	
MXTR	Modified Ruderal Tornado Regeneration Vegetation
NON-USNVC	
Non-Vegetated Water (<1% vegetated)	
NOSR	Open Water Stream & River
NOWL	Open Water Lake
NOWP	Open Water Pond

*Map class also represents other vegetation associations.

Page Reference to Map-Class Descriptions

Page

WBBC – Black Belt Prairie Cedar Woodland E-28
WCOB – Chinkapin Oak Unglaciated Bluff Woodland E-30
WHRO – Western Highland Rim Oak Woodland E-31
FSLO – Shortleaf Pine - Oak Forest E-32
FLWO – East Gulf Coastal Plain Loblolly - White Oak Forest E-33
FLBM – East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest E-34
FNCO – Northern Chestnut Oak Forest E-35
FNOH – Northern Oak - (Hickory) Forest E-36
FHOT – Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest E-39
FSOH – Southern Oak - (Hardwood) Forest E-40
FBNC – North & Central Beech Forest E-42
FBMS – Southern Beech - Magnolia Forest E-43
FXRC – Ruderal Eastern Red-cedar Forest E-45
FXWP – Ruderal Eastern White Pine Forest E-46
FXPN – Ruderal Pine - (Hardwood) Forest E-47
FXHC – Ruderal Hardwood Forest Complex E-49
FXMH – Ruderal Mixed Hardwood Forest E-51
FXSO – Ruderal Sweetgum - (Oak) Forest E-53
FXTT – Ruderal Tuliptree Forest E-55
FXWO – Ruderal Water Oak Forest E-56
FFRO – Southern Red Oak Flatwoods Forest E-57
FOBF – Oak Bottomland & Floodplain Forest E-58
FCBF – East Gulf Coastal Plain Beech Floodplain Forest E-60
FBLF – River Birch Levee Forest E-61
FMHF – Mixed Hardwood Floodplain Forest E-62
FCSF – Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest E-64
FSSF – Sycamore - Silver Maple Calcareous Floodplain Forest E-66
FBWS – Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest E-68
FBCP – East Gulf Coastal Plain Bald-cypress Pondshore E-69

Page Reference to Map-Class Descriptions (continued)

Page

FBCS – Bald-cypress Swamp E-70
FWTS – Water Tupelo Swamp Forest E-71
FCPS – Southern Upper East Gulf Coastal Plain Seepage Forest E-72
FPFS – Coastal Plain Planertree Floodplain Swamp Forest E-73
FIAS – Interior Forested Acidic Seep E-74
FXMF – Ruderal Mixed Floodplain Forest E-75
FXTW – Ruderal Chinese Tallow Wet Forest E-77
HPBB – Black Belt Prairie E-78
HJCP – Mississippi Jackson Calcareous Clay Prairie E-79
SXBB – Ruderal Blackberry - Greenbrier Shrub Thicket E-80
SXGS – Ruderal Groundsel-tree Shrubland E-81
SXPU – Ruderal Chinese Privet Upland Shrubland E-82
SXVL – Ruderal Vine-Shrubland E-83
HXMG – Ruderal Mixed Grassland E-85
SCBF – Floodplain Canebrake E-87
HSFP – Smartweed Floodplain & Pond E-88
SBWR – Black Willow Riverbank Shrubland E-89
SSAS – Southeastern Alder Swamp E-90
SSBP – Southern Buttonbush Pond E-91
HCRM – Common Rush Marsh E-92
HGCM – Giant Cutgrass Slough Marsh E-93
SXPW – Ruderal Chinese Privet Wet Shrubland E-94
HAFV – Aquatic Floating Herbaceous Vegetation E-95
HAAL – American Lotus Aquatic Wetland E-96
HXAV – Aquatic Ruderal Herbaceous Vegetation E-97
MXTR – Modified Ruderal Tornado Regeneration Vegetation E-98
CPLP – Loblolly Pine Plantation E-99
CPSH – Native Southern Hardwood Plantation E-100
CRCC – Row & Close Grain Crop E-101

Page Reference to Map-Class Descriptions (continued)

Page

CDVA – Developed Area E-102

CBRN – Barren Land E-103

NOSR – Open Water Stream & River E-104

NOWL – Open Water Lake E-105

NOWP – Open Water Pond E-106

WBBC – Black Belt Prairie Cedar Woodland

The Black Belt Prairie Cedar Woodland (WBBC) map class represents the *Juniperus virginiana* var. *virginiana* - (*Celtis laevigata*, *Prunus angustifolia*, *Sideroxylon lycioides*) Woodland Association (CEGL007747) in the USNVC. This map class represents natural eastern redcedar (*Juniperus virginiana* var. *virginiana*) woodlands growing among (or over) natural Black Belt prairie herbaceous associations. This map class is very range limited and known only in the Black Belt ecological subsection (Cleland et al. 2007) from milepost 247 to milepost 264 in NATR. Additionally, the Ruderal Eastern Red-cedar Forest (FXRC) map class is excluded from this zone to prevent confusion. The WBBC map class is uncommon along the Parkway covering 122.2 ha (0.6% of the Parkway).

This map class is defined by very open woodlands to completely closed forests where the canopy is at least 25% eastern redcedar, though many examples within the Black Belt are closer to 100%. This map class includes many forests that have the effects of active management, including the Parkway bringing fires back to this prairie system that reduces eastern redcedar cover and restores Black Belt prairies. The eastern redcedar in this map class consistently presents in the aerial imagery as a conical dark-red to purple short-statured conifer, often with patchy herbaceous areas indicative of the remnant Black Belt prairie. Occasionally, loblolly pine (*Pinus taeda*) was intermixed with the eastern redcedar confusing the signature, but this was a relatively uncommon occurrence.

As noted, the FXRC map class is excluded from the Black Belt, though it does exist in the Black Belt ecological subsection where eastern redcedar has regenerated on non-Black Belt soils. Excluding the FXRC map class from the Black Belt was taken to preserve the WBBC map class within an area important to management. The alternative was to lose the WBBC map class to the FXRC map class, which was mapped between milepost 75 to the northern terminus.

The AA results indicate that WBBC was mapped well with a 90% users' accuracy and a 100% producers' accuracy. The AA discloses only a few instances where WBBC was mapped too aggressively, to the Ruderal Pine - (Hardwood) Forest (FXPN) map class. These instances were likely from the misinterpretation of the relative dominance between loblolly pine and eastern redcedar tree covers. There was no instance of consistent confusion in mapping between any map class and WBBC.



Two views of the WBBC map class showing a very old, dense closed canopy eastern redcedar forest (left) compared to a forest under active management with fire and cutting, which has allowed for the reestablishment of patches of Black Belt prairie (right).

WCOB – Chinkapin Oak Unglaciated Bluff Woodland

The Chinkapin Oak Unglaciated Bluff Woodland (WCOB) map class represents the *Quercus muehlenbergii* - (*Juniperus virginiana* var. *virginiana*) Unglaciated Bluff Woodland Association (CEGL004267) in the USNVC. This map class represents very rich steep slopes with a mix of calciphile oak species (*Quercus* spp.) and natural eastern redcedar (*Juniperus virginiana* var. *virginiana*). This map class is found in only two locations in NATR near mileposts 392 and 440. The WCOB map class is exceptionally rare along the Parkway covering only 1.6 ha (0.008% of the Parkway).

This map class is defined by an open canopy on steep slopes with a mixed canopy of eastern redcedar, oaks, and hickory species (*Carya* spp.), with eastern redcedar and oaks both composing at least 25% of the canopy. The eastern redcedar in this map class consistently presents in the aerial imagery as conical dark-red to purple short-statured conifers, often with patchy herbaceous areas indicative of the dry conditions. The oaks consistently present in the aerial imagery as very light-yellow, tan, or white crisp trees, and the hickory present as bright-yellow trees. This combination, especially the signature of the oaks, presented a unique signature for this map class.

The AA results indicate that WCOB was mapped with a 67% users' accuracy (90% confidence interval of 5–128%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' accuracy confidence interval.) The AA discloses only one instance where WBBC was mapped too aggressively, to the Northern Oak - (Hickory) Forest (FNOH) map class. This instance was likely from the misinterpretation of the oak species that dominate the forest.



Two views of the WCOB map class showing the steep slope, open canopy, and diverse vegetation associated with this exceptionally rare map class.

WHRO – Western Highland Rim Oak Woodland

The Western Highland Rim Oak Woodland (WHRO) map class represents two associations in the USNVC: the *Quercus stellata* / *Viburnum rufidulum* / *Schizachyrium scoparium* - (*Sorghastrum nutans*, *Helianthus eggertii*) Woodland (CEGL004686) and the *Quercus marilandica* / *Schizachyrium scoparium* - (*Helianthus mollis*, *Silphium asteriscus*, *Liatris aspera*) Woodland (CEGL004756). This map class represents prairie-based oak woodlands in the Interior Low Plateau ecological subsection (Cleland et al. 2007) of NATR. This map class is found in only two locations in the Parkway near mileposts 371 and 375. The WHRO map class is exceptionally rare along the Parkway covering only 1.6 ha (0.007% of the Parkway).

This map class is defined by an open canopy over herbaceous vegetation on low hills. The canopy that does exist should be dominated by oak species (*Quercus* spp.), specifically post and blackjack (*Q. stellata*, *Q. marilandica*), though in all instances there was substantial invasion by loblolly pine (*Pinus taeda*). The oak consistently presents in the aerial imagery as very light-yellow, tan, or white trees, with crisp crowns and diffuse canopies over an open herbaceous layer, which presents a unique signature for this map class.

The AA results indicate that WHRO was mapped well and consistent with a users' and producers' accuracy at 100%. The AA discloses no new instances of the WHRO map class, and no instances of WHRO were confused in mapping as a different map class.



Two views of the WHRO map class showing a more degraded example of being invaded by woody vegetation (left) compared to a relatively less invaded version (right). Both examples show the open canopy over primarily herbaceous vegetation.

FSLO – Shortleaf Pine - Oak Forest

The Shortleaf Pine - Oak Forest (FSLO) map class represents the following four associations in the USNVC:

- *Pinus echinata* - *Quercus alba* - *Carya alba* East Gulf Coastal Plain Forest (CEGL004050),
- *Pinus echinata* - *Quercus falcata* East Gulf Coastal Plain Forest (CEGL004052),
- *Pinus echinata* - *Quercus stellata* - (*Quercus marilandica*) Forest (CEGL004053), and
- *Pinus* (*echinata*, *taeda*) - *Quercus pagoda* Forest (CEGL004834).

This map class represents mature, nonsuccessional forests with a mixture of dry-site oaks (*Quercus* spp.) and shortleaf pine (*Pinus echinata*), primarily on dry-mesic sites. Occurring in small patches in NATR from milepost 166 north to milepost 351, this map class has its largest area scattered between mileposts 217 and 220. The FSLO map class is rare along the Parkway covering 50.7 ha (0.2% of the Parkway).

This map class is defined by a mixed forest of mature shortleaf pine and dry site oak, including white oak (*Quercus alba*), southern red oak (*Q. falcata*), post oak (*Q. stellata*), and chestnut oak (*Q. prinus*). Generally, this map class was set apart from the FXPN map class based upon the presence of mature oak mixed with mature pine in a nonsuccessional setting. These oaks present in the aerial imagery as crisp, large-canopied pink, red, and especially tan trees mixed among large-canopied dark-red and purple pine. The lack of young examples of this map class within the Parkway is indicative of the fire dependency of the vegetation that composes this map class and the very successful fire suppression that has occurred in the Parkway for the past century or more.

The AA results indicate that FSLO was mapped well, with a 90% users' accuracy and a 100% producers' accuracy. The AA discloses only a few instances (to two other map classes) where FSLO was mapped too aggressively. These instances were likely from the misinterpretation of the ratio of pine-to-hardwood tree cover or misinterpreting short-leaf pine for loblolly pine (*Pinus taeda*).



A view of the FLPO map class showing a mix of white oak and loblolly pine.

FLWO – East Gulf Coastal Plain Loblolly - White Oak Forest

The East Gulf Coastal Plain Loblolly - White Oak Forest (FLWO) map class represents the *Pinus taeda* - *Quercus alba* / *Chasmanthium sessiliflorum* Forest Association (CEGL004763) in the USNVC. This map class represents mature, nonsuccessional forests with a mixture of white oak (*Quercus alba*) and loblolly pine (*Pinus taeda*) primarily on dry-mesic sites. This map class is relatively limited with three distinct patches found in NATR between mileposts 50 and 51, mileposts 150 and 156, and mileposts 171 and 172. The FLWO map class is very rare along the Parkway covering only 12.7 ha (0.06% of the Parkway).

This map class is defined by a mixed forest of mature loblolly pine and white oak. Often, the white oak presents in the aerial imagery as a large-crowned tree with an orange-to-gold signature, which is in sharp contrast to the large, dense, dark-red to purple crown of the loblolly pine.

The AA results indicate that FLWO was mapped well, with an 88% users' accuracy and a 100% producers' accuracy. The AA discloses only one instance where FLWO was mapped too aggressively, to the Ruderal Pine - (Hardwood) Forest (FXPN) map class. This instance was likely from the misinterpretation of the natural versus ruderal forest.



A view of the FLWO map class showing a mix of white oak and loblolly pine.

FLBM – East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest

The East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest (FLBM) map class represents the *Fagus grandifolia* - *Magnolia grandiflora* - *Pinus glabra* - (*Magnolia macrophylla*) / (*Illicium floridanum*) Forest Association (CEGL007460) in the USNVC. This map class represents a natural hardwood-pine mixed forest. This map class is limited to only two occurrences in NATR near milepost 155. The FLBM map class is exceptionally rare along the Parkway covering 1.7 ha (0.008% of the Parkway).

This map class represents a natural mixed forest of American beech (*Fagus grandifolia*), white oak (*Quercus alba*), and spruce pine (*Pinus glabra*). Although American beech and white oak are very common along the Parkway, spruce pine is not and presents a similar signature to other "yellow" pine, such as loblolly (*Pinus taeda*) and shortleaf (*P. echinata*); this similarity is problematic for making discerning between these pines on the aerial imagery. However, spruce pine was only noted along a very small portion of the Parkway, and this map class contains mature American beech and white oak. This combination of natural mixed forests made a unique and range-limited signature in the aerial imagery that consisted of fuzzy purple spruce-pine mixed forests; large, mature white oak that presents as a crisp tan tree crown; and American beech that presents as a sharp gold tree crown

The AA results indicate that FLBM was mapped with both a users' and producers' accuracy at 50% (90% confidence interval of -33–133%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in confidence intervals.) The AA discloses only a pair of instances where FLBM was mapped either too aggressively, to the Oak Bottomland & Floodplain Forest (FOBF) map class, or too conservatively, from the Ruderal Pine - (Hardwood) Forest (FXPN) map class.



A view of the FLBM map class showing American beech and spruce pine.

FNCO – Northern Chestnut Oak Forest

The Northern Chestnut Oak Forest (FNCO) map class represents two associations in the USNVC: the *Quercus prinus* - *Carya* spp. - *Quercus velutina* / *Vaccinium arboreum* / *Iris verna* var. *smalliana* Forest (CEGL007261) and the *Quercus prinus* - *Quercus* spp. / *Vaccinium arboreum* - (*Kalmia latifolia*, *Styrax grandifolius*) Forest (CEGL007700). This map class represents dry-mesic, acidic forests primarily dominated by chestnut oak (*Quercus prinus*). Centered in Tennessee, this map class is found in NATR from milepost 311 in western Alabama to the northern terminus. The FNCO map class is common along the Parkway covering 609.5 ha (2.8% of the Parkway).

This map class is defined by a dominance of chestnut oak over all other canopy species, though on occasion scarlet oak (*Quercus coccinea*) will codominate or even dominate. Several other oak species (*Quercus* spp.) and hickory species (*Carya* spp.) are associated with this map class, though they are generally along the ecotones. This map class occurs on hills, on ridgetops, and on dry and hot south-facing slopes. In the aerial image, the bleached-out red and tan appearance of the oaks, which results from their general water stress, helps define this map class. This map class also has a generally shorter and more open canopy structure than the more mesic oak forests.

The AA results indicate that FNCO was mapped with a 77% users' accuracy (90% confidence interval of 62–91%) and an 85% producers' accuracy. The AA discloses several instances where FNCO was mapped either too aggressively (to two other map classes) or too conservatively (from the Northern Oak - (Hickory) Forest [FNOH] map class). There was consistent confusion between the FNCO and FNOH map classes because of the inability to consistently determine relative dominance of chestnut oak and scarlet oak to other oak species. Upon discussion with Parkway staff, it was determined that the confusion was not sufficient to warrant combining the two map classes.



Two views of the FNCO map class showing the generally open chestnut oak canopy with the potentially dense shrub layer possible in CEGL007700 (left) compared to CEGL007261 providing an often very sparse shrub layer (right).

FNOH – Northern Oak - (Hickory) Forest

The Northern Oak - (Hickory) Forest (FNOH) map class represents the following nine associations in the USNVC:

- *Quercus alba* - *Quercus rubra* - *Carya alba* / *Cornus florida* Acidic Forest (CEGL002067),
- *Quercus alba* - *Quercus rubra* - *Quercus muehlenbergii* / *Cercis canadensis* Forest (CEGL002070),
- *Acer barbatum* - *Quercus shumardii* - *Quercus muehlenbergii* - (*Aesculus glabra*, *Carya myristiciformis*) Forest (CEGL004671),
- *Quercus alba* - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225),
- *Quercus falcata* - *Quercus alba* - *Carya alba* / *Oxydendrum arboreu*m / *Vaccinium stamineum* Forest (CEGL007244),
- *Quercus falcata* - *Quercus stellata* - *Carya alba* / *Vaccinium* spp. Coastal Plain Forest (CEGL007246),
- *Quercus alba* - *Carya alba* - (*Quercus velutina*) / *Desmodium nudiflorum* - (*Carex picta*) Forest (CEGL007795),
- *Quercus muehlenbergii* - *Quercus shumardii* - Carya (*carolinae-septentrionalis*, *ovata*) Forest (CEGL007808), and
- *Quercus shumardii* - *Quercus muehlenbergii* - *Acer* (*barbatum*, *saccharum*) / *Ostrya virginiana* Forest (CEGL008442).

This map class primarily represents a very diverse mix of upland forests along the length of NATR that is dominated by oak species (*Quercus* spp.) and hickory species (*Carya* spp.). Occurring across the Parkway, this map class is mapped from the southern terminus to the northern terminus and is the most common map class in the Parkway. The FNOH map class is very common along the Parkway covering 4,796.7 ha (22.2% of the Parkway).

Initially, this map class consisted of three map classes: a very common grouping of acidic-to-circumneutral oak forests, calcareous bluff oak forests, and nonbluff calcareous oak forests. However, the AA suggests general confusion among these three map classes and they were collapsed together. The calcareous forests occur very rarely within the otherwise very common acidic and circumneutral oak forests.

The presentation of this map class in the aerial imagery is exceptionally varied, but all aspects of this map class are dominated by some combination of oak and/or hickory. Generally, this map class is defined by oak-dominated forests. These oak present in the aerial imagery as crisp crowns of red, orange, and tan. Sometimes, other hardwoods codominate with the dominant oaks in more mixed versions of this map class. On rare occasion, stands of hickory, completely lacking oak, fit within this map class. This map class generally presents in the aerial imagery as young even-aged crowns having a washed-out, greenish-yellow signature with the rare oak crown mixed in.

The AA results indicate that FNOH was mapped with a 70% users' accuracy (90% confidence interval of 60–80%) and a 69% producers' accuracy (90% confidence interval of 59–79%). The AA

discloses several instances where FNOH was mapped either too aggressively (to nine other map classes) or too conservatively (from nine other map classes). There was some consistent confusion among the FNOH map class and three other map classes: Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest (FHOT), Northern Chestnut Oak Forest (FNCO), and Southern Oak - (Hardwood) Forest (FSOH). The confusion with the FHOT map class stems from the inability to consistently determine the degree of dominance of tuliptree (*Liriodendron tulipifera*), but there was not enough confusion in the mapping to warrant a merge of the map classes. The consistent confusion with FNCO originates from the inability to consistently determine relative dominance of chestnut oak (*Quercus prinus*) and scarlet oak (*Quercus coccinea*) to other oak species, but again not enough confusion to warrant merging the map classes. The consistent confusion with FSOH comes from the inability to consistently determine relative dominance of cherrybark (*Quercus pagoda*) and water oak (*Q. nigra*) to other oak species, but again not enough confusion to warrant merging the map classes. Another place of confusion, when overmapped, was between the FNOH and Ruderal Water Oak Forest (FXWO) map classes. These instances were likely from the misinterpretation of water oak as dominance within oak forests.

Originally, the nine USNVC associations of the FNOH map class were split into three map classes for mapping; however, initial AA results pointed out confusion among those three map classes and they collectively became the FNOH map class. Even with this merge, the 90% confidence interval remained below the standard for the producers' accuracy. Decisions with Parkway staff resulted in accepting a slightly lower producers' accuracy for the FNOH map class instead of merging more map classes together in order to boost accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Four examples of the FNOH map class clockwise showing the diverse mix of oak forest within this map class: a hickory-version of CEGL002067 (upper left), an older stand of CEGL007746 draped in Spanish moss (*Tillandsia usneoides*) (upper right), an open CEGL007795 with a carpet of painted sedge (*Carex picta*) (lower right), and a rich slope of CEGL007808 (lower left).

FHOT – Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest

The Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest (FHOT) map class represents the *Quercus alba* - *Carya ovata* - *Liriodendron tulipifera* - (*Quercus phellos*) / *Cornus florida* Forest Association (CEGL007709) in the USNVC. The map class represents a diverse nonsuccessional forest of white oak (*Quercus alba*), hickory species (*Carya* spp.), and tuliptree (*Liriodendron tulipifera*) in a mesic setting. This map class is found in Tennessee only from milepost 345 north to the northern terminus, with a primary concentration at Meriwether Lewis National Monument near milepost 387. The FHOT map class is uncommon along NATR covering 165.5 ha (0.8% of the Parkway).

This map class is defined by a mature mixed forest primarily codominated by white oak and tuliptree, with other mesic hardwoods mixed in. Some examples of this map class, in the most sheltered locations, approach mixed mesophytic in quality. The codominance of mature white oak and tuliptree is what distinguishes this map class from the mature oak-dominated map classes and the more successional (though occasionally mature) tuliptree-dominated Ruderal Tuliptree Forest (FXTT) map class. Generally, the oak presents in the aerial imagery as crisp, large-canopied pink, red, and tan trees while the tuliptree presents as dull pink conical trees.

The AA results indicate that FHOT was mapped well with both a users' and producers accuracy at 87%. The AA discloses only a few instances where FHOT was mapped either too aggressively (to the Northern Oak - (Hickory) Forest [FNOH] map class) or too conservatively (from two other map classes). There was some consistent confusion between the FHOT and FNOH map classes because of the inability to reliably determine the degree of dominance of tuliptree, but not enough confusion in the mapping to warrant merging the map classes.



Two views of the FHOT map class showing a younger, open canopy version (left) and an older, closed canopy version (right).

FSOH – Southern Oak - (Hardwood) Forest

The Southern Oak - (Hardwood) Forest (FSOH) map class represents two associations in the USNVC: the *Quercus pagoda - Quercus nigra* Forest (CEGL004109) and the *Liquidambar styraciflua - Carya illinoinensis - Quercus nigra* Loess Bluff Forest (CEGL004122). This map class primarily represents mature cherrybark oak (*Quercus pagoda*) and water oak (*Quercus nigra*) forests located on deep loess soils along the southern portion of NATR. This map class is found from the southern terminus northward to milepost 106, the northern-most location along the Parkway where cherrybark oak was found to codominate an upland setting. The FSOH map class is very common along the Parkway covering 1,180.5 ha (5.5% of the Parkway).

This map class is defined by the dominance or codominance of cherrybark oak and water oak, with other species such as sweetgum (*Liquidambar styraciflua*) or pecan (*Carya illinoinensis*) and a ubiquitous smattering of loblolly pine (*Pinus taeda*) in a relatively undisturbed setting. Generally composed of a mixed age or mature forest, some younger examples of cherrybark oak regeneration was found along the Parkway. Limited to the loess soils found in the southern part of the Parkway, this map class can be found on both the flat, deep loess plains and in the more rolling loess hills. This map class presents in the aerial imagery as crisp, large, red crowned trees for the cherrybark and water oak trees.

The AA results indicate that FSOH was mapped with a 91% users' accuracy and a 63% producers' accuracy (90% confidence interval of 52–74%). The AA discloses several instances where FSOH was mapped either too aggressively (to three other map classes) or too conservatively (from six other map classes). There was consistent confusion among the FSOH map class and two other map classes: Southern Beech - Magnolia Forest (FBMS) and Northern Oak - (Hickory) Forest (FNOH). In the first instance, the consistent confusion with FBMS is related to an inability to consistently determine relative dominance of cherrybark and water oak to hardwood tree species, but not enough confusion to warrant merging the map classes. In the second instance, the consistent confusion with FSOH is related to an inability to consistently determine relative dominance of cherrybark and water oak to other oak species, but again not enough confusion to warrant merging the map classes.

Originally, CEGL004109 and CEGL004122 were each assigned to a unique map class; however, initial AA results pointed out confusion between the map classes and they collectively became the FSOH map class. Even with this merge, the 90% confidence interval fell slightly below the producers' accuracy. Discussions with Parkway staff resulted in accepting a slightly lower producers' accuracy for the FSOH map class instead of merging more map classes together in order to boost accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Two views of the FSOH map class showing mature oak mixed with a variety of other hardwood species. Both examples are of the CEGL004109 association.

FBNC – North & Central Beech Forest

The North & Central Beech Forest (FBNC) map class represents the following three associations in the USNVC:

- *Fagus grandifolia* - *Acer saccharum* - *Liriodendron tulipifera* Unglaciated Forest (CEGL002411),
- *Fagus grandifolia* - *Liriodendron tulipifera* / *Euonymus americanus* / *Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201), and
- *Fagus grandifolia* - *Quercus alba* / *Cornus florida* Forest (CEGL007881).

Mapped north of Jackson, Mississippi, the southward progression this map class is stopped by the presence of southern magnolia (*Magnolia grandiflora*). Exceptionally rare between Jackson and the Alabama-Tennessee border (near milepost 342), FBNC is generally common from milepost 342to the northern terminus of NATR. The FBNC map class is common along the Parkway covering 455.6 ha (2.1% of the Parkway).

This map class is defined by a mixed hardwood forest with a dominant component of either American beech (*Fagus grandifolia*) or sugar maple (*Acer saccharum*), or a codominance of the two. Generally, American beech is very apparent in the aerial imagery presenting a crisp tan, rose, or gold signature, whereas sugar maple will be a light-pink to white signature or if later in the season, will have lost its leaves.

The AA results indicate that FBNC was mapped well with a 93% users' accuracy and an 82% producers' accuracy. The AA discloses some instances where FBNC was mapped either too aggressively (to two other map classes) or too conservatively (from three other map classes). When undermapped, the AA results suggest that most of the confusion was between the FBNC and the Northern Oak - (Hickory) Forest (FNOH) map classes. This confusion likely resulted from the misinterpretation of the ratio of oak-to-beech cover. There was no instance of consistent confusion in mapping between any map class and FBNC.



Two views of the varying face of the FBNC map class showing a mesic upland (left) versus a wet beech floodplain (right), both dominated by beech.

FBMS – Southern Beech - Magnolia Forest

The Southern Beech - Magnolia Forest (FBMS) map class represents the following three associations in the USNVC:

- *Fagus grandifolia* - *Magnolia grandiflora* - *Quercus pagoda* - *Acer barbatum* - *Pinus taeda* Forest (CEGL004963),
- *Fagus grandifolia* - *Quercus alba* - *Liquidambar styraciflua* / Magnolia grandiflora / *Smilax pumila* Forest (CEGL007210), and
- *Fagus grandifolia* - *Magnolia grandiflora* - *Fraxinus americana* / *Acer barbatum* - *Ostrya virginiana* Forest (CEGL007458).

Occurring from the southern terminus north to milepost 87, the northern range of this map class is defined by the northern limit of southern magnolia (*Magnolia grandiflora*). The FBMS map class is uncommon along the Parkway covering 63.3 ha (0.3% of the Parkway).

This map class is defined by a mixed hardwood forest dominated by American beech (*Fagus grandifolia*) with a mix of other hardwoods, and almost always, a southern magnolia component is present. American beech is generally apparent in the aerial imagery presenting a crisp tan, rose, or gold signature, whereas the southern magnolia, being evergreen, does present as a bright-red tree but generally is subcanopy and hidden. Occasionally, leaf-off imagery was available for portions of the Parkway, though complete coverage was not available. Leaf-off imagery would aid in the viewing of magnolia evergreen trees that exist below the forest canopy.

The AA results indicate that FBMS was mapped well with an 80% users' accuracy and a 92% producers' accuracy. The AA discloses some instances where FBMS was mapped either too aggressively (to three other map classes) or too conservatively (from one other map class). When overmapped, the AA results suggest that most of the confusion was between the FBMS and the Southern Oak - (Hardwood) Forest (FSOH) map classes. This confusion likely resulted from the misinterpretation of the ratio of oak-to-hardwood tree cover. There was no instance of consistent confusion in mapping between any map class and FBMS.



Two views of the varying face of the FBMS map class showing a mesic upland (left) versus a wet forested draw (right), both dominated by American beech with southern magnolia.

FXRC – Ruderal Eastern Red-cedar Forest

The Ruderal Eastern Red-cedar Forest (FXRC) map class represents the *Juniperus virginiana* var. *virginiana* - (*Quercus* spp.) Ruderal Forest Association (CEGL007124) in the USNVC. This map class represents a wide variety of forests along NATR that contain a significant amount of eastern redcedar (*Juniperus virginiana* var. *virginiana*) of varying age-classes. This map class is wide-ranging and is found from just south of milepost 75 north to the Parkway terminus in Tennessee; however, FXRC is not mapped in the Black Belt ecological subsection (Cleland et al. 2007), milepost 247–264, to prevent overlap with WBBC. The FXRC map class is uncommon along the Parkway covering 87.4 ha (0.4% of the Parkway).

This map class is defined by open to closed forests where the canopy is at least 50% eastern redcedar, though some examples may have canopies closer to 40% redcedar. This map class includes forests that are young with an open canopy and others that are very old with a completely closed canopy. The majority of these forests are the result of significant and prolonged disturbance, often from grazing, that suppressed the regeneration of deciduous trees long enough for the redcedar to become established. The redcedar in this map class consistently presents in the aerial imagery as conical dark-red to purple short-statured conifer trees.

The AA results indicate that FXRC was mapped well with an 87% users' accuracy and a 100% producers' accuracy. The AA discloses only a few instances where FXRC was mapped too aggressively (to two other map classes), with most of the confusion in mapping between the FXRC and Ruderal Mixed Hardwood Forest (FXMH) map classes. These instances are likely from the misinterpretation of the ratio of hardwood-to-eastern redcedar tree cover.



Two views of the FXRC map class showing a younger, open canopy version (left) and an older, closed canopy version (right).

FXWP – Ruderal Eastern White Pine Forest

The Ruderal Eastern White Pine Forest (FXWP) map class represents one very limited occurrence of the *Pinus strobus* Ruderal Forest Association (CEGL007944) in the USNVC. This patch is a remnant eastern white pine (*Pinus strobus*) plantation that is no longer managed and is succeeding out of white pine. This map class is only found in NATR between mileposts 413 and 414. The FXWP map class is exceptionally rare along the Parkway covering only 2.0 ha (0.009% of the Parkway).

This map class is defined by white pine planted in rows, but no longer managed, and succeeding into other forest types. Only three occurrences of this map class exist along the Parkway and in the same vicinity of each other; they are likely remnants of the same plantation. This site is well outside the natural range of white pine, but the site was still clearly discernable in the aerial imagery with the mature white pine presenting as a classic soft or fuzzy purple star-like appearance. Additionally, the planted rows were still clearly visible.

The AA results indicate that FXWP was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the FXWP map class, and no instances of FXWP were confused in mapping as a different map class.



A view of the FXWP map class succeeding away from the actively-managed remnant white pine plantation into a more natural vegetation type.

FXPN – Ruderal Pine - (Hardwood) Forest

The Ruderal Pine - (Hardwood) Forest (FXPN) map class represents the following eight associations in the USNVC:

- *Pinus virginiana* Ruderal Forest (CEGL002591),
- *Pinus taeda* / *Liquidambar styraciflua* - *Acer rubrum* var. *rubrum* / *Vaccinium stamineum* Ruderal Forest (CEGL006011),
- *Pinus echinata* Ruderal Forest (CEGL006327),
- *Pinus taeda* - *Liriodendron tulipifera* / *Lindera benzoin* / *Carex crinita* Floodplain Forest (CEGL007546),
- *Pinus taeda* - *Quercus* (*phellos*, *nigra*, *laurifolia*) Floodplain Forest (CEGL007551),
- *Pinus taeda* - *Nyssa biflora* - *Liquidambar styraciflua* / *Lyonia lucida* Ruderal Wet Forest (CEGL007560),
- *Pinus taeda* - *Quercus falcata* - *Liquidambar styraciflua* / *Rhus copallinum* Ruderal Forest (CEGL008450), and
- *Pinus taeda* - *Liquidambar styraciflua* Ruderal Forest (CEGL008462).

This map class primarily represents upland successional forests codominated or dominated by loblolly pine (*Pinus taeda*), though exceptions exist and are explained below. Occurring commonly across NATR, this map class is mapped from the southern to the northern terminus and is the second most common map class in the Parkway. The FXPN map class is very common along the Parkway covering 3,711.4 ha (17.1% of the Parkway).

Initially, this map class was defined by upland successional forests dominated by loblolly pine. However, during the course of fieldwork, it was determined that all successional forests codominated or dominated by loblolly pine were indistinguishable and that the small patches of successional Virginia and short-leaf pine (*Pinus virginiana*, *P. echinata*) were indistinguishable from successional loblolly pine. This brought five of the associations together into a successional pine upland map class that was initially mapped against CEGL007546, CEGL007551, and CEGL007560. These three associations were viewed as rare, natural, mature, wet, mixed pine-hardwood forests that, as a group, should be distinguishable from the successional uplands forest. The mapping between upland and wetland pine types was found to be incorrect during the AA, resulting in one map class that covers the majority of upland and wetland forests codominated or dominated by loblolly pine.

The presentation of this map class in the aerial imagery is exceptionally varied. The map class ranges from dog-hair stands of young loblolly pine, to abandoned loblolly plantations with failing pine and invading oak species (*Quercus* spp.) and sweetgum (*Liquidambar styraciflua*), and to mature stands of loblolly and oak in the floodplain. The unifying theme for this variety, with rare exception, is codominance or dominance of loblolly pine. Loblolly pine presents in the aerial imagery as a classic "yellow pine" signature of dark-red to purple pine with a diffuse branching pattern, especially when mature. The signatures of Virginia and short-leaf pine, also "yellow pine", are very similar and, per our field experience, mixed stands of short-leaf and loblolly pine show no consistent difference in signature between tree species.

The AA results indicate that FXPN was mapped well with a 95% users' accuracy and an 87% producers' accuracy. The AA discloses only a few instances where FXPN was mapped either too aggressively (to three other map classes) or too conservatively (from four other map classes). These instances are likely from either the misinterpretation of the ratio of pine-to-hardwood tree cover, the ratio of pine-to-eastern redcedar (*Juniperus virginiana* var. *virginiana*) tree cover, or the incorrect determination of the ruderal versus nonruderal status of the forest. There was no instance of consistent confusion in mapping between any map class and FXPN.

Originally, the ruderal pine upland forests and the ruderal pine wetland forests were each a separate map class for mapping; however, initial AA results pointed out consistent and significant confusion between those two map classes and they collectively became the FXPN map class. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Four examples of the FXPN map showing the younger, loblolly dominated canopy of CEGL006011 following a controlled fire (upper left), the older mixed oak-loblolly canopy of CEGL008450 (upper right), the disturbed wet loblolly-hardwood canopy of CEGL007546 (lower left), and the mature, mixed age, formerly wet (entrenched floodplain) canopy of CEGL007551 (lower right).

FXHC – Ruderal Hardwood Forest Complex

The Ruderal Hardwood Forest Complex (FXHC) map class represents the following five associations in the USNVC:

- *Paulownia tomentosa* Ruderal Woodland (CEGL003687),
- *Melia azedarach* Ruderal Forest [Park Special] (CEPS004837),
- *Triadica sebifera* Ruderal Forest (CEGL007037),
- *Ailanthus altissima* Ruderal Forest (CEGL007191),
- *Robinia pseudoacacia* Ruderal Forest (CEGL007279).

This map class represents upland successional monocultures of nonnative (excluding native black locust [*Robinia pseudoacacia*]) woodlands and forests. Occurring in small patches in NATR from milepost 37 to the northern terminus, there are also less than MMU areas of this map class sprinkled throughout the Parkway. The FXHC map class is very rare along the Parkway covering only 8.6 ha (0.04% of the Parkway).

This map class is defined by monocultures of fast-growing weedy trees. These species have a tendency to form clones that are easily identified in imagery based upon their shape, which generally appears as a hill-shaped clump of trees. All of these species are found throughout the Parkway but were only mapped when monotypic stands formed. The presentation of this map class in the aerial imagery is varied based upon species with tree of heaven (*Ailanthus altissima*) and black locust that have light-pink to white fuzzy signatures because of their pinnately compound leaves, and the leaves of Chinese tallow (*Triadica sebifera*) that are crisp and bright orange to bright red because of the waxy coat on the leaves.

The AA results indicate that FXHC was mapped with a 60% users' accuracy (90% confidence interval of 14–106%) and a 75% producers' accuracy (90% confidence interval of 27–123%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in confidence intervals.) The AA discloses only a few instances where FXHC was mapped either too aggressively (to two other map classes) or too conservatively (from the Ruderal Mixed Hardwood Forest [FXMH] map class). The AA pointed out there was some consistent confusion between the FXHC and FXMH map classes. This confusion is likely from the misinterpretation of the relative dominance of ruderal tree species because FXMH can contain the same tree species as FXHC, just not as nearly-pure stands.



Two examples of the FXHC map class showing a tree of heaven forest (CEGL007191) on the left and a Chinese tallow forest (CEGL007037) on the right.

FXMH – Ruderal Mixed Hardwood Forest

The Ruderal Mixed Hardwood Forest (FXMH) map class represents the following three associations in the USNVC:

- *Gleditsia triacanthos* - *Ulmus* (*alata*, *rubra*) Ruderal Woodland (CEGL003686),
- *Celtis* (*laevigata*, *occidentalis*) - *Ulmus* spp. - (*Aesculus glabra*) Ruderal Forest (CEGL004697), and
- Ruderal Mixed Deciduous Forest [Park Special] (CEPS004809).

Occurring from the southern terminus to the northern terminus, this map class exists throughout NATR. This map class is associated with human-modified landscapes that have begun to regenerate to forested vegetation but have yet to overcome the past disturbances. The FXMH map class is common along the Parkway covering 736.6 ha (3.4% of the Parkway).

This map class is defined by a mix of generally early successional hardwood trees, especially sugarberry (*Celtis laevigata*) and elm species (*Ulmus* spp.). Sweetgum (*Liquidambar styraciflua*) was often present in the southern portion of the Parkway but never more than codominant. Generally, this map class presents in the aerial imagery as a washed-out and fuzzy-appearing canopy of light- pink, purple, yellow, orange, and grey and as of white trees. The tree canopy is as often broken up and open, generally with young or even-aged trees. This map class was often found as a woodland in successional fields and was also very common along field edges.

The AA results indicate that FXMH was mapped with a 67% users' accuracy (90% confidence interval of 51–82%) and a 63% producers' accuracy (90% confidence interval of 47–78%). The AA discloses several instances where FXMH was mapped either too aggressively (to six other map classes) or too conservatively (from nine other map classes). There was some consistent confusion among the FXMH map class and three other map classes: Ruderal Hardwood Forest Complex (FXHC) classes, Ruderal Tuliptree Forest (FXTT), and Ruderal Sweetgum - (Oak) Forest (FXSO). In the first two instances, the confusion is likely from misinterpretation of the relative dominance of tree species with confusion between whether a single ruderal tree species is dominant or the forest is a mix of ruderal tree species. The third instance likely results from misinterpretation of the relative dominance of sweetgum to other hardwood tree species; while both FXMH and FXSO have sweetgum, sweetgum cannot dominate in FXMH but should dominate in FXSO.

Occasional confusion among the FXMH map class, an upland forest, and three wetland forest map classes show the difficulty of interpreting the hydrology of the Parkway from the aerial imagery. Further confusion with other hardwood forests, which include sweetgum forests (when sweetgum was the dominant tree), American beech (*Fagus grandifolia*) forests, and oak forests, likely resulted from the misinterpretation in the amount of successional and nonsuccessional tree species in the forests.

For the FXMH map class, the 90% confidence interval slightly exceeded the accuracy standard for the users' accuracy and slightly fell below for the producers' accuracy. Discussions with Parkway staff resulted in accepting a slightly lower producers' accuracy for the FXMH map class instead of

merging FXMH with other ruderal forest or nonruderal forest map classes in order to boost accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Two views of the FXMH map class showing the generally younger, disturbed, and invaded aspects of this map class. The image on the left shows the CEPS004809 association while the image on the right shows the CEGL004697 association.

FXSO – Ruderal Sweetgum - (Oak) Forest

The Ruderal Sweetgum - (Oak) Forest (FXSO) map class represents two associations in the USNVC: the *Liquidambar styraciflua* Ruderal Forest (CEGL007216) and the *Liquidambar styraciflua* - *Quercus* (*alba*, *falcata*) Ruderal Forest (CEGL007217). The map class represents upland successional forests codominated or dominated by sweetgum (*Liquidambar styraciflua*). This map class is found in NATR from the southern terminus northward to milepost 386, the northern-most location along the Parkway where sweetgum was found to codominate in an upland setting. The FXSO map class is common along the Parkway covering 995.9 ha (4.6% of the Parkway).

This map class is defined by upland forests dominated by sweetgum or the codominance of sweetgum and oak species (*Quercus* spp.). Successional in nature, the majority of the stands in this map class were young or even-aged, though some mature examples were found. Sweetgum generally presents in the aerial imagery as an interesting light- to dark-yellow or gold canopy that can be either fuzzy or crisp. This signature was often mixed with the bright-red of young oaks and a variety of other hardwoods and evergreens. The largest issue in mapping this map class was reliably determining the boundary between the upland FXSO map class and the wetland Ruderal Mixed Floodplain Forest (FXMF) map class, which can be a sweetgum codominated or dominated wetland forest. Landscape cues, such as streams, floodplains, and lower terrain, were generally used to make this determination, but these cues turned out to be less than 100% reliable.

The AA results indicate that FXSO was mapped with a 63% users' accuracy (90% confidence interval of 52–74%) and an 88% producers' accuracy. The AA discloses several instances where FXSO was mapped either too aggressively (to seven other map classes) or too conservatively (from four other map classes). There was some consistent confusion in mapping between FXSO and Ruderal Mixed Hardwood Forest (FXMH) map classes. This confusion likely results from misinterpretation of the relative dominance of sweetgum to other hardwood tree species (while both FXSO and FXMH have sweetgum, sweetgum cannot dominate in FXMH and should dominate in FXSO). When overmapped, two consistent themes emerge from the AA results. The first theme pointed out confusion in mapping among the FXSO map class and four oak forest map classes, with most of the confusion to the Southern Oak - (Hardwood) Forest (FSOH) map class. The confusion with FSOH likely resulted from the similar mix of tree species in each map class and the potential for misinterpreting whether a forest was ruderal or not. The second theme pointed out confusion in mapping among the FXSO map class and three wetland forest map classes, with most of the confusion to the FXMH map class. The consistent confusion with FXMH resulted from consistently interpreting a ruderal sweetgum forest as a wetland or floodplain forest rather than an upland forest.

Originally, CEGL007216 and CEGL007217 were each represented by their own map class; however, initial AA results pointed out consistent and significant confusion between the two map classes and they collectively became the FXSO map class. Even with this merge, the 90% confidence interval fell slightly below for the users' accuracy standards. Discussions with Parkway staff resulted in accepting a slightly lower producers' accuracy for the FXSO map class instead of merging FXSO with other oak upland forest map classes or the hardwood wetland forest map class in order to boost

accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Two examples of the FXSO map class showing the young, sweetgum version (CEGL007216) on the left and the more mature and mixed version (CEGL007217) on the right.

FXTT – Ruderal Tuliptree Forest

The Ruderal Tuliptree Forest (FXTT) map class represents two associations in the USNVC: the *Liriodendron tulipifera* / (*Cercis canadensis*) / (*Lindera benzoin*) Ruderal Forest (CEGL007220) and the *Liriodendron tulipifera* - *Quercus* spp. Ruderal Forest (CEGL007221). This map class is found sparsely along NATR from milepost 275 to milepost 398 and then consistently from milepost 398 to the north terminus with an isolated patch just north of milepost 61. The FXTT map class is uncommon along the Parkway covering 103.0 ha (0.5% of the Parkway).

This map class is defined by early- to late-successional forests codominated or dominated by tuliptree (*Liriodendron tulipifera*). This ranges from young, near-monotypic stands of tuliptree to very diverse, near-mesophytic forests where the codominance of tuliptree is shared with many other species, and the successional nature of the site pulls it away from other map classes. The aerial imagery signature of tuliptree was difficult to concisely identify; but, in general, tuliptree presents as a pink (sometimes white, orange, or red) conical tree (except in very large individuals where the tree crown has become broken).

The AA results indicate that FXTT was mapped well with an 80% users' accuracy and an 86% producers' accuracy. The AA discloses some instances where FXTT was mapped either too aggressively (to four other map classes) or too conservatively (from three other map classes). There was some consistent confusion between the FXTT and Ruderal Mixed Hardwood Forest (FXMH) map classes. This confusion was likely from the misinterpretation of ruderal forests consisting of mixed tree species with no clear dominant for FXMH and a mix species of trees with tuliptree dominant for FXTT. Other confusion, when overmapped, were to three other ruderal-type map classes and were likely from the misinterpretation of successional tree species dominance in the forest stands. When undermapped, there was confusion from two other nonruderal map classes, including beech (*Fagus*) forests and oak (*Quercus*) forests, and were likely from the misinterpretation of nonsuccessional tree species for successional ones.



Two views of the FXTT map class showing a young, monotypic stand along the edge of the Parkway (left) compared to a rich, near mesophytic riparian corridor with codominant tuliptree (right).

FXWO – Ruderal Water Oak Forest

The Ruderal Water Oak Forest (FXWO) map class represents the *Quercus nigra* Ruderal Forest Association (CEGL004638) in the USNVC. This map class represents successional upland forests dominated by water oak (*Quercus nigra*). This map class is found along NATR from the southern terminus north to milepost 311 in western Alabama. The FXWO map class is common along the Parkway covering 388.7 ha (1.8% of the Parkway).

This map class is defined by a dominance of water oak in an upland setting with signs of significant disturbance both recent and past. Often water oak is the sole dominant in the canopy, but occasionally other oaks, especially cherrybark oak (*Q. pagoda*) and willow oak (*Q. phellos*), are present at low cover. This map class occurs on uplands and along the upland-wetland interface and generally has smaller-crowned oaks. However, water oak grows very quickly (as compared to other oak species) and many of the older patches of FXWO had a similar crown morphology to the very common, co-occurring, ecologically similar Southern Oak - (Hardwood) Forest (FSOH) map class. In general, FXWO presents in the aerial imagery as a darker red signature than that of the cherrybark oak that dominates FSOH. Additionally, FXWO commonly had significant nonoak hardwoods mixed in the canopy, and FSOH was generally oak dominated.

The AA results indicate that FXWO was mapped with a 72% users' accuracy (90% confidence interval of 57–88%) and an 84% producers' accuracy. The AA discloses instances where FXWO was mapped either too aggressively (to two other map classes) or too conservatively (from the Northern Oak - (Hickory) Forest [FNOH] map class). For the overmapping, the confusion of FSOH for FXWO was by far the more significant of the two. This confusion likely resulted from the misinterpretation of a nonruderal landscape as ruderal. For the undermapping, the confusion with FNOH likely resulted from the misinterpretation of both oak species and the misinterpretation of a ruderal landscape as nonruderal.



Two views of the FXWO map class showing an open canopy version with significant understory and midstory development (left) versus a closed canopy version with much reduced understory and midstory development (right).

FFRO – Southern Red Oak Flatwoods Forest

The Southern Red Oak Flatwoods Forest (FFRO) map class represents the *Quercus falcata* Wet Flatwoods Forest Association (CEGL004412) in the USNVC. The map class represents southern red oak (*Quercus falcata*) dominated forests with very flat topography subject to periodic inundation by shallow, stationary water. This map class is found in NATR from milepost 214 north to milepost 386. The FFRO map class is rare along the Parkway covering 28.6 ha (0.1% of the Parkway).

This map class is defined by southern red oak dominated forests on exceptionally flat terrain that can be flooded, but where the water is not flowing. Generally, this map class presents in the aerial imagery as a mature oak forest with crisp red tree crowns that form a single plane of closed tree canopy along very flat portions of the Parkway.

The AA results indicate that FFRO was mapped with a 76% users' accuracy (90% confidence interval of 57–96%) and an 87% producers' accuracy. The AA discloses a few instances where FFRO was mapped either too aggressively (to two other map classes) or too conservatively (from two other map classes). These instances likely resulted from the misinterpretation of the relative dominance of southern red oak to other oaks, along with the interpretive challenge of mapping upland and wetland oak forests in the Parkway. There was some slight consistent confusion between the FFRO and Northern Oak - (Hickory) Forest (FNOH) map classes, but it was too low to warrant merging the map classes.



Two views of the FFRO map class showing the generally flat topography with slightly deeper pockets where water settles. The example on the left shows a forest that has not seen flooding since last fall (note the lack of areas of black leaves on the ground) compared to the forest on the right with extensive evidence of standing water (indicated by the black leaves on the ground).

FOBF – Oak Bottomland & Floodplain Forest

The Oak Bottomland & Floodplain Forest (FOBF) map class represents the following seven associations in the USNVC:

- *Quercus michauxii* - *Quercus shumardii* - *Liquidambar styraciflua* / *Arundinaria gigantea* Swamp Forest (CEGL002099),
- *Quercus phellos* - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Pond Forest (CEGL002102),
- *Quercus lyrata* - *Liquidambar styraciflua* / *Forestiera acuminata* Floodplain Forest (CEGL002424),
- *Quercus phellos* - *Quercus nigra* - *Quercus alb*a / *Chasmanthium* (*laxum*, *sessiliflorum*) Floodplain Forest (CEGL004771),
- *Quercus laurifolia* / *Carpinus caroliniana* / *Justicia ovata* Riparian Forest (CEGL007348),
- *Liquidambar styraciflua* - *Quercus pagoda* - *Carya* spp. / *Carpinus caroliniana* / *Carex* spp. Floodplain Forest (CEGL007353), and
- *Quercus pagoda* - *Quercus nigra* / *Halesia diptera* / *Chasmanthium sessiliflorum* - *Dicliptera brachiata* Floodplain Forest (CEGL007354).

This map class represents floodplain and bottomland forests codominated or dominated by oak species (*Quercus* spp.). Occurring in a majority of floodplains and bottomlands in Mississippi and Alabama, this map class stretches along NATR from the southern terminus northward to milepost 342, just into Tennessee. The FOBF map class is common along the Parkway covering 647.1 ha (3.0% of the Parkway).

This map class is defined by a mixture of oaks and occasional hardwoods adapted to periodic or sustained inundation. The FOBF map class is often associated with riparian corridors and backwaters in broad floodplains; however, the map class will also occur in hydrologically isolated catchments. Defined by the dominance of oaks in a wet setting, the signature of the oak in the aerial imagery varied from tan to orange to pink to red, but the oak signature was generally crisp. Often, oaks presented as several different canopy colors in the forest mixed with various hardwood tree species. Generally, this map class was in a low topographic position and on flat ground.

The AA results indicate that FOBF was mapped with a 90% users' accuracy and a 71% producers' accuracy (90% confidence interval of 58–84%). The AA discloses several instances where FOBF was mapped either too aggressively (to three other map classes) or too conservatively (from seven other map classes). There was no instance of consistent confusion in mapping between any map class and FOBF. When undermapped, the AA results suggest that most of the confusion in mapping was between the FSOH and Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest (FSCF) map classes. This confusion likely resulted from the misinterpretation in relative density of oaks to other hardwood trees, mainly American sycamore (*Platanus occidentalis*) and sweetgum (*Liquidambar styraciflua*).



Four different examples of the vegetation associations that compose the FOBF map class from upper left clockwise: CEGL002102, CEGL002424, CEGL004771, and CEGL007348. Each shows the primarily closed canopy over flat, often inundated soils with the characteristic root buttressing clearly visible in many images.

FCBF – East Gulf Coastal Plain Beech Floodplain Forest

The East Gulf Coastal Plain Beech Floodplain Forest (FCBF) map class represents the *Fagus grandifolia* - *Carya* spp. / (*Acer negundo*, *Magnolia macrophylla*, *Tilia americana* var. *heterophylla*) Temporarily Flooded Forest Association (CEGL004745) in the USNVC. The map class represents a diverse floodplain forest. This map class is found in NATR at only two locations near mileposts 64 and 164. The FCBF map class is very rare along the Parkway covering 6.7 ha (0.03% of the Parkway).

This map class is defined by the codominance or dominance of American beech (*Fagus grandifolia*) along with a mix of other hardwoods, though mostly excluding oaks and hardwood tree species more adapted to regular flooding. Generally, this map class occupies a higher topographic position in the floodplain along the upper terrace of streams that only receive occasional flooding. The presence of mature American beech in the floodplain is what distinguishes this map class from all other floodplain map classes with the crisp tan, rose, or gold signature of the beech in the aerial imagery being relatively unique for floodplain tree species.

The AA results indicate that FCBF was mapped with a 60% users' accuracy (90% confidence interval of 14–106%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' accuracy confidence interval.) The AA discloses only a pair of instances where FCBF was mapped too aggressively (to two other map classes). These instances were likely from the misinterpretation of the relative dominance of American beech to other hardwood trees in floodplain forests.



A view of the FCBF map class showing occasional flooding in the upper terrace landscape along with American beech and a mix of hardwoods.

FBLF – River Birch Levee Forest

The River Birch Levee Forest (FBLF) map class represents the *Betula nigra* - *Platanus occidentalis* / *Alnus serrulata* / *Boehmeria cylindrica* Floodplain Forest Association (CEGL007312) in the USNVC. The map class represents wet forest dominated by river birch (*Betula nigra*). This map class is found in NATR from milepost 268 north to milepost 384. The FBLF map class is rare along the Parkway covering 25.6 ha (0.1% of the Parkway).

This map class is defined by the dominance of river birch with the occasional presence of other active floodplain hardwood species. Often this map class is an even-aged near-monocultures of river birch. Generally, this map class occupies the most active portion of the floodplain, but older stands of this map class may become disconnected from the active floodplain because of floodplain migration. The river birch in this map class consistently presents in the aerial imagery as dull purple-gray that is more obvious in the monotypic stands.

The AA results indicate that FBLF was mapped well with a 100% users' accuracy and a 94% producers' accuracy. The AA discloses only one instance where FBLF was mapped too conservatively, to the Mixed Hardwood Floodplain Forest (FMHF) map class. This instance was likely from the misinterpretation of the relative dominance between river birch and other hardwood trees.



A view of the FBLF map class showing a floodplain dominated by river birch.

FMHF – Mixed Hardwood Floodplain Forest

The Mixed Hardwood Floodplain Forest (FMHF) map class represents the following five associations in the USNVC:

- *Fraxinus pennsylvanica* - *Ulmus americana* - *Celtis laevigata* / *Ilex decidua* Floodplain Forest (CEGL002427),
- *Acer saccharinum* - *Celtis laevigata* - *Carya illinoinensis* Floodplain Forest (CEGL002431),
- *Quercus texana* - *Celtis laevigata* - *Ulmus* (*americana*, *crassifolia*) - (*Gleditsia triacanthos*) Floodplain Forest (CEGL004619),
- *Acer negundo* - (*Platanus occidentalis*, *Populus deltoides*) Floodplain Forest (CEGL004690), and
- *Acer negundo* Ruderal Floodplain Forest (CEGL005033).

This map class primarily represents nonsuccessional mixed-species floodplain forests dominated by some mix of ash species (*Fraxinus* spp.), elm species (*Ulmus* spp.), sugarberry (*Celtis laevigata*), and boxelder (*Acer negundo*). Occurring in most floodplains across NATR, this map class is mapped from the southern terminus to milepost 426, near the northern terminus. The FMHF map class is common along the Parkway covering 224.8 ha (1.0% of the Parkway).

Initially, this map class was mapped as three map classes based upon expected differences in location within the floodplain and along the Parkway and upon the dominance of different tree species. However, AA determined that too much overlap existed among the three map classes, and they were combined into a single nonsuccessional mixed-species map class. This map class is defined by a generally mixed-species hardwood canopy of nonsuccessional species. This is distinct from the successional floodplain forest in FXMF, dominated by sweetgum (*Liquidambar styraciflua*), tuliptree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), and ash. This map class is also distinct from FXMF by the several more monotypic nonsuccessional floodplain forests map classes dominated by river birch (*Betula nigra*), American beech (*Fagus grandifolia*), oak species (*Quercus* spp.), or American sycamore (*Platanus occidentalis*).

The presentation of this map class in the aerial imagery is exceptionally varied, ranging from dog-hair stands of young boxelder to large, old, mixed-species stands of ash, elm and sugarberry trees. The unifying theme for this variety, with rare exception, is the mixed hardwoods in the floodplain. Generally presenting in the aerial imagery as a mix of fuzzy pink, purple, and white crowned trees, this map class was also one of the first too lose its leaves in the fall, so many examples towards the northern end of the Parkway are completely leafless.

The AA results indicate that FMHF was mapped with an 80% users' accuracy and a 72% producers' accuracy (90% confidence interval of 61%–83%). The AA discloses several instances where FMHF was mapped either too aggressively (to five other map classes) or too conservatively (from seven other map classes). There was some consistent confusion between the FMHF and Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest (FCSF) map classes because of the inability to consistently determine relative dominance of American sycamore and sweetgum to other hardwood trees, but not enough confusion to warrant merging the map classes. When overmapped, the AA results suggest

most of the confusion in mapping was between the FMHF and Ruderal Mixed Floodplain Forest (FXMF) map classes, likely from a misinterpretation of ruderal for nonruderal wetland forests. When undermapped, the AA results suggest that most of the confusion in mapping was between the FMHF and Sycamore - Silver Maple Calcareous Floodplain Forest (FSSF) map classes, likely from a misinterpretation of dominance of American sycamore and, less common, silver maple (*Acer saccharinum*) to other hardwood trees in wetland forests.

Originally, the five USNVC associations of the FMHF map class were split into three map classes for mapping; however, initial AA results pointed out consistent and significant confusion among those three map classes. Following discussions with Parkway staff, the three map classes collectively became the FMHF map class. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Four examples of the FMHF map class clockwise showing younger and mature mixed-species hardwood floodplain forests classified as the following associations: CEGL002427 (upper left), CEGL002431 (upper right), CEGL004619 (lower left), and CEGL005033 (lower right).

FCSF – Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest

The Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest (FCSF) map class represents the *Platanus occidentalis* - *Liquidambar styraciflua* - (*Ulmus americana*) / (*Crataegus viridis*) Floodplain Forest Association (CEGL007335) in the USNVC. The map class represents floodplain forest dominated by American sycamore (*Platanus occidentalis*) and sweetgum (*Liquidambar styraciflua*) south of Tupelo, Mississippi, and is found in NATR from the southern terminus north to milepost 247. The FCSF map class is rare along the Parkway covering 53.9 ha (0.2% of the Parkway).

This map class is defined by the dominance of American sycamore and sweetgum in the floodplain. Instances of successional upland American sycamore were found along the Parkway and these known areas were not mapped as FSSF because they were outside the floodplain. Generally, this map class presents in the aerial imagery as a floodplain forest with large, diffuse crowned trees with an orangish-yellow to greenish-yellow color.

In order to distinguish the FCSF map class from the very similar FSSF map class, the southern range of silver maple along the Parkway was determined to be around Tupelo, Mississippi, and was used as the northern extent for FCSF. Although instances of floodplain forests dominated by American sycamore and lacking silver maple are common north of Tupelo, Mississippi, they are well within the range of silver maple and likely include other species not expected south of Tupelo, Mississippi.

The AA results indicate that FCSF was mapped with a 63% users' accuracy (90% confidence interval of 47–79%) and a 90% producers' accuracy. The AA discloses several instances where FCSF was mapped either too aggressively (to four other map classes) or too conservatively (from two other map classes). These instances are likely from the misinterpretation of dominance of American sycamore to other hardwood trees in wetland forests, including oak species (*Quercus* spp.). There was no instance of consistent confusion in mapping between any map class and FCSF.

For the FCSF map class, the producers' accuracy well exceeds the 80% standard, and the users' accuracy fell slightly below the standard, even at the 90% confidence interval. Discussions with Parkway staff resulted in accepting a slightly lower users' accuracy for the FCSF map class instead of merging FCSF with other map classes in order to boost accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



A view of the FCSF map class showing a floodplain dominated by American sycamore and sweetgum.

FSSF – Sycamore - Silver Maple Calcareous Floodplain Forest

The Sycamore - Silver Maple Calcareous Floodplain Forest (FSSF) map class represents the *Platanus occidentalis - Acer saccharinum - Juglans nigra - Ulmus rubra* Floodplain Forest Association (CEGL007334) in the USNVC. The map class represents a floodplain forest dominated by American sycamore (*Platanus occidentalis*) from Tupelo, Mississippi, at milepost 259 north to the northern terminus of NATR. The FSSF map class is rare along the Parkway covering 50.8 ha (0.2% of the Parkway).

This map class is defined by the dominance of American sycamore or very rarely silver maple (*Acer saccharinum*) in the floodplain. Instances of successional upland American sycamore were found along the Parkway and these areas were not mapped as FSSF because they were outside the floodplain. Generally, this map class presents in the aerial imagery as a floodplain forest with large, diffuse crowned trees with an orangish-yellow to greenish-yellow color. The rare instances with dominant silver maple present a much different aerial imagery signature with a diffuse and arching pink crown tree.

In order to distinguish the FSSF map class from the very similar Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest (FCSF) map class, the southern range of silver maple along the Parkway was determined to be around Tupelo, Mississippi, and was used as the southern extent for FSSF. Although individual silver maple trees are likely to exist south of Tupelo, Mississippi, they are exceptionally unlikely to be a codominant component of the canopy.

The AA results indicate that FSSF was mapped with a 66% users' accuracy (90% confidence interval of 49–82%) and a 100% producers' accuracy. The AA discloses several instances where FSSF was mapped too aggressively (to five other map classes). Most of the confusion in mapping was between the FSSF and Mixed Hardwood Floodplain Forest (FMHF) map classes, this confusion likely resulted from a misinterpretation of dominance of American sycamore and, less common, silver maple to other hardwood trees in wetland forests.



A view of the FSSF map class showing a floodplain dominated by American sycamore.

FBWS – Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest

The Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest (FBWS) map class represents the *Salix nigra* - *Acer* (*rubrum*, *saccharinum*) / *Alnus serrulata* - *Cephalanthus occidentalis* Swamp Forest Association (CEGL007703) in the USNVC. The map class represents wet forests dominated by black willow (*Salix nigra*). This map class is found in NATR from milepost 85 north to milepost 175. The FBWS map class is exceptionally rare along the Parkway covering 1.6 ha (0.007% of the Parkway).

This map class is defined by the dominance of tree-height (>5 m) black willow with the occasional presence of other active floodplain hardwood species. Generally, this map class presents in the aerial imagery as a diffuse purple tree crown with a fuzzy edge and a dense core, occurring along pond margins and riparian corridors.

The AA results indicate that FBWS was mapped with both a users' and producers' accuracy at 67% (90% confidence interval of 5–128%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in confidence intervals.) The AA discloses only a pair of instances where FBWS was mapped either too aggressively (to the Water Tupelo Swamp Forest [FWTS] map class) or too conservatively (from the Mixed Hardwood Floodplain Forest [FMHF] map class).



A view of the FBWS map class showing a floodplain dominated by river birch.

FBCP – East Gulf Coastal Plain Bald-cypress Pondshore

The East Gulf Coastal Plain Bald-cypress Pondshore (FBCP) map class represents the *Taxodium distichum* East Gulf Coastal Plain Pondshore Swamp Woodland Association (CEGL004046) in the USNVC. The map class represents shorelines dominated by bald cypress (*Taxodium distichum*). This map class is found at only one location in NATR between mileposts 108 and 109. The FBCP map class is exceptionally rare along the Parkway covering 0.5 ha (0.002% of the Parkway).

This map class is defined by bald cypress dominated shorelines along ponds and lakes. These areas tend to be where water levels and terrain support bald cypress only over a narrow and linear band rather than the large and contiguous areas of bald cypress dominated swamps and backwaters. This map class presents in the aerial imagery as a wet forest along pond and lake margins dominated by bald-cypress, which appear as bright-yellow conical trees.

The AA results indicate that FBCP was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the FBCP map class, and no instances of FBCP were confused in mapping as a different map class.



A view of the FBCP map class showing a pond shore dominated by bald cypress.

FBCS – Bald-cypress Swamp

The Bald-cypress Swamp (FBCS) map class represents the *Taxodium distichum* / *Lemna minor* Floodplain Forest Association (CEGL002420) in the USNVC. The map class represents swamp forests dominated by bald cypress (*Taxodium distichum*). This map class is found in swamps, backwaters, and oxbows in NATR from milepost 45 to milepost 162. The FBCS map class is very rare along the Parkway covering 10.0 ha (0.05% of the Parkway).

This map class is defined by bald cypress dominated swamps and backwaters where water levels and terrain are more consistent and support broad areas of bald cypress swamp suitable to bald cypress dominated shorelines. These shorelines have water levels that are more variable and only support narrow bands of bald cypress. This map class presents in the aerial imagery as a wet forest in swamps, backwaters, and oxbows dominated by bald cypress, which appear as bright-yellow conical trees. Often water tupelo (*Nyssa aquatica*) was present to codominant with the bald cypress, but water tupelo never dominates in this map class.

The AA results indicate that FBCS was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the FBCS map class, and no instances of FBCS were confused in mapping as a different map class.



A view of the FBCS map class showing a swamp forest dominated by bald cypress.

FWTS – Water Tupelo Swamp Forest

The Water Tupelo Swamp Forest (FWTS) map class represents the *Nyssa aquatica* Swamp Forest Association (CEGL002419) in the USNVC. The map class represents swamp forests dominated by water tupelo (*Nyssa aquatica*). This map class is found rarely in swamps, backwaters, and oxbows in NATR from milepost 40 to milepost 342. The FBCS map class is very rare along the Parkway covering 10.7 ha (0.05% of the Parkway).

This map class is defined by water tupelo dominated swamps and backwaters where water levels and terrain are consistent and support broad areas of water tupelo swamp. This map class presents in the aerial imagery as a wet forest in swamps, backwaters, and oxbows dominated by water tupelo, which appear as very fuzzy and diffuse white-crowned trees when leaves are present. Often, water tupelo is completely senesced in the aerial imagery and presents as a leafless tree canopy over open water. Often bald cypress (*Taxodium distichum*) was present or codominant with the water tupelo, but bald cypress never dominates in this map class.

The AA results indicate that FWTS was mapped with an 83% users' accuracy and a 71% producers' accuracy (90% confidence interval of 36–107%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the producers' accuracy confidence interval.) The AA discloses a few instances where FWTS was mapped either too aggressively (to the Smartweed Floodplain & Pond [HSPF] map class) or too conservatively (from two other map classes).



A view of the FWTS map class showing a swamp forest dominated by highly-buttressed water tupelo with the occasional bald cypress.

FCPS – Southern Upper East Gulf Coastal Plain Seepage Forest

The Southern Upper East Gulf Coastal Plain Seepage Forest (FCPS) map class represents the *Nyssa biflora - Liquidambar styraciflua* / *Magnolia virginiana* / *Hamamelis virginiana - Viburnum nudum* Swamp Forest Association (CEGL008477) in the USNVC. The map class represents swamp forests dominated by swamp tupelo (*Nyssa biflora*) and sweetgum (*Liquidambar styraciflua*), with a mix of other swamp tree species. This map class is found rarely towards the edges of swamps, backwaters, and oxbows in NATR from milepost 141 to milepost 183. The FCPS map class is very rare along the Parkway covering 11.7 ha (0.05% of the Parkway).

This map class is defined by wet forests and swamps with saturated soils that are generally not inundated. Normally near the edges of large swamp complexes, this map class presents in the aerial imagery as a mix of mainly leafless trees (swamp tupelo) intermixed with a variety of other hardwood tree species with sweetgum having a golden canopy and the evergreen sweetbay (*Magnolia virginiana*) having a bright-red canopy.

The AA results indicate that FCPS was mapped with both a users' and producers' accuracy at 86%. The AA discloses only a pair of instances where FCPS was mapped either too aggressively (to the Ruderal Mixed Floodplain Forest [FXMF] map class) or too conservatively (from the Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest [FCSF] map class).



A view of the FCPS map class showing a swamp forest dominated by a mixed-species forest with swamp tupelo and sweetbay.

FPFS – Coastal Plain Planertree Floodplain Swamp Forest

The Coastal Plain Planertree Floodplain Swamp Forest (FBCS) map class represents the *Planera aquatica* Floodplain Forest Association (CEGL007394) in the USNVC. The map class represents swamp forests dominated by planertree (*Planera aquatica*). This map class is found in swamps, backwaters, and oxbows in NATR from milepost 154 to milepost 159. The FPFS map class is very rare along the Parkway covering 5.1 ha (0.02% of the Parkway).

This map class is defined by planertree dominated swamps and backwaters where water levels and terrain are consistent and support areas of planertree swamp. This map class presents in the aerial imagery as a wet, short-statured forest in swamps and backwaters dominated by planertree, which appear as dense, shrubby grayish-white broadly-branching trees. Other swamp trees, such as water tupelo (*Nyssa aquatica*), bald cypress (*Taxodium distichum*), and red maple (*Acer rubrum*) were generally present, but planertree dominates in this map class.

The AA results indicate that FPFS was mapped with a 40% users' accuracy (90% confidence interval of -6–86%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in users' confidence interval.) The AA discloses a few instances where FPFS was mapped too aggressively, to the Ruderal Mixed Floodplain Forest (FXMF) map class. These instances were likely from the misinterpretation in the dominance of ruderal hardwood trees, particularly red maple, for planertree.



A view of the FPFS map class showing a swamp forest dominated by planertree.

FIAS – Interior Forested Acidic Seep

The Interior Forested Acidic Seep (FIAS) map class represents the *Acer rubrum* var. *trilobum* - *Nyssa sylvatica* / *Rhododendron canescens* - *Viburnum nudum* var. *nudum* / *Woodwardia areolata* Seep Forest Association (CEGL004425) in the USNVC. The map class represents a single swamp forest that is dominated by red maple (*Acer rubrum* var. *trilobum*) and black gum (*Nyssa sylvatica*) near milepost 379 in NATR. The FIAS map class is exceptionally rare along the Parkway covering 0.6 ha (0.003% of the Parkway).

This map class is only mapped at a single known location and is defined by an acidic forested seep dominated by red maple and black gum. This example is highly damaged by a wind event and is undergoing regeneration. This makes describing the aerial imagery signature difficult because the signature presented by this site is likely not representative of how this map class would present undisturbed. At this site, the map class presents in the aerial imagery as a broken-up canopy with many downed trees evident with small red maple and black gum presenting fuzzy crowns of pink, orange, and yellow.

The AA results indicate that FIAS was mapped with a 100% users' accuracy and a 50% producers' accuracy (90% confidence interval of -33–133%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in users' confidence interval.) The AA discloses one instance where FPFS was mapped too conservatively, from the Ruderal Sweetgum - (Oak) Forest (FXSO) map class. This instance seems a bit of an anomaly, likely from the misinterpretation between wetland and upland habitat.



A view of the wind event disturbed FIAS map class showing a swamp forest dominated by black gum but having a very broken-up canopy.

FXMF – Ruderal Mixed Floodplain Forest

The Ruderal Mixed Floodplain Forest (FXMF) map class represents the *Liquidambar styraciflua* - (*Liriodendron tulipifera*) Ruderal Wet Forest Association (CEGL007330) and the *Acer rubrum* - *Fraxinus pennsylvanica* / *Saururus cernuus* - (*Phanopyrum gymnocarpon*) Swamp Forest Association (CEGL007380) in the USNVC. This map class primarily represents successional wet forests with saturated soils found throughout NATR. This map class is found from the southern terminus northward to milepost 431 near the northern terminus. The FXMF map class is common along the Parkway covering 685.5 ha (3.2% of the Parkway).

This map class is defined by the dominance or codominance of sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and occasionally, tuliptree (*Liriodendron tulipifera*) with saturated-to-inundated soils in a disturbed or successional landscape. As each of these species also occurs in nonsuccessional wet forests, the successional aspect of this map class cannot be underestimated. The presentation of this map class is highly varied and confounded by the co-occurrence of very similar upland successional forest map classes.

In general, this map class presents in the aerial imagery as a short-statured, small-crowned, densely-packed forest in wetlands and floodplains that is also subject to canopy gaps with the color varying based on position along the Parkway. In the more southern portion of the Parkway, this map class generally presents in the aerial imagery as a light- to dark-yellow or gold canopy of sweetgum mixed with other wetland hardwood trees. Towards the middle of the Parkway, this map class becomes much more mixed with a presentation of pink, gold, yellow, and white crowns indicative of the mix of species in this map class, though pure stands of sweetgum still exist. Towards the northern end of the Parkway sweetgum becomes much less common or altogether absent and is often replaced by the conical pink crown of tuliptree with a continued mix of yellow, orange, and some red crowns with the addition of leafless trees that have senesced for the year.

The AA results indicate that FXMF was mapped with a 94% users' accuracy and 55% producers' accuracy (90% confidence interval of 43–67%). The AA discloses that FXMF was mapped too aggressively (to two other map classes) but consistently mapped too conservatively (from nine other map classes). There was minimal consistent confusion between the FXMF and Oak Bottomland & Floodplain Forest (FOBF) map classes, likely from misinterpreting the relative dominance of oak species (*Quercus* spp.) to other hardwood trees; this minor confusion did not warrant merging the map classes. The consistent undermapping had two focal points: Mixed Hardwood Floodplain Forest (FMHF) and Ruderal Sweetgum - (Oak) Forest (FXSO) map classes. The consistent confusion with FMHF resulted from repeatedly interpreting a mixed tree species floodplain forest as natural rather than ruderal. The consistent confusion with FXSO resulted from repeatedly interpreting a ruderal sweetgum forest as an upland forest rather than a wetland or floodplain forest.

For the FXMF map class, the users' accuracy exceeds the 80% standard, and the producers' accuracy fell significantly below the standard, even at the 90% confidence interval. Discussions with Parkway staff resulted in accepting a lower users' accuracy for the FXMF map class instead of merging FXMF with other map classes in order to boost accuracy results. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Four examples of the FXMF map class showing a young CEGL007330 (upper left), a middle-aged CEGL007330 (upper right), an older CEGL007330 (lower left), and a CEGL007380 (lower right).

FXTW – Ruderal Chinese Tallow Wet Forest

The Ruderal Chinese Tallow Wet Forest (FXTW) map class represents the *Triadica sebifera* Ruderal Wet Forest Association (CEGL007412) in the USNVC. The map class represents wet forests dominated by Chinese tallow (*Triadica sebifera*) and is found in NATR at one location between mileposts 93 and 94. The FXTW map class is exceptionally rare along the Parkway covering 0.2 ha (0.001% of the Parkway) and making it the rarest map class along the Parkway. Although technically below the MMU for a forest map class, this forest extended outside the Parkway boundary to cover a MMU.

This map class is defined by the dominance of Chinese tallow on saturated soils. The one location where this map class occurs is a basin swamp with saturated soils. Chinese tallow presents in the aerial imagery as a bright and crisp pinkish-orange small-canopied tree.

The AA results indicate that FXTW was mapped with a 100% users' accuracy and a 50% producers' accuracy (90% confidence interval of -33–133%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in users' confidence interval.) The AA discloses one instance where FXTW was mapped too conservatively, from the Ruderal Blackberry - Greenbrier Shrub Thicket (SXBB) map class. This instance seems to be bit of an anomaly and likely resulted from the underestimation of Chinese tallow canopy cover over shrubs.



A view of the FXTW map class showing a wet forest dominated by Chinese tallow.

HPBB – Black Belt Prairie

The Black Belt Prairie (HPBB) map class represents the *Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea candida* - *Liatris squarrosa* - (*Silphium terebinthinaceum*) Black Belt Grassland Association (CEGL004664) in the USNVC. This map class represents diverse natural prairie occurring on chalky, calcium rich soils in the Black Belt ecological subsection (Cleland et al. 2007). This map class is very range limited and found only in the Black Belt in NATR from milepost 251 to milepost 262. The HPBB map class is very rare along the Parkway covering 5.2 ha (0.02% of the Parkway).

This map class is defined by a very diverse and often rare mix of graminoid and forb vegetation, growing on chalky soils of the Black Belt region and does not exist outside this region. A great deal more of this map class exists as <MMU patches in the Black Belt Prairie Cedar Woodland (WBBC) map class. This map class is actively managed by the Parkway and will likely increase in area during the following years. Additionally, this map class presents differently in the aerial imagery depending on where in the management cycle the vegetation is. This ranges from freshly mowed or burned and rapidly regrowing vegetation with a flat and patchy bright red signature to dense mats of tall dead vegetation with a light tan-gray signature. Because of this map class's limited range, only known locations were mapped in the Parkway.

The AA results indicate that HPBB was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the HPBB map class, and no instances of HPBB were confused in mapping as a different map class.



Two views of the HPBB map class showing a view of the map class in spring (left) versus a view of the same location in summer (right). This location had been burned the prior fall to reduce woody vegetation and leaf litter and resulted in a very open and lush version of this map class.

HJCP – Mississippi Jackson Calcareous Clay Prairie

The Mississippi Jackson Calcareous Clay Prairie (HJCP) map class represents the *Schizachyrium scoparium* - *Sorghastrum nutans* - *Dalea purpurea* - *Silphium integrifolium* Jackson Prairie Grassland Association (CEGL004020) in the USNVC. This map class represents native prairie remnants growing on clay soils in and around the Jackson, Mississippi, area. This map class is very limited in distribution and is found in NATR only from milepost 102 to milepost 127. The HJCP map class is exceptionally rare along the Parkway covering 3.1 ha (0.01% of the Parkway).

This map class is defined by diverse herbaceous uplands dominated by a mix of native grasses and forbs. Because this signature will present identically to any abandoned field, the HJCP map class was only mapped at known locations confirmed during field work. This map class is actively managed to maintain the herbaceous vegetation; therefore, this map class presents differently in the aerial imagery depending on where in the management cycle the vegetation is. This ranges from freshly mowed and rapidly regrowing vegetation with a flat and patchy bright red signature to dense mats of tall dead vegetation with a light tan-gray signature.

The AA results indicate that HJCP was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the HJCP map class, and no instances of HJCP were confused in mapping as a different map class.



A view of the HJCP map class showing a diverse mix of native grass and forb species.

SXBB – Ruderal Blackberry - Greenbrier Shrub Thicket

The Ruderal Blackberry - Greenbrier Shrub Thicket (SXBB) map class represents the *Rubus* (*argutus*, *trivialis*) - *Smilax* (*glauca*, *rotundifolia*) Ruderal Shrubland Association (CEGL004732) in the USNVC. This map class represents disturbed upland fields succeeding into native shrubs and vines. This map class is very limited and was only found in NATR from milepost 90 to milepost 95. The SXBB map class is exceptionally rare along the Parkway covering 2.1 ha (0.01% of the Parkway).

This map class is defined by a dense shrubland of blackberry species (*Rubus* spp.) and greenbrier species (*Smilax* spp.) in an upland setting. Generally, blackberry presents in the aerial imagery as a bright-red, dense, low, and flat-canopied shrub that spreads across the landscape in large clonal patches.

The AA results indicate that SXBB was mapped with a 50% users' accuracy (90% confidence interval of -4–104%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' confidence interval.) The AA discloses only two instances where SXBB was mapped too conservatively (to two other forest map classes). These instances were likely from the misinterpretation of total tree canopy cover, interpreting tree cover as <25% and classifying the area as shrubland.



A view from the edge of the SXBB map class showing a dense tangle of blackberry canes with a very consistent canopy height.

SXGS – Ruderal Groundsel-tree Shrubland

The Ruderal Groundsel-tree Shrubland (SXGS) map class represents the *Baccharis halimifolia* Ruderal Shrubland Association (CEGL004657) in the USNVC. This map class represents disturbed lands invaded by the shrub eastern baccharis (*Baccharis halimifolia*), also known as groundsel tree. This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 43 north to milepost 408. The SXGS map class is very rare along the Parkway covering 18.3 ha (0.08% of the Parkway).

This map class is defined by disturbed lands with an open- to closed-canopy shrubland dominated by eastern baccharis. Generally found growing on saturated soils, eastern baccharis is historically found in coastal areas influenced by saltwater. This salt tolerance has allowed this map class to spread inland along road corridors and colonize uplands. Eastern baccharis has a very distinct signature in the aerial imagery and presents as a bright-pink or white puff of a shrub in these disturbed areas.

The AA results indicate that SXGS was mapped well with a 90% users' accuracy and a 100% producers' accuracy. The AA discloses only one instance where SXGS was mapped too aggressively, to the Mixed Hardwood Floodplain Forest (FMHF) map class. This instance was likely from the misinterpretation of total tree canopy cover, interpreting tree cover <25% and classifying the area as shrubland.



A view of the SXGS map class showing a low, wet field invaded by eastern baccharis.

SXPU – Ruderal Chinese Privet Upland Shrubland

The Ruderal Chinese Privet Upland Shrubland (SXPU) map class represents the *Ligustrum sinense* Ruderal Upland Shrubland Association (CEGL003807) in the USNVC. This map class represents disturbed uplands invaded by the nonnative shrub Chinese privet (*Ligustrum sinense*). This map class is wide-ranging and widely dispersed along NATR with patches found from milepost 10 north to milepost 372. The SXPU map class is very rare along the Parkway covering 6.0 ha (0.03% of the Parkway).

This map class is defined by an open- to closed-canopy upland shrubland dominated by Chinese privet. Generally, Chinese privet presents in the aerial imagery as a bright-red, dense, and often round crown, and privet has a tendency to form monocultures where the individual bushes create a landscape that appears to be large red hummocks.

The AA results indicate that SXPU was mapped with a 60% users' accuracy (90% confidence interval of 14–106%) and a 75% producers' accuracy (90% confidence interval of 27%–123%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in confidence intervals.) There was some consistent confusion between the SXPU and Ruderal Vine-Shrubland (SXVL) map classes because of the inability to reliably determine privet shrubs from shrubs covered in vines, but the confusion in the mapping was insufficient to warrant merging the map classes.



A view from underneath the canopy of the SXPU map class.

SXVL – Ruderal Vine-Shrubland

The Vine-Shrubland (SXVL) map class represents the following three associations in the USNVC:

- *Pueraria montana* var. *lobata* Ruderal Vine-Shrubland (CEGL003882),
- *Vitis rotundifolia* - *Ampelopsis arborea* - *Campsis radicans* Ruderal Wet Vine-Shrubland (CEGL004620), and
- *Wisteria sinensis* Ruderal Vine-Shrubland (CEGL008568).

This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 10 north to milepost 283. The SXVL map class is very rare along the Parkway covering 12.4 ha (0.06% of the Parkway).

This map class was originally defined by just the kudzu vine-shrubland (CEGL003882). This nonnative and highly invasive vine smothers landscapes and presents a unique signature in the aerial imagery comparable to having a fuzzy, bright-red sheet draped over the underlying vegetation.

The AA results indicate that SXVL was mapped with an 86% users' accuracy and a 75% producers' accuracy (90% confidence interval of 44–106%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' confidence interval.) There was some consistent confusion between the SXVL and Ruderal Chinese Privet Upland Shrubland (SXPU) map classes because of the inability to consistently determine vine-covered shrubs from Chinese privet (*Ligustrum sinense*), but the confusion was insufficient to warrant merging the map classes.



A view of three aspects of the SXVL map class showing a CEGL003882 (upper), a CEGL004620 (lower left), and a CEGL008568 (lower right).

HXMG – Ruderal Mixed Grassland

The Ruderal Mixed Grassland (HXMG) map class represents the following nine associations and one alliance in the USNVC:

- *Scirpus cyperinus* Southern Ruderal Marsh (CEGL003866),
- *Rhus copallinum* - *Andropogon virginicus* Ruderal Grassland (CEGL004035),
- *Andropogon virginicus* var. *virginicus* Ruderal Grassland (CEGL004044),
- *Lolium* (*arundinaceum*, *pratense*) Ruderal Grassland (CEGL004048),
- *Sorghum halepense* Ruderal Grassland (CEGL004108),
- *Imperata cylindrica* Ruderal Grassland (CEGL004673),
- *Paspalum notatum* Ruderal Grassland (CEGL004700),
- *Axonopus fissifolius* Ruderal Herbaceous Vegetation [Park Special] (CEPS004833),
- *Schizachyrium scoparium* - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow (CEGL006333), and
- *Andropogon virginicus* - *Ambrosia artemisiifolia* - *Conyza canadensis* Eastern Ruderal Grassland (A3321).

This map class represents lands dominated by managed graminoids and forbs. This map class is ubiquitous along NATR and is found from the southern terminus to the northern terminus. The HXMG map class is very common along the Parkway covering 3,176.0 ha (14.7% of the Parkway).

This map class is defined by lands managed to maintain herbaceous vegetation including road edges, pastures, and power and pipeline rights-of-ways. Originally, upland and wetland versions were mapped separately; however, results of the AA determined that this distinction was not mapped well. The vegetation in this map class is highly variable in species composition, degree of management, and temporal change. The vegetation includes actively mowed fields and road edges to abandoned agriculture succeeding to young ruderal forest. This variable range in landscape provides for an equally variable presentation in the aerial imagery from bright red and flat fields regrowing after recent mowing, to tan-gray fields dominated by standing-dead herbaceous material.

The AA results indicate that HXMG was mapped well with a 100% users' accuracy and a 97% producers' accuracy. The AA discloses only one instance where HXMG was mapped too conservatively, to the Floodplain Canebrake (SCBF) map class. This instance was likely from the misinterpretation of giant cane (*Arundinaria gigantea* ssp. *gigantea*) when it was actually a mix of other tall ruderal herbaceous vegetation.

Originally, CEGL003866 was mapped separate from the other vegetation types listed for the HXMG map class; however, initial AA results pointed out low accuracy for the original map class representing CEGL003866, and the original map class was folded into the HXMG map class following discussions with the Parkway. Information on this decision can be found in "Appendix H: Accuracy Assessment Reconciliation."



Four views of the HXMG map class showing an often-mown field at the Bear Creek Mound (upper left), a road side primarily dominated by forbs with some mixed grass and shrubs (upper right), a pipeline right-of-way dominated by grasses (lower left), and a power line right-of-way dominated by wet forbs (lower right).

SCBF – Floodplain Canebrake

The Floodplain Canebrake (SBWR) map class represents the *Arundinaria gigantea* ssp. *gigantea* Shrub Swamp Association (CEGL003836) in the USNVC. This map class represents landscapes dominated by giant cane (*Arundinaria gigantea* ssp. *gigantea*). This map class was only found in NATR at a single location between mileposts 6 and 7. The SBWR map class is very exceptionally rare along the Parkway covering 0.8 ha (0.004% of the Parkway).

This map class is defined by landscapes dominated by giant cane usually in combination with riparian flooding. This vegetation was once relatively common across southeastern North America and is now exceedingly rare even though giant cane is commonly found in floodplain forests along the Parkway. This map class was mapped based upon a known location for this vegetation association and neither mapped nor found anywhere else along the Parkway. This map class presents in the aerial imagery as a very tall and dense herbaceous vegetation, with a coarse texture and dark-pink to light-red color.

The AA results indicate that SCBF was mapped with a 50% users' accuracy (90% confidence interval of -33–133%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' confidence interval.) The AA discloses only one instance where SCBF was mapped too aggressively, to the Ruderal Mixed Grassland (HXMG). This instance was likely from the misinterpretation of a mix of other tall ruderal herbaceous vegetation as giant cane.



A view of the only SCBF found and mapped along the Parkway.

HSFP – Smartweed Floodplain & Pond

The Smartweed Floodplain & Pond (HSFP) map class represents the following three associations in the USNVC:

- *Polygonum* (*hydropiperoides*, *punctatum*) - *Leersia* spp. Shoreline Wet Meadow (CEGL004290),
- *Polygonum amphibium* - (*Polygonum hydropiperoides*) Shoreline Wet Meadow (CEGL004699), and
- *Polygonum* spp. - *Phanopyrum gymnocarpon* Shoreline Wet Meadow (CEGL008555).

This map class represents wetlands and wet soils dominated by smartweed species (*Polygonum* spp.). This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 37 north to milepost 384. The HSFP map class is very rare along the Parkway covering 6.8 ha (0.03% of the Parkway).

This map class is defined by disturbed wetlands and wet soils dominated by smartweed often mixed with other wetland plant species. The map class presents numerous signatures in the aerial imagery but is usually a short and dense mat of tan-to-pink and pink-to-red vegetation, depending on the favorability of the growing conditions. Given the quick growth and early senescence of smartweeds, this map class can change quickly during the course of the season.

The AA results indicate that HSFP was mapped well with a 100% users' accuracy and an 80% producers' accuracy. The AA discloses only one instance where HSFP was mapped too conservatively, from the Water Tupelo Swamp Forest (FWTS) map class. This instance was likely from the misinterpretation of total tree canopy cover, interpreting tree cover <10% and classifying the area as an herbaceous wetland when there was sufficient tree cover to call the area a forest.



Two views of the HSFP map class showing CEGL004290 (left) and CEGL004699 (right).

SBWR – Black Willow Riverbank Shrubland

The Black Willow Riverbank Shrubland (SBWR) map class represents the *Salix nigra* Wet Shrubland Association (CEGL003901) in the USNVC. This map class represents wet shrublands dominated by black willow (*Salix nigra*). This map class is wide-ranging and widely dispersed with patches found in NATR from of milepost 48 north to milepost 408. The SBWR map class is very rare along the Parkway covering 6.6 ha (0.03% of the Parkway).

This map class is defined by wetlands with a moderate amount of hydrologic disturbance (from sources such as roads and beavers) that are dominated by shrub-height (<5 m) black willow. These shrublands may eventually succeed into the Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest (FBWS) map class provided enough time. The black willow that defines this map class typically presents in the aerial imagery as a low puffy purple shrub generally growing in dense, monotypic patches over clear, wet, and often disturbed ground.

The AA results indicate that SBWR was mapped well with a 100% users' accuracy and an 83% producers' accuracy. The AA discloses only one instance where SBWR was mapped too conservatively, from the Ruderal Mixed Floodplain Forest (FXMF) map class. This instance was likely a combination of misinterpreting shrub-tree species and total tree canopy cover, interpreting tree cover <10% and classifying the area as shrub wetland instead of a forest wetland.



A marsh with an extensive area of SBWR regeneration following flooding of a swamp forest.

SSAS – Southeastern Alder Swamp

The Southeastern Alder Swamp (SSAS) map class represents the *Alnus serrulata* Southeastern Shrub Swamp Association (CEGL008474) in the USNVC. This map class represents wet shrublands dominated by hazel alder (*Alnus serrulata*). This map class is wide-ranging and widely dispersed with patches found in NATR from of milepost 141 north to milepost 364. The SSAS map class is very rare along the Parkway covering 8.0 ha (0.04% of the Parkway).

This map class is defined by wetlands with generally stable water levels that are dominated by hazel alder. Often, this map class exhibits signs of invading wetlands with past disturbance that removed the tree cover. This map class presents in the aerial imagery as a short-to-medium statured shrub-dominated wetland with a very shiny red-purple and clumpy signature.

The AA results indicate that SSAS was mapped well with a 100% users' accuracy and an 80% producers' accuracy. The AA discloses only one instance where SSAS was mapped too conservatively, from the Southern Buttonbush Pond (SSBP) map class. This instance was likely from the misinterpretation of shrub species dominance, interpreting common buttonbush (*Cephalanthus occidentalis*) as dominate to hazel alder.



Two views of the SSAS map class showing the alder swamp from under the canopy (left image) and from above the canopy (right image).

SSBP – Southern Buttonbush Pond

The Southern Buttonbush Pond (SSBP) map class represents the *Cephalanthus occidentalis* / *Carex* spp. - *Lemna* spp. Southern Shrub Swamp Association (CEGL002191) in the USNVC. This map class represents wet shrublands dominated by common buttonbush (*Cephalanthus occidentalis*). This map class is wide-ranging and widely dispersed with patches found sparsely in NATR from milepost 129 north to milepost 342, just into Tennessee. The SSBPS map class is exceptionally rare along the Parkway covering 2.0 ha (0.009% of the Parkway).

This map class is defined by wetlands with generally stable and somewhat deeper water levels that are dominated by common buttonbush. Often, this map class exhibits signs of invading wetlands with past disturbance that removed the tree cover. This map class presents in the aerial imagery as a short-to-medium statured shrub-dominated wetland with a dull tan-to-grey signature, often showing a jumble of tangled vegetation.

The AA results indicate that SSBP was mapped well with an 80% users' accuracy and a 100% producers' accuracy. The AA discloses only one instance where SSBP was mapped too aggressively, to the Southeastern Alder Swamp (SSAS) map class. This instance was likely from the misinterpretation of shrub species dominance, interpreting common buttonbush as dominant to hazel alder (*Alnus serrulata*).



A view of the SSBP map class showing the dense, tangled wet shrubland dominated by common buttonbush.

HCRM – Common Rush Marsh

The Common Rush Marsh (HCRM) map class represents the *Juncus effusus* Marsh Association (CEGL004112) in the USNVC. This map class represents wetlands dominated by common rush (*Juncus effusus*). This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 45 north to milepost 302. The HCRM map class is very rare along the Parkway covering 4.8 ha (0.02% of the Parkway).

This map class is defined by wetlands and wet soils dominated by common rush. This map class can occur in both traditional wetland settings where common rush dominates other wetland plants and in disturbed wet soils where common rush can readily grow. The map class presents in the aerial imagery as a tussocky, short-to-medium height herbaceous vegetation in wetlands and on low, wet soils with a pinkish-tan to tannish-grey signature. Often, patches of other wetland vegetation were mixed in, but never dominant.

The AA results indicate that HCRM was mapped well and consistently with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the HCRM map class, and no instances of HCRM were confused in mapping as a different map class.



A view of the HCRM map class showing a mixed-species emergent wetland.

HGCM – Giant Cutgrass Slough Marsh

The Giant Cutgrass Slough Marsh (HGCM) map class represents the *Zizaniopsis miliacea* Coastal Plain Slough Marsh Association (CEGL004139) in the USNVC. This map class represents wetlands dominated by giant cutgrass (*Zizaniopsis miliacea*). This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 21 north to milepost 342. The HGCM map class is very rare along the Parkway covering 7.7 ha (0.04% of the Parkway).

This map class is defined by emergent wetlands dominated by giant cutgrass in combination with numerous other emergent wetland plants. Generally, this map class presents in the aerial imagery as very tall herbaceous vegetation with a crisp bright pink for growing giant cutgrass to bright tan for senesced giant cutgrass.

The AA results indicate that HGCM was mapped well and consistently with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the HGCM map class, and no instances of HGCM were confused in mapping as a different map class.



A view of the HGCM map class showing an emergent vegetation marsh dominated by giant cutgrass.

SXPW – Ruderal Chinese Privet Wet Shrubland

The Ruderal Chinese Privet Wet Shrubland (SXPW) map class represents the *Ligustrum sinense* Ruderal Wet Shrubland Association (CEGL003837) in the USNVC. This map class represents disturbed wetlands invaded by the nonnative shrub Chinese privet (*Ligustrum sinense*). This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 39 north to milepost 321. The SXPW map class is very rare along the Parkway covering 6.8 ha (0.03% of the Parkway).

This map class is defined by an open- to closed-canopy shrubland dominated by Chinese privet growing in saturated soils. Generally, Chinese privet presents in the aerial imagery as a bright-red, dense, and often round crown and has a tendency to form monocultures where individual bushes create a landscape that appears to be large red hummocks.

The AA results indicate that SXPW was mapped well and consistently with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the SXPW map class, and no instances of SXPW were confused in mapping as a different map class.



A view from underneath the canopy of the SXPW map class.

HAFV – Aquatic Floating Herbaceous Vegetation

The Aquatic Floating Herbaceous Vegetation (HAFV) map class represents the following three associations in the USNVC:

- *Nuphar advena* - *Nymphaea odorata* Aquatic Vegetation Association (CEGL002386),
- *Hydrocotyle ranunculoides* - (*Sacciolepis striata*) Floating Aquatic Vegetation (CEGL004305), and
- *Potamogeton* spp. - *Ceratophyllum* spp. - *Elodea* spp. Aquatic Vegetation Association (CEGL004725).

This map class represents wetlands dominated by a mixture of floating and submerged vegetation and is wide-ranging and widely dispersed with patches found in NATR from milepost 21 north to milepost 384. The HAFV map class is very rare along the Parkway covering 7.4 ha (0.03% of the Parkway).

This map class is defined by wetlands dominated by emergent or submergent vegetation that can be a mix of several native species but is specifically not dominated by either American lotus (*Nelumbo lutea*) or nonnative floating aquatic plant species. The map class presents in the aerial imagery as numerous signatures but is generally at or below the water surface, having a light-pink to white signature for floating vegetation, a dull reddish-brown signature for submergent vegetation, and a wide mix in between for mixed floating-submergent aquatic vegetation. The mix of floating and submergent aquatic vegetation also varies through the year depending upon seasonal variation.

The AA results indicate that HAFV was mapped well and consistent with both a users' and producers' accuracy at 100%. The AA discloses no new instances of the HAFV map class, and no instances of HAFV were confused in mapping as a different map class.



A view of the HAFV map class showing floating and submergent wetland plants dominated by a mix of species.

HAAL – American Lotus Aquatic Wetland

The American Lotus Aquatic Wetland (HAAL) map class represents the *Nelumbo lutea* Aquatic Vegetation Association (CEGL004323) in the USNVC. This map class represents wetlands dominated by American lotus (*Nelumbo lutea*). This map class is extremely limited in distribution and is found in NATR between mileposts 108 and 109. The HAAL map class is exceptionally rare along the Parkway covering 1.2 ha (0.006% of the Parkway).

This map class is defined by wetlands dominated by floating and emergent aquatic vegetation with American lotus dominating overall. This map class was confined to just one corner of the Barnett Reservoir where an extensive bed of American lotus exists. The map class presents in the aerial imagery as floating emergent vegetation with the leaves of the American lotus clearly visible above the surface of the water; American lotus is the only aquatic species where the leaf will present like this in the aerial imagery along the Parkway.

The AA results indicate that HAAL was mapped with a 100% users' accuracy and a 67% producers' accuracy (90% confidence interval of 5–128%). (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' confidence interval.) The AA discloses only one instance where HAAL was mapped too conservatively, to the Aquatic Ruderal Herbaceous Vegetation (HXAV) map class. This instance was likely from the misinterpretation of species composition of the floating aquatic vegetation.



A view of the HAAL map class showing a mixed-species floating and emergent aquatic vegetation wetland dominated by American lotus.

HXAV – Aquatic Ruderal Herbaceous Vegetation

The Aquatic Ruderal Herbaceous Vegetation (HXAV) map class represents the following three associations in the USNVC:

- *Alternanthera philoxeroides* Ruderal Aquatic Vegetation (CEGL003858),
- *Eichhornia crassipes* Southeast Temperate Ruderal Aquatic Vegetation (CEGL007671), and
- *Ludwigia peploides* Aquatic Vegetation (CEGL007835).

This map class represents wetlands dominated by either nonnative aquatic plants or aquatic plants significantly outside their historical range. This map class is wide-ranging and widely dispersed with patches found in NATR from milepost 82 north to milepost 342. The HXAV map class is very rare along the Parkway covering 8.7 ha (0.04% of the Parkway).

This map class is defined by wetlands dominated by emergent vegetation that can be a mix of any of several nonnative or opportunistic native species. The map class presents numerous signatures in the aerial imagery but is generally a dense mat at the water surface with a bright-pink to bright-red signature. The mix of emergent to submergent vegetation also varies through the year depending upon seasonal variation affecting the signature. Additionally, many of the plant species in this map class are not rooted. This provides the potential for this vegetation to float around in wetlands, depending on wind and water currents.

The AA results indicate that HXAV was mapped with a 75% users' accuracy (90% confidence interval of 27–123%) and a 100% producers' accuracy. (With the rarity of this map class along the Parkway, the number of potential AA sites was restricted; thus, resulting in a wide range in the users' confidence interval.) The AA discloses only one instance where HXAV was mapped too aggressively, to the American Lotus Aquatic Wetland (HAAL) map class. This instance was likely from the misinterpretation of dominance of the aquatic plants.



Two views of the HXAV map class with the left image showing a view of CEGL003858, and the right image showing a view of CEGL007671.

MXTR – Modified Ruderal Tornado Regeneration Vegetation

The Modified Ruderal Tornado Regeneration Vegetation (MXTR) map class represents various stretches of NATR that had been significantly impacted by tornado damage after 2010; therefore, these areas are not tied to any specific association in the USNVC. These areas include a patchwork of formerly intact forest, both upland and wetland, that is undergoing rapid succession and regeneration. This map class is primarily found in NATR between mileposts 204 and 212, with another small patch between mileposts 229 and 277. The MXTR map class is uncommon along the Parkway covering 158.8 ha (0.7% of the Parkway).

This map class is defined by forests catastrophically disturbed by tornadic activity composed of some remnant mature trees with severely damaged crowns (<10% canopy) over dense regeneration. Generally, the downed trees exhibited the characteristic circular pattern caused by the winds of the tornado. Often, small patches of shrub or herbaceous vegetation or open water are within the regenerating vegetation. Similar to other catastrophic disturbance events (e.g., fire, clear-cut), these forests have not sufficiently regenerated to be any specific vegetation type; however, these forests uniquely maintain a vestige resemblance to their original vegetation associations making them classification opinion and error prone.

The MXTR map class was not assessed during the AA process. This decision was made as the vegetation does not fit into the concept of a natural (including ruderal) vegetation type. These forests are highly disturbed and rapidly changing but should become recognizable vegetation associations within a decade.



Two views of the MXTR map class showing a formerly forested landscape decimated by tornadic activity.

CPLP – Loblolly Pine Plantation

The Loblolly Pine Plantation (CPLP) map class represents *Pinus taeda* Forest Plantation Cultural Subtype (CST007179) in the USNVC. The map class represents loblolly pine (*Pinus taeda*) forests that are actively managed for timber production. This map class is widely scattered throughout NATR from the southern terminus north to milepost 382. The CPLP map class is rare along the Parkway covering 37.9 ha (0.2% of the Parkway).

This map class is defined by areas of loblolly pine actively managed to produce timber. Areas that are no longer actively managed but maintain all the aspects of active management are likely included. Without exception, every location mapped as CPLP is along the Parkway boundary, is generally a narrow strip along this boundary, and extends outward into the surrounding landscape beyond the boundary. These parameters may be indicative to either issues with the geospatial boundary used in the mapping project or issues with the boundary on the ground. Areas of active management for timber inside the Parkway boundary no longer exist; therefore, all instances of loblolly pine forest determined as clearly within the Parkway were mapped to other map classes.

Because the CPLP map class is a cultural vegetation map class, it was not assessed for accuracy.



A view of the CPLP map class showing a young loblolly pine plantation along the boundary of the Parkway.

CPSH – Native Southern Hardwood Plantation

The Native Southern Hardwood Plantation (CPSH) map class represents the Native Southern Hardwood Plantation Cultural Type (CTY017) in the USNVC. The map class represents planted forests that are composed of native hardwood species actively managed for timber production or potentially for horticultural sale (e.g., nursery trees). This map class is widely and rarely scattered throughout NATR from the southern terminus north to milepost 382. The CPSH map class is rare along the Parkway covering 1.1 ha (0.005% of the Parkway).

This map class is defined by areas of native hardwoods actively managed to produce timber. These areas likely includes areas that are no longer actively managed, yet maintain all the aspects of active management and are potential areas for native forest regeneration. Without exception, every location mapped as CPSH is along the Parkway boundary, is generally a narrow strip along this boundary, and extends outward into the surrounding landscape. These parameters may be indicative to either issues with the geospatial boundary used in the mapping project or issues with the boundary on the ground.

Because the CPSH map class is a cultural vegetation map class, it was not assessed for accuracy.



A view of the CPSH map class showing a field of young native hardwood trees planted in rows.

CRCC – Row & Close Grain Crop

The Row & Close Grain Crop (CRCC) map class represents the Row & Close Grain Crop Cultural Formation (CFO04) in the USNVC. The map class represents fields planted to agricultural crops. This map class is scattered throughout NATR from milepost 40 northward to milepost 428, with several sections along the Parkway having extensive areas of this map class. The CPSH map class is common along the Parkway covering 458.3 ha (2.1% of the Parkway).

This map class is defined by areas planted and managed for agricultural crops. During the 2014 field reconnaissance effort for mapping, agriculture crops of corn, soybeans, cotton, sorghum, wheat, and oats were noted with each presenting a different signature in the aerial imagery that was collected for the NATR vegetation mapping project. What ties this map class together is the consistent presentation of a monoculture of similar-aged plants growing in rows, which denotes active agriculture. Many fields along the Parkway rotate among row crops, hay, and fallow fields; therefore, all fields were mapped per their presentation at the date of imagery. This means that areas mapped as CRCC could now be Ruderal Mixed Grassland (HXMG) and vice versa depending on what stage of the fallow cycle the field is in.

Because the CRCC map class is a cultural vegetation map class, it was not assessed for accuracy.



Two views of the CPSH map class showing a field of oats pre-harvest (left) and a field of soybeans midseason (right).

CDVA – Developed Area

The Developed Area (CDVA) map class represents, in part, the Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03) in the USNVC. The Barren Land (CBRN) map class also represents, in part, the CSC03 Cultural Subclass. The map class represents areas actively managed in NATR to promote human activity. This map class starts at the southern terminus and ends at the northern terminus, with some type of representation of CDVA between every milepost along the entire Parkway. The CDVA map class is very common along the Parkway covering 1,895.5 ha (8.8% of the Parkway).

This map class is defined by areas actively managed for human use. Some of these areas are relatively low intensity, such as camp grounds and vegetated picnic areas, and others are very high intensity, such as the I-80 corridor or Natchez Trace Parkway road. All areas of man-made impervious surface greater than the MMU were included in this map class, including gravel and dirt roads, buildings, and parking areas.

Because the CDVA map class is a cultural vegetation map class, it was not assessed for accuracy.



Four views of the CDVA map class showing a very low-intensity use in a fully vegetated and tree-canopied picnic area with virtually no impervious surface (upper left), a managed hill maintained to promote a view with some impervious surface (upper right), a medium-intensity parking area with significant impervious surface, (lower left), and the high-intensity TN-840 corridor (lower right).

CBRN – Barren Land

The Barren Land (CBRN) map class represents, in part, the Herbaceous & Woody Developed Vegetation Cultural Subclass (CSC03) in the USNVC. The Developed Area (CDVA) map class also represents, in part, the CSC03 cultural subclass. The CBRN map class represents unvegetated lands disturbed by human activity in NATR. This map class is widely scattered from milepost 96 north to milepost 425. The CBRN map class is very rare along the Parkway covering 21.2 ha (0.098% of the Parkway).

This map class is defined by areas actively undergoing development or modification that has left large areas denuded of vegetation (which will not be planted to a crop). This map class is generally transitory in nature because it represents a landscape that is actively modified for human activity, such as construction. Several instance of new CBRN not captured in our imagery were noted during the field reconnaissance process, as well as several instances where areas of CBRN in our imagery had already been revegetated.

Because the CBRN map class is a cultural vegetation map class, it was not assessed for accuracy.

No representative pictures of the CBRN map class are available.

NOSR – Open Water Stream & River

The Open Water Stream & River (NOSR) map class represents unvegetated streams and rivers. This map class is wide-ranging and widely dispersed large streams and rivers found in NATR from the southern terminus to the northern terminus. The NOSR map class is common along the Parkway covering 497.6 ha (2.3% of the Parkway).

This map class is defined by streams and rivers large enough to not be completely covered by overarching vegetation. Wetland vegetation—aquatic and/or emergent—may be present (usually in shallow waters close to shorelines) but should contribute <10% cover; however, small areas (below the size of a MMU) of wetland vegetation having >10% cover—including herbaceous vegetation, shrubs, and trees—may be present. Given the very low reflectivity of water, this map class generally presents in the aerial imagery as a very dark and completely flat linear feature. In shallow or clear instances, the riverbed is often visible.

Because the NOSR map class is an open water map class, it was not assessed for accuracy.



A view of the NOSR map class showing the Buffalo River along the Parkway in Tennessee.

NOWL – Open Water Lake

The Open Water Lake (NOWL) map class represents unvegetated lakes. This map class is limited to the shores of the Barnett Reservoir in NATR between mileposts 105 and 115. The NOWL map class is rare along the Parkway covering 28.9 ha (0.1% of the Parkway).

This map class is defined by open water lakes that are >8 ha in area and have <10% cover of wetland vegetation present. Wetland vegetation—aquatic and/or emergent—may be present (usually in shallow waters close to shorelines) but should contribute <10% cover; however, small areas (below the size of a MMU) of wetland vegetation having >10% cover—including herbaceous vegetation, shrubs, and trees—may be present. Given the very low reflectivity of the water, this map class generally presents in the aerial imagery as a very dark and completely flat area.

Because the NOWL map class is an open water map class, it was not assessed for accuracy.



A view of the NOWL map class showing the Ross R Barnett Reservoir.

NOWP – Open Water Pond

The Open Water Pond (NOWP) map class represents unvegetated ponds. This map class is widely scattered throughout NATR from the southern terminus north to milepost 306. The NOWP map class is very rare along the Parkway covering 13.7 ha (0.06% of the Parkway).

This map class is defined by open water lakes that are <8 ha in area and have <10% cover of wetland vegetation present. Wetland vegetation—aquatic and/or emergent—may be present (usually in shallow waters close to shorelines) but should contribute <10% cover; however, small areas (below the size of a MMU) of wetland vegetation having >10% cover—including herbaceous vegetation, shrubs, and trees—may be present. Given the very low reflectivity of the water, this map class generally presents in the aerial imagery as a very dark and completely flat area.

Because the NOWP map class is an open water map class, it was not assessed for accuracy.



A view of the NOWP map class showing a small deep pond with a narrow vegetated edge but otherwise unvegetated surface and bottom.

Table E–3. Map classification listing, sorted alphabetically by map-class code, used for the Natchez Trace Parkway vegetation mapping project.

Map-class Code	Map-class Name
CBRN	Barren Land
CDVA	Developed Area
CPLP	Loblolly Pine Plantation
CPSH	Native Southern Hardwood Plantation
CRCC	Row & Close Grain Crop
FBCP	East Gulf Coastal Plain Bald-cypress Pondshore
FBCS	Bald-cypress Swamp
FBLF	River Birch Levee Forest
FBMS	Southern Beech - Magnolia Forest
FBNC	Northern & Central Beech Forest
FBWS	Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest
FCBF	East Gulf Coastal Plain Beech Floodplain Forest
FCPS	Southern Upper East Gulf Coastal Plain Seepage Forest
FCSF	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest
FFRO	Southern Red Oak Flatwoods Forest
FHOT	Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest
FIAS	Interior Forested Acidic Seep
FLBM	East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest
FLWO	East Gulf Coastal Plain Loblolly - White Oak Forest
FMHF	Mixed Hardwood Floodplain Forest
FNCO	Northern Chestnut Oak Forest
FNOH	Northern Oak - (Hickory) Forest
FOBF	Oak Bottomland & Floodplain Forest
FPFS	Coastal Plain Planertree Floodplain Swamp Forest
FSLO	Shortleaf Pine - Oak Forest
FSOH	Southern Oak - (Hardwood) Forest
FSSF	Sycamore - Silver Maple Calcareous Floodplain Forest
FWTS	Water Tupelo Swamp Forest
FXHC	Ruderal Hardwood Forest Complex
FXMF	Ruderal Mixed Floodplain Forest
FXMH	Ruderal Mixed Hardwood Forest
FXPN	Ruderal Pine - (Hardwood) Forest
FXRC	Ruderal Eastern Red-cedar Forest
FXSO	Ruderal Sweetgum - (Oak) Forest
FXTT	Ruderal Tuliptree Forest
FXTW	Ruderal Chinese Tallow Wet Forest
FXWO	Ruderal Water Oak Forest
FXWP	Ruderal Eastern White Pine Forest
HAAL	American Lotus Aquatic Wetland
HAFV	Aquatic Floating Herbaceous Vegetation
HCRM	Common Rush Marsh
HGCM	Giant Cutgrass Slough Marsh
HJCP	Mississippi Jackson Calcareous Clay Prairie
HPBB	Black Belt Prairie
HSFP	Smartweed Floodplain & Pond

Table E–3 (continued). Map classification listing, sorted alphabetically by map-class code, used for the Natchez Trace Parkway vegetation mapping project.

Map-class Code	Map-class Name
HXAV	Aquatic Ruderal Herbaceous Vegetation
HXMG	Ruderal Mixed Grassland
MXTR	Modified Ruderal Tornado Regeneration Vegetation
NOSR	Open Water Stream & River
NOWL	Open Water Lake
NOWP	Open Water Pond
SBWR	Black Willow Riverbank Shrubland
SCBF	Floodplain Canebrake
SSAS	Southeastern Alder Swamp
SSBP	Southern Buttonbush Pond
SXBB	Ruderal Blackberry - Greenbrier Shrub Thicket
SXGS	Ruderal Groundsel-tree Shrubland
SXPU	Ruderal Chinese Privet Upland Shrubland
SXPW	Ruderal Chinese Privet Wet Shrubland
SXVL	Vine-Shrubland
WCOB	Chinquapin Oak Unglaciated Bluff Woodland
WHRO	Western Highland Rim Oak Woodland
WBBC	Black Belt Prairie Cedar Woodland

Appendix F: Accuracy Assessment Form

NPS VEGETATION MAPPING PROGRAM: ACCURACY ASSESSMENT POINT FORM

Park: **NATR** State: _____ AA Point Code: _____ GPS Point Code: _____

Survey Date ___/___/2015 **AA Point Time:** _____ am/pm **Field Team:**_____

Photo of Form Y / N Photo #s _____[*Photo of Form, N, E, S, W, then 1or more representative of MMU*]

NAD83 UTM ZONE 15/16 [*Circle One*] **WAAS enabled? Y N Averaging? Y N iterations/GPS score**_____

UTM X __ __ __ __ __ __ m E **UTM Y** __ __ __ __ __ __ __ m N **#of sats**:_____ **Accuracy (m)** _____

GPS Model: Garmin_____ **GPS Unit #**_____

If GPS Point is an *intentional* offset from the AA Point, circle the explanation & illustrate relationships in sketch below:

a. **Physical constraints in reaching waypoint** (*list direction and estimated distance from new GPS point to the area observed and describe any other relevant details)*:
b. **Other** (*explain in notes below*):

ENVIRONMENTAL DESCRIPTION

1. Elevation _____**(m) Elevation Source**: GPS (on ground)/DRG/other:_____

2. Unvegetated Surface Substrate
(*estimate percentage of applicable covers;* ***should total 100%***):
____ bedrock
____ loose boulders and stones
____ leaf litter / organic matter
____ decaying wood
____ water
____ mineral soil / sand
____ other (*specify*)

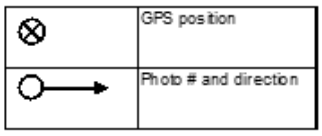
3. Slope _____
A – 0-3% (0-2^0) (level or nearly level)
B – 3-9% (2-5^0) (gentle)
C – 9-16% (5-9^0) (sloping/rolling)
D – 16-31% (9-17^0) (moderate/hilly)
E – 31-65% (17-33^0) (steep)
F – 65-75% (33-37^0) (very steep)
G – 75%+ (>37^0) (extremely steep)

4. Aspect _____
F (flat)
V (variable)
N 338-22^0 NE 23-67^0
E 68-112^0 SE 113-157^0
S 158-202^0 SW 203-247^0
W 248-292^0 NW 293-337^0

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

5. Environmental Comments: (*Characteristics that affect vegetation –e.g., if site is a wetland, indicate type of hydrology, e.g., seepage wetland, temporarily flooded stream bottom, seasonally flooded pond, etc.; topographic position, landform, evidence of natural and human disturbance, successional status, stand maturity, etc.*)

6. SKETCH OF OBSERVATION AREA
(aerial view or transect view or both): indicate north arrow, where GPS positions were collected, whether an offset point was needed, locations and bearings of photopoints, plot orientation, roads, trails, as well as distinctive features of the vegetation, e.g., transitions to different vegetation types, or landscape features, etc. Use the symbols in the key below for GPS points and photos. *Site need not be circular if constrained by map guidelines.*



VEGETATION STRUCTURE: AA Point Code: _____

Stratum	Strata max. height (select one from right)	Cover values by strata (upper value of range = 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100%)	Strata Heights (max. defaults)
Canopy			20 m, 35 m, or > 35 m
Subcanopy			10 m, 20m
Shrub			2 m, or 5 m
Herbaceous			0.5 m, 1 m, or 2 m
Aquatic or NonVascular *(circle one)*			

VEGETATION COMPOSITION: (list all dominant and diagnostic species for each stratum (one species per row)
Record total cover, then record the cover class for each species in all strata in which that species is dominant or diagnostic.
Use the following cover classes for all cover estimates: **P < 5%; 01 = 5-15%; 02 = 15-25%; 03 = 25-35%; 04 = 35-45%; 05 = 45-55%; 06 = 55-65%; 07 = 65-75%; 08 = 75-85%; 09 = 85-95%; 10=>95%**

SPECIES Write out full name or use code from approved list *E.g.:* CORNFLO [= *Cornus florida*]	Diagn. species (X)	Total cover for assessed area	Tree Canopy layer	Subcanopy layer	Shrub layer	Herb layer	A or NV layer	Specimen Collected (Y), Confidence in ID (C, P, U)
Plants Reference: USDA Plants								

POINT ASSESSMENT: Is the **MMU 0.25 ha or 0.5 ha**: (circle one) *consult map for MMU size at this point*

Representativeness: Is the area of the vegetation being assessed around the point at least equivalent to 1 MMU? **Y N**
Is the vegetation homogeneous, very patchy, or does it appear to be transitional between two types? (circle one)
Please note adjacent vegetation communities.

Fit (does MMU key easily to an association?): **H M L** Your **confidence** in determination: **H M L**
Provide additional comments about problems or ease applying the key at this site, rationale for choice of association, if there was doubt, etc.

FIELD CLASSIFICATION: Primary Field Call (*Name & Code in Key*):_____ **CEGL00**_____
Secondary Field Call *(if there is doubt about first call)*:_____ **CEGL00**_____

OFFICE CLASSIFICATION: Reviewer Name:_____ Review Date:_____ **Final CEGL00** _____
Final Common Name:_____ If final call differs from original, give reason why:

Appendix G: Accuracy Assessment Field Manual

FIELD MANUAL FOR ACCURACY ASSESSMENT SAMPLING

NATIONAL PARK SERVICE
VEGETATION MAPPING INVENTORY PROGRAM

NATCHEZ TRACE PARKWAY
SUMMER 2015

Prepared for
United States Department of the Interior
National Park Service

Prepared by
NatureServe
4600 N. Fairfax Dr., 7th floor
Arlington, VA 22203

Contents

Page

A. THE BASIC FRAMEWORK FOR VEGETATION DESCRIPTION G-5

Vegetation Physiognomy, Floristics, and Environment G-5

Cover of Species, Including by Strata G-5

Environmental Factors G-5

B. PROJECT AND AA SITE DESCRIPTION OVERVIEW G-6

Field Sampling Strategy G-6

Recognizing Strata and Growth Forms G-7

Measuring Species Abundance and Strata Using Percent Cover G-8

C. ACCURACY ASSESSMENT FORM G-9

The Basics G-9

Getting There G-9

Once There—The Basic Procedures for Field Data Collection G-10

Before Leaving Each AA Site G-14

Final Steps Including Turning in Data Each Week G-14

Explanations of Data Fields on AA Form G-15

D. CHECKLISTS FOR FIELD TEAMS G-20

Planning for the Day G-20

Planning for the Week G-20

Final Steps at Week's End G-20

Field Materials G-21

A. THE BASIC FRAMEWORK FOR VEGETATION DESCRIPTION

Vegetation Physiognomy, Floristics, and Environment

The U.S. National Vegetation Classification (USNVC) is a vegetation classification that integrates floristic and physiognomic criteria, along with some environmental criteria, to define vegetation units. The upper levels of the USNVC hierarchy use formation concepts that are based on dominant and diagnostic growth forms that reflect the environment at global to continental scales. The formation concept has a long tradition in vegetation classification. In the revised USNVC, the formation concept is treated primarily as a physiognomic unit guided by ecological considerations, but importantly, it is open to some floristic input from lower levels. The midlevels are based on dominant and diagnostic growth forms and compositional similarity reflecting biogeography and continental to regional environmental factors. The lower levels (L7 and L8) are based on diagnostic and/or dominant species and compositional similarity reflecting local to regional environmental factors. The field sampling design emphasizes collecting data on all three sets of criteria. Field teams gather data on (1) dominant species, (2) dominant growth forms, and (3) environmental factors. Physiognomic and structural information are needed for the dominant and uppermost layers of vegetation. Location and environmental data are needed to confirm or explain floristic classification decisions.

Floristic information is the leading criteria for the alliance and association units that are being used to check the vegetation map at the Natchez Trace Parkway (NATR). These units are based on total species composition of a stand, as represented by a sampling unit. Thus, floristics and physiognomy must be described across all strata (or layers) of vegetation. Information on dominant and diagnostic species is collected across these layers to confirm the classification of the vegetation at accuracy assessment (AA) observation sites.

Cover of Species, Including by Strata

In addition to the simple presence of growth forms and species in an AA site, a measure of their abundance or dominance is needed. The USNVC gives consideration to the presence and abundance of species and to growth forms. Percent cover is the most widely accepted measure of species abundance or dominance because (1) it can be applied to all species, whether aquatic, herb, grass, shrub, or tree; (2) it is relatively easy to estimate in the field; and (3) it is a reliable and accurate measure for the purposes of classification.

Because the USNVC is an integrated physiognomic-floristic hierarchy, information on species percent cover should be collected within the context of the vertical strata in the AA site. In this way, major species dominants can be link to the dominant growth forms, and diagnostic species patterns can be assessed in the different layers of vegetation. In addition, older datasets that only contain information on a single stratum (e.g., only tree layer data) can still be compared to the percent cover data of that stratum.

Environmental Factors

Although primary classification decisions are based on floristic composition and physiognomy, final decisions about vegetation classes are often made in the context of information on environmental or local site factors. Indeed, habitat features are often valuable in making decisions about the diagnostic

value of species and they are useful in completing descriptions of vegetation types and using those descriptions to answer management or research questions (e.g., value as habitat to certain species or suitability for trails). Habitat features may help explain the vegetation pattern or provide additional criteria for the vegetation field key. For this reason, a variety of ecological or habitat factors are recommended to be collected, including at minimum: slope, elevation and aspect, topographic position, and evidence of disturbances. Wherever possible, "picklists" are provided to ensure consistency and ease of data entry. The information is rarely technical in nature, thus facilitating data collection in the field.

B. PROJECT AND AA SITE DESCRIPTION OVERVIEW

This section provides field teams with general instructions and guidelines for completing fieldwork for a given project area. The information gives the "how-to" for decision making in collecting data. Detailed, field-by-field coding conventions are provided for each of the primary data forms.

Field Sampling Strategy

Field sites are pre-selected based on the total area of each map class and corresponding associations. Sites are selected randomly using Geospatial Modeling Environment suite of tools and are spaced according to the minimum mapping unit (MMU) of a particular map class. Up to three accuracy assessment (AA) observation sites are permissible in any single mapped polygon. Sampling will be done after navigating to the pre-selected AA points. Once at the site, the field crew should make sure to consider an area equal to the MMU when making classification decisions. The MMU for NATR is 0.5 hectares (ha) (~1.2 acres) for most map units and 0.25 ha (~0.6 acres) for some map units (the MMU for each site will be noted on the field maps and within the AA point file attribution for the GPS unit). **The mapping team has not mapped vegetation units at scales smaller than 0.25 ha and thus it is critical that the AA field team does not consider smaller vegetation units either.** A circle with a radius of 40 meters (m) is 0.5 ha; a circle with a radius of 28 m is 0.25 ha. Once the field team is at the correct site and has scouted out an area equal to the MMU, they will begin to collect field data.

It is helpful to remember that map classes are not necessarily the same thing as vegetation associations. Map polygons are drawn and AA points are selected based on map classes. The field crew will assess the vegetation at an AA site and assign it to a vegetation association based on the field key to vegetation associations of NATR. At NATR, many, but not all, map classes are equivalent to vegetation associations. In most cases, this difference will not be important, or even apparent, to the field crews. One possible result of the difference that will affect the crews is that AA points may occasionally encompass more than one vegetation association. If a map class is composed of two similar vegetation associations, an AA point may be chosen that falls entirely within that single map class but on the border of two vegetation associations. In this event, field crews should not move the AA point but should record data as normal and note that two vegetation associations are present, or field crews should note that the site is intermediate between two associations and that crews are not confident only one association fits the site best (accomplished by recording both a primary and secondary best fit vegetation association name and corresponding 4-digit code on the data sheet and recording information on "confidence" and "fit" on the primary call).

Recognizing Strata and Growth Forms

A comprehensive vegetation description requires information on physiognomy, floristics, and environment. To standardize the collection of physiognomic information, collect information on the main strata of vegetation, including a list of species present in those strata. Because of the importance of using a standard approach to sampling vegetation strata, the issue is discussed in some detail here to ensure that subsequent discussions of field data collection are clear. A stratum is a layer of vegetation that includes all plant growth forms that occur within it. Plants are assigned to strata based on their predominant position or height in the stand, not by their taxonomy or mature growth form. Consequently, a tree species that has both seedlings and saplings in an AA site will be listed in several strata. In describing the vegetation physiognomy of an AA site for classification purposes, it is only necessary to capture the main features of the often-complex stand conditions rather than to describe the layering in the greatest possible detail.

In terrestrial environments, four basic vegetation strata should be recognized whenever they are present: tree, shrub, herb, and moss (sensu Fosberg 1961; the ground layer of mosses, liverworts, lichens, and algae). In aquatic environments, floating and submerged strata should be recognized where present. These six strata are needed to convey both the vertical distribution of overall cover and the predominant growth forms. Additionally, the six strata may be used to convey the abundance of each species in each stratum so as to provide a more detailed record of vegetation composition by strata. The six strata are defined as follows (see Figure G–1 for an example):

Tree stratum includes tall trees (single-stemmed woody plants, generally more than 5 m in height at maturity under optimal growing conditions). Very tall shrubs with tree-like form may also be included here, as may other growth forms such as lianas and epiphytes, and their contribution to the stratum can be further specified using the "growth form" field. For the **NATR field form, this stratum is broken down into two categories: canopy and sub-canopy.** Field teams should use the Height Scale and Cover Scale on the form. Estimate the stratum heights to the nearest height from the options provided, Canopy (20 m, 35 m, or >35 m) and Subcanopy (10 m or 20 m).

Shrub stratum includes shrubs (multiple-stemmed woody plants, generally less than 5 m in height at maturity under optimal growing conditions) and shorter trees (saplings) less than 5 m in height. As with the tree stratum, other growth forms present in this stratum may also be included; however, herbaceous growth forms should be excluded, as their stems often die back annually and do not have as consistent a height as woody growth forms. Field teams should use the Height Scale and Cover Scale on the form. Estimate the stratum heights to the nearest height from the options provided, Shrub (2 m or 5 m). (Some other projects differentiate tall shrub and short shrub strata.)

Herb stratum (also referred to as field or ground stratum) includes herbs (plants generally without woody stems and often dying back annually) often in association with low creeping semi-shrubs, vines, and nonwoody brambles (such as raspberries), as well as tree seedlings <1 m tall. Estimate the stratum heights to the nearest height from the options provided, Herbaceous (0.5 m, 1 m, or 2 m). Where herbs are entirely absent, it is still possible to recognize this

stratum if other very low woody or semi-woody growth forms are present. Prostrate shrubs are also included in this category (woody stemmed).

Nonvascular stratum (also referred to as moss, bryoid, or ground stratum): is defined entirely by mosses, lichens, liverworts, and algae that are growing on the ground. Ground-creeping vines, prostrate shrubs, and herbs should be treated in the herb stratum.

Floating aquatic stratum includes rooted or drifting plants that float on the water surface (e.g., duckweed, water-lily).

Submerged aquatic stratum includes rooted or drifting plants that by-and-large remain submerged in the water column or on the aquatic bottom (e.g., pondweed). The focus is on the overall strata arrangement of these aquatic plants. Note that emergent plant growth forms that are in a wetland should be placed in the strata listed above (e.g., cattail or sedges would be placed in the herb stratum, bald cypress or black ash in the tree stratum).

Epiphytes, vines, and lianas are treated where they are present within the strata defined above, not as separate strata.

Within each basic woody stratum, separate out substrata (see Strata and Substrata, page G–18).

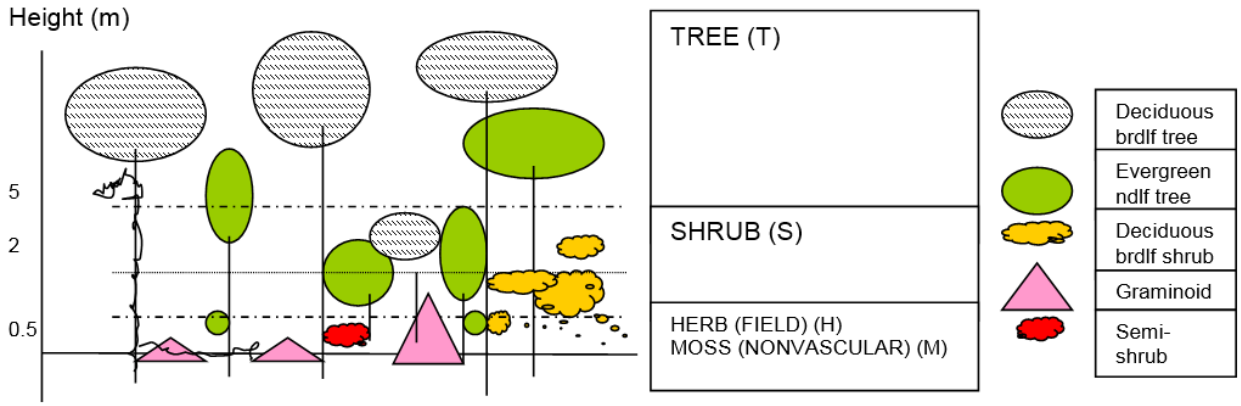


Figure G–1. Major strata (layers) recognized in terrestrial vegetation. Shown here are typical strata found in forests. Additional strata within stands of aquatic vegetation are floating aquatic and submerged aquatic.

Measuring Species Abundance and Strata Using Percent Cover

Percent cover is a meaningful attribute for nearly all plant growth forms and allows their abundances to be evaluated in comparable terms. Percent cover can be defined generically as "the vertical projection of the crown or shoot area to the ground surface expressed as … percent of the reference area" (Mueller-Dombois and Ellenberg 1974). For our purposes, percent cover based on crown or shoot area is applied as canopy cover rather than foliar cover. Canopy cover is the percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included.

Canopy cover is the preferred method of collecting cover because it better estimates the "area that is directly influenced by the individuals of each species" (Daubenmire 1968), is easier than foliar cover

to estimate from aerial photos, and is more likely to correlate with satellite image analysis. A classification based on canopy cover is better suited for mapping vegetation than one based on foliar cover. Strata cover should always be estimated on an absolute basis, and individual species cover should also be estimated as absolute cover rather than relative cover, which is taken relative to the absolute cover of the strata. If relative species cover is needed for later analysis, there is a very easy conversion (relative cover for a species within a stratum equals absolute cover for that species in that stratum/absolute cover for the stratum).

C. ACCURACY ASSESSMENT FORM

The Basics

The AA sites are not marked by defined boundaries. AA points are randomly selected in advance. Field teams navigate to the point using GPS, scout out the area briefly to get a feel for what the area is like, and record some general data to characterize it on an AA form.

Getting There

Depending on the project, the team may have a variety of base maps to work with to locate AA sites. In National Park Service Vegetation Mapping Inventory Program projects, field teams will have, at a minimum, an aerial photo with the AA points that they need to visit/sample. Polygons to be assessed will either be at a radius of 28 m (0.25 ha MMU) or 40 m (0.5 ha MMU). Linework between polygons will not generally appear on the maps, except in cases where the chosen AA point has a lower than typical buffer from the adjacent polygon. The team will navigate to each selected area using maps, the aerial photo(s), and GPS. If point maps are provided to the field crew(s), these maps may have roads and trails highlighted on them to help the team as well.

Before leaving for your site each week... check that the team has all the materials needed to complete the fieldwork (see Section D: Checklists for Field Teams).

Every morning... check the GPS receiver to make sure it is set to NAD 83, that the batteries are charged or at a sufficient amount, replacement batteries are brought along, and the storage memory is sufficient for the day's work. Check the camera to ensure there is space for the day's work. If you are using a digital camera, verify that batteries and memory are sufficient.

Location of the AA site... navigate to the exact coordinates of the target AA point. If it is not safe to position yourself at the exact coordinates (and assuming there is a clear line of sight to the AA point and that you can easily key the community type out and take data with a reasonable level of confidence), then get as close as possible, record the Universal Transverse Mercator (UTM) coordinates and UTM zone of your actual position, and then record the offset. The offset should be recorded as a direction (azimuth) and distance (in meters) from the UTM coordinates where you are standing to the target point you were originally aiming for.

Acceptable Reasons for dismissing an AA point (and information on how to document this)...

Most AA sites at NATR should be very easy to access. The only exceptions will be sites that end up being too close to roads, sites that are in or on the opposite side of a water body that cannot be easily crossed, and sites that fall on private land that is marked with no trespassing signs, fenced, or may

have other issues related to safety. In order to determine if you can dismiss an AA point, please ask the following questions. If you answer yes to any of these questions, you should go to the second set of questions below:

- Does anyone on the team feel that accessing the AA site will be an unacceptable risk to their personal safety?
- To access the AA site, will you need to cross land marked as "no trespassing"?
- Will accessing the AA site require you to climb a fence (e.g., no gates)?
- Will accessing the AA site require you to navigate through water above your knees and are no other means available to efficiently access the AA site (boat, etc.)?

If you answered yes to any of these questions, please answer the following question to determine if you can dismiss the AA point:

- Without traveling to the center of the AA site, do you have clear line of sight to the AA point and can you easily key the community type out and take data with a reasonable level of confidence?

If you answered one of the first four questions "yes" but also answered the last question "yes", then you can still proceed with collecting point data remotely but will need to make some notes in the sketch. Also, you will take the GPS data from where you are standing and need to explain in the notes that the GPS data are where you observed the AA point, not at the intended site center.

If you answered "no" to the last question, throw out the point.

VERY IMPORTANT: AS SOON AS YOU DISMISS AN AA POINT, PLEASE TEXT, CALL, OR EMAIL NATURESERVE STAFF WITH THE POINT NAME, REASON FOR DISMISSING IT OUT, AND ANY OTHER USEFUL INFORMATION SO THAT WE CAN WORK WITH UMESC STAFF TO ASSIGN A NEW AA POINT TO REPLACE THIS ONE AS SOON AS POSSIBLE. In 2015, the NatureServe contact will be Rickie White (Rickie_white@natureserve.org) but Carl Nordman may also be able to help if Rickie is unavailable (carl_nordman@natureserve.org).

Once There—The Basic Procedures for Field Data Collection

Determine and Record the AA Site Location

Using the GPS receiver, field teams determine the UTM coordinates and UTM zone. The field teams record the coordinates under the **UTM X** and **UTM Y** blanks, and circle the UTM zone on the AA site form. Field teams also record the GPS estimated error. If the team cannot get a GPS reading with sufficient accuracy (estimated error at or below 10 m), they should mark the location they were at as precisely as they can on the aerial photo maps they have or they should continue to let the GPS run in the background while taking data to see if they can get the estimated error value lower (in meters). If a map was marked up, the exact location coordinates can be estimated later. Note on the field form that this will be required and attach the map to the form. Do not forget to record whether the GPS was WAAS enabled, whether you used averaging, the accuracy in meters, the number of satellites, and the GPS score (developed when averaging).

Identifiers/Locators

Complete the information for any fields that are not already completed. The AA point code is pre-determined by the mapping group and should be recorded on the form. The GPS point code, on the other hand, is assigned by the fieldworker and should match the GPS point code entered into the GPS unit when taking the data.

Taking Vegetation Photographs

Teams should take six photos at each AA site. The first photo is of the AA field form after recording, at a minimum, the AA point number, UTM coordinates, and UTM zone. The next four photos should be in the four cardinal directions (N, E, S, W) starting with north. Because the photos taken in the cardinal directions may not capture the feel of the area, take one photo that best represents the sample area. Make sure to mark on the field form the photo numbers or the order of the photos taken in the blank marked "photo #s" (order of photos should be "photo of form, N, E, S, W, representative photo").

Record Environmental Description

Environmental information for AA sites is relatively simple. Record the elevation, slope angle, aspect (slope direction), topographic position, and environmental factors affecting the vegetation of the area. Instruments and their use are covered during training so that all fieldworkers are collecting these data the same way.

Sketch of Observation Area

The sketch is very important because it can often be used to help later reviewers better understand the environmental context. With this information, the reviewer may be able to give the final call a higher confidence value or conversely may use the information to make a different call than the original data collector. If possible, make sure that each AA site has a sketch, especially for areas where you perceive that multiple associations exist in one MMU. Be sure to follow sketch instructions listed on the NATR AA field form.

Complete Vegetation Description

Substrata (e.g., canopy tree and subcanopy tree) are standard for the National Park Service Vegetation Mapping Inventory Program and are seated within the basic strata.

Provide the prevailing height of the top of each stratum.

Having decided on the strata, record the species information in the following manner:

1. Begin by simply listing the dominant 1–4 species (plus any diagnostic species) observed in each of the main layers.
2. Collect any unknown dominant or diagnostic species (see details below) and label each bag or sheet containing the specimen with the AA site code and a unique identifier corresponding to the code on the form (e.g., *Carex* #1, Fern #2).
3. When the list appears complete (including all the dominant plant species found in each stratum of the vegetation), begin estimating cover. For each stratum:
    a. Estimate total absolute cover of the stratum (Tree Canopy, Herbaceous, etc.);

   b. Estimate individual species absolute canopy percent covers for the stratum (e.g., *Quercus rubra* in the Tree Canopy);
   c. Add up species covers within the stratum and compare to total stratum cover. Sort out any discrepancies, recognizing that overlap can occur between species and layers and that you are only recording cover of dominant species (e.g., cover of minor species will not appear on the data sheet and absolute cover of all dominant species may be lower or higher than total stratum cover in many cases).
4. Check your list of species to be sure that each is clearly written out. Whenever possible, use the species names that match the taxonomic authority for your project.

Some Guidance on Estimating Cover

The percent cover of the stratum is the total vertical projection of the canopy cover of all species collectively onto the ground, not the sum of the individual percent covers of all species in the stratum.

Plants are assigned to strata based on their predominant position or height in the stand, not by their taxonomy or mature growth form. Consequently, a tree species that has both seedlings and saplings in an AA site could be listed in several strata.

Epiphytes and lianas are handled by listing them in the strata in which they occur. Thus, epiphytes and lianas may also be listed on the field form in more than one stratum.

The herb stratum (herb, herbaceous, or field stratum) includes all low woody, semi-woody plants, or creeping vines, where these woody plants and vines overlap in height with the herbs. This inclusion is a compromise among strata based strictly on height versus growth form. Field teams may find it helpful to create a checklist of dwarf-shrubs, semi-woody shrubs, or vines that are to be recorded along with herbaceous plants as part of the herb stratum.

The nonvascular stratum (sometimes called moss, bryoid, or ground stratum) is reserved strictly for very low growing cryptogams (mosses, lichens, liverworts, algae, and bacteria), even where herbs or woody plants may be reduced to very short heights.

Collecting Specimens

Field teams should have sufficient botanical expertise to identify most species encountered in the project area. If botanical expertise is not possible, an expert taxonomist should be identified early in the project. A large backlog of unidentified pressed specimens should be avoided because storing and curating large numbers of specimens becomes inefficient. Our permit for NATR specifies that all specimens should be destroyed once identification is complete, so please notify the permit holder (Rickie White) if you feel any specimens need to be kept and turned into to the Parkway because of special circumstances. If the team cannot identify a plant to species, they should record it on the form as “unknown species 1,” “unknown species 2,” “unknown *Carex* sp. 1,” etc. They can record associated cover class and other data for the unknown as they would for any other species. They can then do one of two things:

a. If the team needs the species identified right away because it appears to be dominant or diagnostic (they will be seeing it all over the place or it's much more common in this particular vegetation type than in others), they can take a sample of the species with as much of the plant as possible, especially intact flower or fruiting parts, if present. Place the sample in a bag or on a sheet and label the bag or sheet with the AA site code and the name used on the data form (e.g., *Carex* sp.1). A member of the team should then try to key it out.
b. If plant specimens must be saved for identification beyond a few days, they must be dried and pressed, but mounting is unnecessary unless the specimens are to be housed in a herbarium. Aquatic plants should be handled by placing a mounting sheet at the bottom of a deep tray of water. Suspend the plant in the basin and arrange it as needed, then carefully remove from the basin. Place between blotters to dry. Mark the pressed specimen with the AA site code and the name used on the data form.

If possible, store specimens in a cool, dry place until ready to be pressed. Bagged specimens will keep fresh longer in the refrigerator or ice chest until pressed or identified. A judgment must be made early on regarding species that should be identified in the field versus those that can wait. Common plants recurring in many AA sites are best keyed in the field, whereas those encountered rarely or at very low cover may be keyed later when manuals are likely to be readily accessible. A quick prioritization of what to key and what to press may be made based on the recurrence of the species in samples and on the cover-class estimate of the species in a particular AA site. Field teams should mark the specimen tag with its cover class estimate and any notes helpful in identification such as "tall shrub" or "wetland plant", as well as its unique identifying number for the vegetation sample. If pressed specimens begin to build up, teams should let their project supervisor know. The supervisor/coordinator can then take steps to have some of the plant specimens identified.

Classifying the AA Site

Once all data have been collected at an AA site, the field team needs to provide a classification name for the vegetation. Field teams will have a vegetation field key to work through to decide on the classification. Typically, physiognomy and floristics will both be important to place a community within the USNVC. Any confusion about how to classify the AA site or if the vegetation field key does not work well should be noted on the AA form. The concepts of "confidence" and "fit" allow users to record how confident they are that the classification name decided on is correct based on their experience in the field, as well as how well the association "keyed out" (or fit). Additionally, if the vegetation field key does not work well at a specific site, the AA crew should still record a best fit vegetation association based on the vegetation field key, again, noting that the vegetation type assigned to the site is the "best fit" and scoring the fit as low and the confidence as high, medium, or low depending upon their professional opinion.

If the vegetation field key fails repeatedly in one area, please look at and make notes on how the vegetation field key may be improved to provide the best outcome and suggest changes to the project supervisor/coordinator.

Before Leaving Each AA Site

Before heading off, be sure to check the forms to be sure all of the categories have been completed. In particular:

1. Look over the various strata categories to be sure there are cover values for all strata and species within each stratum.
2. Look over the dominant species lists to be sure none were missed that were called out or observed.
3. Review the descriptive fields that summarize the overall impression of the stand (environmental comments, unvegetated surface, representativeness, adjacent vegetation communities, fit, confidence, and classification comments). If these have not been filled out, now is a good time.
4. Check the equipment list to be sure nothing is left behind and all flagging has been cleaned up.

Final Steps Including Turning in Data Each Week

Perhaps the most important step, turning in data in a timely manner will help complete the project on time and on budget. Turning in data in a timely will also keep loss of data down to a minimum because data that pile up can often disappear or become disorganized creating confusion and data loss. The following are the key steps to complete before and during the handoff of data:

1. At the end of each week (or longer) stint of fieldwork, download all GPS points you collected as well as all photo images to your computer. If possible, also scan all final field data sheets as a backup in preparation for mailing the originals to the NatureServe regional office in Durham, North Carolina (601A Foster Street, Durham, NC 27701).
2. Upload scanned field forms, field photos and GPS file for corresponding sites to the NatureServe transfer site using the instructions in the "Upload-instructions.doc" file that each field team was given.
3. Mail data sheets to Rickie White, 601A Foster Street, Durham, NC 27701.
4. Email updated list of data points that were collected during the week so that completed points can be kept tracked of, what points were thrown out, and what points are not completed.

Explanations of Data Fields on AA Form

LOCATION INFORMATION

State
Provide state name or code.

AA Point Code
Number for the AA point, from AA map or from pre-loaded list in the GPS unit. In the GPS unit, these are called RndID projected in NAD83 UTM Zone 15 or 16.

GPS Point Code
Code for the coordinates saved in the GPS. At NATR, use N plus a four digit number. For instance, if the AA point code is 203, then the GPS point code would be "N0203". The AA point code and GPS point code should be really close to one another unless the crew had GPS difficulties or was required to offset the point because of issues with access.

Survey Date
Record the date the survey was taken; month, day, year.

AA Point Time
Record the time data collection was started at the site.

Field Team
Record the names of surveyors, with team leader listed first. The team leader is the person most responsible for the quality of the data recorded on the form and the first person to which questions about the data will be addressed. Full names should be recorded (full first and last name).

Photo of Form
Circle whether or not photos of the first page of the AA form were taken.

Photo Numbers
Record the individual photo numbers or range of photo numbers, as listed in the camera, taken at each specific site. There should be at least six photos collected. The first six photos are, in order, (1) the first page of the AA form after at least the point number, UTM, and date have been recorded, (2) in cardinal directions from the GPS point clockwise starting with north (N, E, S, W), and (3) one or more photos that best represent the assessed area. In an ideal entry, the photo #s form would read "photo of form, N, E, S, W, representative photo".

Datum/UTM Zone
For the NATR vegetation mapping project, this should be NAD 83. Our Garmin units automatically choose the UTM zone (in some cases 15 and in some cases 16, depending upon the section of NATR where you are taking data). PLEASE BE AWARE OF WHICH ZONE YOU ARE TAKING DATA IN AND RECORD THAT ZONE BY CIRCLING THE CORRECT ONE AT THE TOP OF PAGE 1 FOR EVERY UTM COORDINATE VALUE TAKEN.

WAAS Enabled
Is the WAAS system available and enabled on your GPS unit? Wide Area Augmentation System (WAAS) is an air navigation aid developed by the Federal Aviation Administration to augment the Global Positioning System (GPS), with the goal of improving its accuracy, integrity, and availability.

GPS Accuracy
Note the accuracy of your GPS Unit (in meters) and whether GPS averaging was used.

UTM X
Record UTM X coordinates, also called "easting", using a GPS unit.

UTM Y
Record UTM Y coordinates, also called "northing" using a GPS unit.

No. of Satellites
Record the number of satellites available to your GPS unit when recording the site location.

Iterations/GPS Score
Averaging points is generally advisable. If you average, please do so ideally for 100 iterations.

GPS Point is Intentionally Offset
If the crew cannot reach the pre-set coordinates of the AA point, note the reason (e.g., dangerous slope, water, private property) then record the azimuth and estimated distance to the pre-set coordinates. If the assessment area around the original coordinates is visible and the crew feels they can accurately classify the vegetation (binoculars may be useful for this) they should continue with the form.

ENVIRONMENTAL DESCRIPTION
Elevation
Record the elevation in meters at which the GPS point was recorded. Note the source used to calculate elevation. The GPS unit is preferred as a source for elevation over the DRG maps, but the latter can be used if necessary. If the GPS was not placed at ground level when recording, subtract the height (in meters) that the GPS was at when recording to get the correct elevation for that location.

Unvegetated Surface Substrate
Estimate ground or surface cover to the nearest percentage by each category, including woody stem basal area (Table G–1). For surface features not provided on this list, use the "other" category and note the feature. Cover estimates should sum to 100%. In cases where moss, lichen, sand or litter thinly covers the rock, ignore the less significant cover and record the total cover of rock. Rock and sand definitions are from Brady and Weil (2002).

Table G–1. Percent value descriptions to record unvegetated surface values within an accuracy assessment site.

[mm, millimeter; cm, centimeter]

Value	Description
Percent Bedrock	Percent of surface that is exposed bedrock
Percent Loose Boulders and Stone	Percent of surface that is exposed gravel/pebble (2–75 mm), cobble (75–256 mm) and stone/boulder (>256 mm).
Percent Leaf Litter / Organic Matter	Percent of surface that is litter
Percent Decaying Wood	Percent of surface that is wood >1 cm diameter
Percent Water	Percent of surface that is covered in water
Percent Mineral Soil / Sand	Percent of surface that is occupied by bare mineral soil or eolian or alluvial sand deposits (0.05 mm to 2.0 mm)
Other	

Slope
Measure the slope in degrees using a clinometer or estimate using a compass that contains a slope-measuring device. Circle the appropriate slope degree that best describes each site.

Aspect
Measure the slope aspect (direction of slope) using a compass (be sure to correct for the magnetic declination). Note: all compasses should be pre-set to an average declination for the park and thus, readings from the compasses carried by the field teams may be directly noted. Circle the aspect that best describes the site.

Topographic Position
Take a second to observe where the AA site is on the landscape. Then, choose one of the following categories: Interfluve (Ridge/summit/crest), High slope, Midslope, Lowslope, Toeslope, Low level (terrace), or channel bed.

Environmental Comments
Enter any additional noteworthy comments on the environmental setting. This field can be used to describe stand history such as fire events (date since last fire or evidence of severity), as well as other disturbance or stand regeneration factors. On the form it states, "(*Characteristics that affect vegetation—e.g., if the site is a wetland, indicate type of hydrology, e.g., seepage wetland, temporarily flooded stream bottom, seasonally flooded pond, etc.; topographic position, landform, evidence of natural and human disturbance, successional status, stand maturity, etc.*)"

Sketch of Observation Area
Draw a sketch of the observation area using aerial view or transect view, or both. Indicate north arrow, where GPS coordinates were collected, whether an offset point was needed, locations and bearings of photo points, AA site orientation, roads, trails, and any other distinctive features of the vegetation (e.g., transitions to different vegetation types, landscape features). Site need not be circular if constrained by map guidelines.

VEGETATION STRUCTURE

Stratum, Strata Maximum Height, Cover Values by Strata

For all of the strata that are present, record the height and total cover. You should use the Height Scale and Cover Scale on the form. Estimate the stratum heights to the nearest height from the options provided.

Record the maximum cover class for each vertical vegetation stratum indicated on the table. The heights in the right column indicate the maximum height accepted for each stratum, Canopy (20 m, 35 m, >35 m), Subcanopy (10 m, 20 m), Shrub (2 m, 5 m), and Herbaceous (0.5 m, 1 m, or 2 m). The lowest stratum contains all woody plants <0.5 m tall and all herbaceous plants, regardless of height. Choose a default maximum height for each stratum.

VEGETATION COMPOSITION

List the absolute cover of all species with a cover value of more than 10% with a special emphasis on the species that you would consider to be characteristic of the vegetation at the AA site. You may list additional species that are present at lower cover if they are deemed to be diagnostic. Write the species in the "Species" column; indicate whether you consider it a diagnostic species for the purpose of classification, noting if you have collected it for further identification work. Record species cover in the following cover classes:

P <5%, 01 = 5-15%, 02 = 15-25%, 03 = 25-35%, 04 = 35-45%, 05 = 45-55%, 06 = 55-65%, 07 = 65-75%, 08 = 75-85%, 09 = 85-95%, 10=>95%

Species

Record the full taxon name or use the code from the list supplied by NatureServe.

Diagnostic Species

Place a check mark or X if the taxon is diagnostic of the vegetation community. A diagnostic taxon is any species whose relative constancy or abundance differentiates one vegetation type from another.

Total Cover

Record the total cover of the taxon throughout the entirety of the assessed area.

Canopy Layer

Record the total cover of the taxon in the tree canopy over the assessed area.

Subcanopy Layer

Record the total cover of the taxon in the subcanopy over the assessed area.

Shrub Layer [note: this field form only accommodates one shrub stratum]

Record the total cover of the taxon in the shrub stratum over the assessed area.

Herbaceous Layer

Record the total cover of the taxon in the herbaceous layer over the assessed area.

Aquatic or Nonvascular Layer

Record the total cover of the taxon in the aquatic or nonvascular layer over the assessed area.

Specimen Collected
Place a "Y" if a specimen was collected for this species.

Confidence in ID
Note the confidence in the identification of the taxon as H=High, M=Medium, or L=Low.

POINT ASSESSMENT
Representativeness
Is the area of the vegetation being assessed around the AA point at least equivalent to 1 MMU? Indicate whether the vegetation is homogeneous, very patchy, or transitional between two types? Note whether there are other vegetation communities within or near the assessment area.

Fit
Rated as HIGH, MEDIUM, or LOW – record both how easily the vegetation at the AA site was keyed to a vegetation community AND how confident the field crew is that the vegetation communities they keyed the site to actually fits the vegetation at the site. Vegetation at a site may fit the vegetation field key well but the final classification may not match the community well or vice versa. If you chose MEDIUM or LOW, record how well the vegetation field key worked to classify the vegetation around the AA point. Especially important is to note any difficulties or questions encountered in classifying the AA site, either because of confusion with the vegetation field key or disturbance/heterogeneity around the AA site.

Primary Field Call
This is the vegetation community that best fits the AA site based on the vegetation field key. Please use the Common Name of the vegetation association as listed in the vegetation field key and record the ELCODE (e.g., CEGL00XXXX) of association that best fits the site.

Secondary Field Call
If the vegetation of the area at the AA site seems intermediary between two types or if there are two associations prominent within the assessment area, record the second best fit in this field and record the ELCODE (e.g., CEGL00XXXX) and common name of that association as listed in the vegetation field key. Small inclusions of a second association in the assessment area are ignored.

D. CHECKLISTS FOR FIELD TEAMS

Planning for the Day

1. Safety and sustenance issues (plenty of food, water, proper clothing, first-aid kit).
2. Field communications: Develop plan with additional field crews, NatureServe, or Park Staff, detailing check-in times.
3. Check GPS (batteries, available memory, waypoints, below MMU assessment area polyline tracks, etc.).
4. Check digital camera (batteries, available memory).
5. Check list for all other field equipment.
6. Plan the day's mission before departure using the hardcopy AA point map with flagged points.

Planning for the Week

1. Check for all appropriate maps, aerial imagery (if available), and AA point maps.
2. Develop an estimate of reasonable expectations of AA sites to choose for each team broken up by day and based on an estimate of individual team's travel logistics for the week.
3. Develop plan for the week to sample all AA points in work area.
4. Balance items 2 and 3 in the "Planning for Day" list with the expected work schedule of the teams and ensure adequate time off and reduce overtime concerns.
5. Check for all necessary information for AA point maps for the zone and blank field forms.
6. Communication with management team and field teams.
   All uncertainties dealt with (e.g., not able to get to some points, problems with interpreting PI information, personnel issues, problems in interpreting classification/key, park-related logistics).
7. Organization of field teams.
   a. Gather Q.C.'ed field forms (allow time for Q.C. and resolving questions about the forms).
   b. Obtain all plants not identified (allow time for plant identification).
   c. Were there any questions about the polygons visited during the week?
   d. What was accomplished, what was not accomplished?
   e. Pass on the developments and questions to the management team on a regular basis. Do not let them build up too long.

Final Steps at Week's End

1. Update list of sampled AA sites.
2. Upload all GPS point data and photo data to transfer site.
3. Scan data sheets or create hardcopy backup prior to mailing them to 601A Foster Street, Durham, NC 27701.

Field Materials

- AA point maps
- road/trail maps
- compass
- GPS receiver (checked daily to ensure that it is set correctly (to NAD 83)
- clinometer
- camera and batteries/memory card (allow at least six exposures per AA site)
- baggies
- pens/permanent markers
- AA forms, including some on waterproof paper
- classification report for the project
- vegetation field key
- loupe/magnifier for identifying plants
- botanical manuals

Appendix H: Accuracy Assessment Reconciliation

Contents

Page

Explanation of Accuracy Assessment Reconciliation H-4

A. COMBINE FXPU AND FXPW H-6

B. LEAVE FXMH AS IS, ACCEPT LOW ACCURACY H-6

C. COMBINE FXSG AND FXGO H-6

D. COMBINE FCWO AND FGPO H-7

E. COMBINE FDMO, FMOR, AND FGCB; LEAVE FICO AS IS, ACCEPT LOW ACCURACY H-7

F. COMBINE FBEF, FMHF, AND FNSB H-8

G. LEAVE FSGF AS IS, ACCEPT LOW ACCURACY H-8

H. LEAVE FXMF AS IS, ACCEPT LOW ACCURACY H-9

I. COMBINE HXMG AND HXWM H-9

Explanation of Accuracy Assessment Reconciliation

This appendix presents the steps used to reconcile the vegetation map layer following the accuracy assessment (AA) analysis for the Natchez Trace Parkway vegetation mapping project. This process involved presenting to Natchez Trace Parkway staff a review of how and why vegetation map classes did not meet National Park Service Vegetation Mapping Inventory Program standards, providing them with a suggestion for how to remedy the issue, and explaining to them the benefits and consequences from accepting that choice. The standard set by the National Park Service Vegetation Mapping Inventory Program is that a map class be at least 80% accurate within the 90% confidence interval for the map class; the upper limit 90% confidence interval is abbreviated as (UL–CI). The following table (Table H–1) presents a list of the map classes referenced in this appendix and what became of them to help understand the process and maintain continuity with the final map classification for the Parkway. Please reference Table H–1 for map class acronyms in this appendix only.

Table H–1. Original map-class codes and names that existed prior to accuracy assessment map reconciliation, linked to current map-class codes and names.

[The U.S. National Vegetation Classification associations are presented by map class to complete the bridge. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Original Map-Class Code	Original Map-Class Name	USNVC Association Code	Current Map-Class Code	Current Map-Class Name
FBEF	Forest Box-Elder Floodplain	CEGL005033	FMHF	Mixed Hardwood Floodplain Forest
FCWO	Forest Cherrybark & Willow Oaks	CEGL004109	FSOH	Southern Oak - (Hardwood) Forest
FDMO	Forest Dry-Mesic Oak	CEGL002067, CEGL002070, CEGL007225, CEGL007244, CEGL007246, CEGL007795	FNOH	Northern Oak - (Hickory) Forest
FGCB	Forest Gulf Calcareous Bluff	CEGL004671	FNOH	Northern Oak - (Hickory) Forest
FGPO	Forest Sweetgum - Pecan - Water Oak	CEGL004122	FSOH	Southern Oak - (Hardwood) Forest
FICO	Forest Interior Chestnut Oak	CEGL007261, CEGL007700	FNCO	Northern Chestnut Oak Forest
FMHF	Forest Mixed Hardwood Floodplain	CEGL002427, CEGL002431, CEGL004690	FMHF	Mixed Hardwood Floodplain Forest
FMOR	Forest Mixed Oak Rich	CEGL007808, CEGL008442	FNOH	Northern Chestnut Oak Forest
FNSB	Forest Nuttall Oak - Sugarberry Bottomland	CEGL004619	FMHF	Mixed Hardwood Floodplain Forest
FSGF	Forest Sycamore - Sweetgum Floodplain	CEGL007335	FCSF	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest

Table H–1 (continued). Original map-class codes and names that existed prior to accuracy assessment map reconciliation, linked to current map-class codes and names.

[The U.S. National Vegetation Classification associations are presented by map class to complete the bridge. USNVC, U.S. National Vegetation Classification; CEGL, Community Element Global; CEPS, Community Element Park Special]

Original Map-Class Code	Original Map-Class Name	USNVC Association Code	Current Map-Class Code	Current Map-Class Name
FXGO	Forest Successional Sweetgum Oak	CEGL007217	FXSO	Ruderal Sweetgum - (Oak) Forest
FXHC	Forest Successional Hardwood Complex	CEGL003687, CEGL007037, CEGL007191, CEGL007279, CEPS004837	FXHC	Ruderal Hardwood Forest Complex
FXMF	Forest Successional Mixed Floodplain	CEGL007330, CEGL007380	FXMF	Ruderal Mixed Floodplain Forest
FXMH	Forest Successional Mixed Hardwood	CEGL003686, CEGL004697, CEPS004809	FXMH	Ruderal Mixed Hardwood Forest
FXPU	Forest Successional Pine Upland	CEGL002591, CEGL006011, CEGL006327, CEGL008450, CEGL008462	FXPN	Ruderal Pine - (Hardwood) Forest
FXPW	Forest Successional Pine Wetland	CEGL007546, CEGL007551, CEGL007560	FXPN	Ruderal Pine - (Hardwood) Forest
FXSG	Forest Successional Sweetgum	CEGL007216	FXSO	Ruderal Sweetgum - (Oak) Forest
FXTT	Forest Successional TulipTree	CEGL007220, CEGL007221	FXTT	Ruderal Tuliptree Forest
FXWO	Forest Successional Water Oak	CEGL004638	FXWO	Ruderal Water Oak Forest
HXMG	Herbaceous Successional Mixed Grasses	CEGL004035, CEGL004044, CEGL004048, CEGL004108, CEGL004700, CEGL006333, CEPS004833	HXMG	Ruderal Mixed Grassland
HXWM	Herbaceous Successional Wet Meadow	CEGL003866	HXMG	Ruderal Mixed Grassland

A. COMBINE FXPU AND FXPW

Confusion between successional upland loblolly pine and successional wetland loblolly pine (FXPU and FXPW)

Problem: Despite finding evidence in the field that the rare wetland successional loblolly pine (i.e., natural) could be mapped separate from the ubiquitous upland successional loblolly pine (i.e., successional or planted), the AA results proved differently. No areas of wet pine were found in polygons mapped as FXPU, but large amounts of dry pine were found in polygons mapped as FXPW.

Suggestion: Combine the FXPU and FXPW map classes together. This combination will pull user and producer accuracy well above 80%.

Consequences: The Parkway will lose mapped polygons of natural wetland loblolly pine but will maintain the plots, field reconnaissance, and AA data for these sites.

Parkway Staff Decision: Support combining FXPU and FXPW.

B. LEAVE FXMH AS IS, ACCEPT LOW ACCURACY

General undermapping of upland successional forest (FXMH)

Problem: The FXMH map class was not mapped aggressively enough, and general confusion exists with nonsuccessional forests (i.e., consistently, mappable areas of FXMH in polygons are mapped as natural/semi-natural forest). However, there is no pattern of error with any specific natural/semi-natural forest map class, which precludes an easy fix.

Suggestion: Accept a slightly lower accuracy and leave the FXMH map class as is.

Consequences: The raw producers' accuracy sits at 63% (UL-CI 78%), with a users' accuracy at 67% (UL-CI 82%). This percentage is slightly lower than program standards, but because of the generalized confusion, the Parkway will only lose resolution for another map class in attempting to improve this map class. There is an option to merge this map class with FXTT, but FXTT was mapped well and is generally a richer, less disturbed map class. Additionally, the 80% accuracy standard would only be met on the UL-CI; this outcome is thought not to increase the Parkway's ability to resolve vegetation types.

Parkway Staff Decision: Support leaving FXMH as is, willing to accept the slightly lower Producers' accuracy.

C. COMBINE FXSG AND FXGO

Confusion between successional upland sweetgum forests (FXSG and FXGO)

Problem: There is consistent confusion between early-successional sweetgum (FXSG) and late-successional sweetgum-oak (FXGO). Essentially, there is on-the-ground confusion on weather age, oak content, or both, is what determines the vegetation type; this confusion has negatively impacted the FXSG map class.

Suggestion: Collapse FXSG and FXGO into a single map class. The single map class will pull producer accuracy well above 80% but still leaves users' accuracy at 63% (UL-CI 74%). Accepting the slightly lower users' accuracy is suggests because the remaining opportunities to collapse this map class and increase accuracy do so at the expense of having a meaningful map class. These opportunities are to collapse the sweetgum into the natural cherrybark oak forest (FCWO) or to collapse it into the wetland successional sweetgum forest (FXMF).

Consequences: Collapsing FXSG and FXGO will result in poor age distinction for this map class, but the resulting map class will still be dominated or codominated by successional sweetgum. Collapsing the merged upland successional gum into FCWO will destroy the primary natural map class for the southern part of the Parkway. Collapsing the merged upland successional gum into FXMF will confuse upland versus wetland management of successional sweetgum forests in the Parkway.

Parkway Staff Decision: Support combining FXSG and FXGO.

D. COMBINE FCWO AND FGPO

General undermapping of natural cherrybark oak forest (FCWO)

Problem: The natural cherrybark oak forest (FCWO) was generally undermapped with numerous examples found in more ruderal/successional map classes (FXHC, FXSG, FXGO, and FXWO). There was also general confusion between one rare, natural map class (FGPO) and the natural cherrybark oak forest (FCWO).

Suggestion: As FCWO is a natural vegetation map class, it would be preferential to keep it that way. Merging FCWO with FGPO is suggested, as these are both natural vegetation map classes. Other merge options would bring ruderal/successional vegetation into the map class causing an additional level of confusion. This puts users' accuracy well above 80%, but producers' accuracy is still low at 63% (UL-CI 74%).

Consequences: Collapsing the natural vegetation together will result in lower resolution for some rare natural vegetation along the Parkway, but this vegetation is still covered by field data for the project. There will still be generalized confusion with successional map classes having areas of natural cherrybark oak vegetation (specifically FXGO and FXWO), but these areas will preserve the line between successional and natural vegetation and reduce confusion among different types of successional forest.

Parkway Staff Decision: Support combining FCWO and FGPO.

E. COMBINE FDMO, FMOR, AND FGCB; LEAVE FICO AS IS, ACCEPT LOW ACCURACY

General confusion of dry-mesic oak (FDMO), rich oak (FMOR), and calcareous bluff (FGCB) map classes

Problem: The dry-mesic oak map class was generally undermapped, and the rich oak and calcareous bluff map classes were generally overmapped.

Suggestion: Combine the FDMO, FMOR, and FGCB map classes together. This combination will increase users' accuracy to 70% (UL-CI 80%), but leaves producers accuracy at 69% (UL-CI 79%). These percentages could be improved by merging this group with the most xeric oak (FICO) map class, but this means introducing a fire-dependent oak map class into a map class with either periodic or no fire dependency. Additionally, although there is confusion between FICO and FDMO, there is no confusion among FICO and FMOR or FGCB, and FICO is mapped well enough to stand alone.

Consequences: The dry-mesic oak map class is greatly more common than the relatively uncommon rich oak map classes. So, there will only be a limited dilution effect of the dry-mesic oak map class that is the core of the northern Parkway. The Parkway will be left with a somewhat confused resolution of FDMO to FICO, but these two map classes share an extensive ecotone in the driest and hottest part of the Parkway, while FICO and FMOR/FGCB realistically never cross.

Parkway Staff Decision: Support combining FDMO, FMOR, and FGCB; support leaving FICO as is; willing to accept the slightly lower producers' accuracy for new merged type.

F. COMBINE FBEF, FMHF, AND FNSB

Confusion in the hardwood floodplain map classes FBEF, FMHF, and FNSB

Problem: The FMHF map class was generally undermapped with confusion occurring to the generally overmapped FBEF and FNSB map classes. All three map classes are natural floodplain forests.

Suggestion: Combine the FBEF, FMHF, and FNSB map classes into one generalized natural hardwood floodplain forest map class. This combination will bring users' and producers' accuracy above 80%.

Consequences: As all the map classes share similar species, landscape position, and are not successional, there will be generally little information lost given the existing confusion. Some confusion will remain with other floodplain forest map classes, but these map classes are generally mapped well.

Parkway Staff Decision: Support combining FBEF, FMHF, and FNSB.

G. LEAVE FSGF AS IS, ACCEPT LOW ACCURACY

The overmapping of the FSGF map class resulting in a users' accuracy slightly below standards

Problem: The FSGF map class was mapped somewhat too aggressively. The users' accuracy for the map class stands at 63% (UL-CI 79.47%), and the producers' accuracy stands at 90% (UL-CI 103%). There is no general pattern of confusion with another single map class that allows for a merge.

Suggestion: Accept a slightly below program standard users' accuracy. This map class could be arbitrarily merged into another floodplain forest to increase the accuracy based upon statistics, but that will not provide the Parkway with a better, more usable map.

Consequences: The confusion for this map class is overwhelmingly dominated by other floodplain forest map classes. While none of them are dominated by sycamore, all of them accept sycamore as a canopy component. By accepting a slightly lower standard on the FSGF map class, the Parkway will prevent a sycamore dominated map class from rolling into a nonsycamore map class.

Parkway Staff Decision: Support leaving FSGF as is, willing to accept slightly lower accuracy.

H. LEAVE FXMF AS IS, ACCEPT LOW ACCURACY

The categorical undermapping of the FXMF map class

Problem: While straight users' accuracy for this map class is 94%, straight producers' accuracy is only 55%. This result is caused by errors in initial field notes suggesting the FXMF map class was not as common on the landscape as the AA found it to be. Examples of FXMF were found in nine other map classes and consistently to some of those map classes. There appears to be no logical way to improve this map class.

Suggestion: Accept a very undermapped FXMF map class in the interest of preserving the other map classes it could potentially be merged into. Mathematically, the most logical map class to merge FXMF into is the combined FXSG/FXGO map class. This merge still would not bring this FXSG/FXGO/FXMF map class anywhere near compliance and would greatly confuse upland and wetland map classes.

Consequences: The FXMF map class is mapped very well, as almost everything mapped as FXMF is correct, but lots of FXMF exists on the landscape that is not covered by this map class. There appears to be no way to remedy this issue.

Parkway Staff Decision: Support leaving FXMF as is, willing to accept slightly lower accuracy.

I. COMBINE HXMG AND HXWM

Rolling the overmapped and very rare HXWM into the well-mapped and very common HXMG

Problem: The HXMG map class is very common and mapped very well, HXWM is exceptionally rare and often confused with HXMG. Although the upper level confidence interval for HXWM exceeds the 80% accuracy standard, 3 of the 5 instances mapped as HXWM were found to be HXMG but only 2 were HXWM. This indicates that wet managed herbaceous vegetation looks too similar to dry managed herbaceous vegetation to split reliably.

Suggestion: Merge HXWM into HXMG and have very small areas of wet managed herb in the matrix dry managed herb.

Consequences: None. The 8.5 hectares of HXWM fold into the nearly 3,200 hectares of HXMG.

Parkway Staff Decision: Support combining HXMG and HXWM.

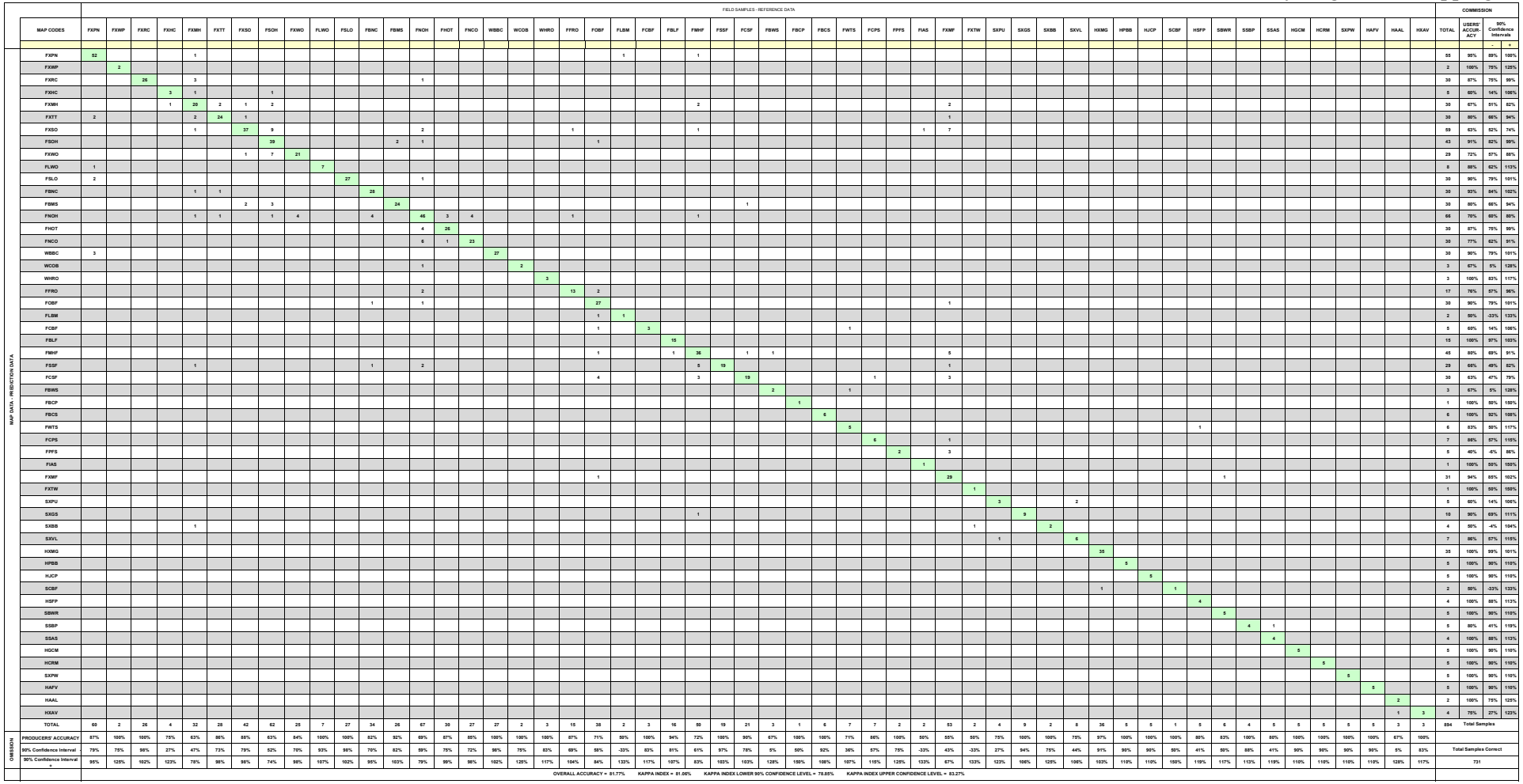
Appendix I: Accuracy Assessment Contingency Table

Explanation of the Contingency Table

The accuracy assessment (AA) contingency table (or matrix) for the Natchez Trace Parkway vegetation map layer is an array of numbers set out in rows and columns to compare results of vegetation types represented on the map layer to vegetation types as verified on the ground at AA sites. Numbers listed within the green-shaded cells (listed collectively as a descending diagonal across the table from left to right) denote the number of agreements in classification between AA sites and the map layer. Contrary, numbers listed outside the green-shaded cells denote the number of disagreements and are placed in the matrix to indicate where the confusion to other map classes exists.

Map-class codes from this project are used in the matrix to identify vegetation types for ease of comparison during the analysis and are listed at the side of each row and the top of each column. A condensed crosswalk (cross-reference) between the map classes and the codes to vegetation types is provided within this appendix. This table lists the various vegetation types assigned to the map-class codes that are used to label vegetation types in this contingency table. For a comprehensive crosswalk between map classes and vegetation types, refer to the main report section or "Appendix E: Descriptions of Map Classes."

The columns present vegetation associations in the U.S. National Vegetation Classification listed by map-class codes of the map classes that represent them. These columns tabulate the producer's accuracy by listing errors of exclusion (omission errors) present in the map. The rows present the map classes listed by their respective map-class codes. These rows tabulate the users' accuracy by listing errors of inclusion (commission errors) present in the map. (Again, refer to the crosswalk for map-class names and links to vegetation types.) Following the contingency table is another table listing the calculations for the kappa index, which provides for an adjustment for chance agreements.



MAP DATA - PREDICTION DATA \ FIELD SAMPLES - REFERENCE DATA	FXPN	FXWP	FXRC	FXHC	FXMH	FXTT	FXSO	FSOH	FXWO	FLWO	FSLO	FBNC	FBMS	FNOH	FHOT	FNCO	WBBC	WCOB	WHRO	FFRO	FOBF	FLBM	FCBF	FBLF	FMHF	FSSF	FCSF	FBWS	FBCP	FBCS	FWTS	FCPS	FPFS	FIAS	FXMF	FXTW	SXPU	SXGS	SXBB	SXVL	HXMG	HPBB	HJCP	SCBF	HSFP	SBWR	SSBP	SSAS	HGCM	HCRM	SXPW	HAFV	HAAL	HXAV	TOTAL	USERS' ACCUR. ACY	90% Confidence Intervals -	90% Confidence Intervals +
FXPN	52				1																	1				1																													55	95%	89%	100%
FXWP		2												1																																											2	100%	75%	125%
FXRC			26		3									1																																											30	87%	75%	99%
FXHC				3	1			1																																																5	60%	14%	106%
FXMH				1	20	2	1	2																	2											2																				30	67%	51%	82%
FXTT	2				2	24	1																												1																						30	80%	66%	94%
FXSO					1		37	9						2						1					1									1	7																				59	63%	52%	74%
FSOH								39					2	1							1																																			43	91%	82%	99%
FXWO							1	7	21																																															29	72%	57%	88%
FLWO	1									7																																														8	88%	62%	113%
FSLO	2										27			1																																											30	90%	79%	101%
FBNC					1	1						28																																												30	93%	84%	102%
FBMS							2	3					24													1																															30	80%	66%	94%
FNOH					1	1		1	4			4		46	3	4				1					1																															66	70%	69%	86%
FHOT														4	26																																								30	87%	75%	99%
FNCO														6	1	23																																								30	77%	62%	91%
WBBC	3																27																																						30	90%	79%	101%
WCOB														1				2																																					3	67%	5%	128%
WHRO																			3																																			3	100%	83%	117%
FFRO														2						13	2																																		17	76%	57%	96%
FOBF												1		1							27															1																			30	90%	79%	101%
FLBM																					1	1																																	2	50%	-33%	133%
FCBF																					1		3								1																							5	60%	14%	106%
FBLF																								15																															15	100%	57%	103%
FMHF																					1			1	36		1	1							5																			45	80%	69%	91%
FSSF					1							1		2											5	19									1																			29	66%	49%	82%
FCSF																					4				3		19					1			3																			30	63%	47%	79%
FBWS																												2			1																						3	67%	5%	128%
FBCP																													1																									1	100%	50%	150%
FBCS																														6																								6	100%	52%	108%
FWTS																															5																1						6	83%	50%	117%
FCPS																																6			1																			7	86%	57%	115%
FPFS																																	2		3																			5	40%	-4%	86%
FIAS																																		1																			1	100%	50%	150%
FXMF																					1														29										1								31	94%	85%	102%
FXTW																																				1																	1	100%	50%	150%
SXPU																																					3				2												5	60%	14%	106%
SXGS																									1													9																10	90%	69%	111%
SXBB					1																															1			2													4	50%	-4%	104%
SXVL																																					1				6												7	86%	57%	115%
HXMG																																										35												35	100%	59%	101%
HPBB																																										5											5	100%	50%	110%
HJCP																																											5										5	100%	50%	110%
SCBF																																											1		1								2	50%	-33%	133%
HSFP																																													4								4	100%	88%	113%
SBWR																																														5							5	100%	50%	110%
SSBP																																														4	1						5	80%	41%	119%
SSAS																																															4						4	100%	88%	113%
HGCM																																																5					5	100%	50%	110%
HCRM																																																	5				5	100%	50%	110%
SXPW																																																		5			5	100%	50%	110%
HAFV																																																		5		5	100%	50%	110%
HAAL																																																		2	2	100%	75%	125%
HXAV																																																		1	3	4	75%	27%	123%
TOTAL	60	2	26	4	32	28	42	62	25	7	27	34	26	67	30	27	27	2	3	15	38	2	3	16	50	19	21	3	1	6	7	7	2	2	53	2	4	9	2	8	36	5	5	1	5	6	4	5	5	5	5	5	3	3	884	Total Samples		
OMISSION \ PRODUCERS' ACCURACY	87%	100%	100%	75%	63%	86%	88%	63%	84%	100%	100%	82%	92%	69%	87%	85%	100%	100%	100%	87%	71%	50%	100%	94%	72%	100%	90%	67%	100%	100%	71%	86%	100%	50%	55%	50%	75%	100%	100%	75%	97%	100%	100%	100%	80%	83%	100%	80%	100%	100%	100%	100%	67%	100%				
90% Confidence Interval -	79%	75%	98%	27%	47%	73%	79%	52%	70%	93%	98%	70%	82%	59%	75%	72%	98%	75%	83%	69%	58%	-33%	83%	81%	61%	97%	78%	5%	50%	92%	36%	57%	75%	-33%	43%	-33%	27%	94%	75%	44%	91%	90%	90%	90%	41%	50%	58%	41%	90%	90%	90%	90%	5%	83%	Total Samples Correct			
90% Confidence Interval +	95%	125%	102%	123%	78%	98%	98%	74%	98%	107%	102%	95%	103%	79%	99%	98%	102%	125%	117%	104%	84%	133%	117%	107%	83%	103%	103%	128%	150%	108%	107%	115%	125%	133%	67%	133%	123%	106%	125%	106%	103%	110%	110%	150%	119%	117%	113%	119%	110%	110%	110%	110%	128%	117%	731			

OVERALL ACCURACY = 81.77% KAPPA INDEX = 81.06% KAPPA INDEX LOWER 90% CONFIDENCE LEVEL = 79.85% KAPPA INDEX UPPER CONFIDENCE LEVEL = 83.27%

Code	P(row 1)	P(col i)	P(chance i)
FXPN	0.061521	0.067114	0.004129
FXWP	0.002237	0.002237	0.000005
FXRC	0.033557	0.029083	0.000976
FXHC	0.005593	0.004474	0.000025
FXMH	0.033557	0.035794	0.001201
FXTT	0.033557	0.031320	0.001051
FXSO	0.065996	0.046980	0.003100
FSOH	0.048098	0.069351	0.003336
FXWO	0.032438	0.027964	0.000907
FLWO	0.008949	0.007830	0.000070
FSLO	0.033557	0.030201	0.001013
FBNC	0.033557	0.038031	0.001276
FBMS	0.033557	0.029083	0.000976
FNOH	0.073826	0.074944	0.005533
FHOT	0.033557	0.033557	0.001126
FNCO	0.033557	0.030201	0.001013
WBBC	0.033557	0.030201	0.001013
WCOB	0.003356	0.002237	0.000008
WHRO	0.003356	0.003356	0.000011
FFRO	0.019016	0.016779	0.000319
FOBF	0.033557	0.042506	0.001426
FLBM	0.002237	0.002237	0.000005
FCBF	0.005593	0.003356	0.000019
FBLF	0.016779	0.017897	0.000300
FMHF	0.050336	0.055928	0.002815
FSSF	0.032438	0.021253	0.000689
FCSF	0.033557	0.023490	0.000788
FBWS	0.003356	0.003356	0.000011
FBCP	0.001119	0.001119	0.000001
FBCS	0.006711	0.006711	0.000045
FWTS	0.006711	0.007830	0.000053
FCPS	0.007830	0.007830	0.000061
FPFS	0.005593	0.002237	0.000013
FIAS	0.001119	0.002237	0.000003
FXMF	0.034676	0.059284	0.002056
FXTW	0.001119	0.002237	0.000003
SXPU	0.005593	0.004474	0.000025
SXGS	0.011186	0.010067	0.000113
SXBB	0.004474	0.002237	0.000010
SXVL	0.007830	0.008949	0.000070
HXMG	0.039150	0.040268	0.001577
HPBB	0.005593	0.005593	0.000031
HJCP	0.005593	0.005593	0.000031
SCBF	0.002237	0.001119	0.000003
HSFP	0.004474	0.005593	0.000025
SBWR	0.005593	0.006711	0.000038
SSBP	0.005593	0.004474	0.000025
SSAS	0.004474	0.005593	0.000025
HGCM	0.005593	0.005593	0.000031
HCRM	0.005593	0.005593	0.000031
SXPW	0.005593	0.005593	0.000031
HAFV	0.005593	0.005593	0.000031
HAAL	0.002237	0.003356	0.000008
HXAV	0.004474	0.003356	0.000015
P(chance)	Total	1	0.037497

P(correct)	0.817673
P(chance)	0.037497

Kappa	0.810570
90%CI -	0.788453
90%CI+	0.832688

Map-Class Code	Map-Class Name	U.S. National Vegetation Classification Codes
FXPN	Ruderal Pine - (Hardwood) Forest	CEGL007124
FXWP	Ruderal Eastern White Pine Forest	CEGL007560
FXRC	Ruderal Eastern Red-cedar Forest	CEGL007944
FXHC	Ruderal Hardwood Forest Complex	CEGL003687, CEGL007037, CEGL007191, CEGL007279, CEPS004837
FXMH	Ruderal Mixed Hardwood Forest	CEGL003686, CEGL004697, CEPS004809
FXTT	Ruderal Tuliptree Forest	CEGL007220, CEGL007221
FXSO	Ruderal Sweetgum - (Oak) Forest	CEGL007216, CEGL007217
FSOH	Southern Oak - (Hardwood) Forest	CEGL004109, CEGL004122
FXWO	Ruderal Water Oak Forest	CEGL004638
FLWO	East Gulf Coastal Plain Loblolly - White Oak Forest	CEGL004763
FSLO	Shortleaf Pine - Oak Forest	CEGL004050, CEGL004052, CEGL004053, CEGL004834
FBNC	Northern & Central Beech Forest	CEGL002411, CEGL007201, CEGL007881
FBMS	Southern Beech - Magnolia Forest	CEGL004963, CEGL007458, CEGL007210
FNOH	Northern Oak - (Hickory) Forest	CEGL002067, CEGL002070, CEGL004671, CEGL007225, CEGL007244, CEGL007246, CEGL007808, CEGL008442
FHOT	Highland Rim White Oak - Tuliptree Mesic Lower Slope Forest	CEGL007709
FNCO	Northern Chestnut Oak Forest	CEGL007261, CEGL007700
WBBC	Black Belt Prairie Cedar Woodland	CEGL007747
WCOB	Chinquapin Oak Unglaciated Bluff Woodland	CEGL004267
WHRO	Western Highland Rim Oak Woodland	CEGL004686, CEGL004756
FFRO	Southern Red Oak Flatwoods Forest	CEGL004412
FOBF	Oak Bottomland & Floodplain Forest	CEGL002102, CEGL002099, CEGL002424, CEGL004771, CEGL007348, CEGL007353, CEGL007354
FLBM	East Gulf Coastal Plain Acidic Loam Beech - Magnolia Forest	CEGL007460
FCBF	East Gulf Coastal Plain Beech Floodplain Forest	CEGL004745
FBLF	River Birch Levee Forest	CEGL007312
FMHF	Mixed Hardwood Floodplain Forest	CEGL002427, CEGL002431, CEGL004619, CEGL004690, CEGL005033
FSSF	Sycamore - Silver Maple Calcareous Floodplain Forest	CEGL007334
FCSF	Gulf Coastal Plain Sycamore - Sweetgum Floodplain Forest	CEGL007335
FBWS	Upper Coastal Plain/Interior Low Plateau Black Willow Pond Forest	CEGL007703
FBCP	East Gulf Coastal Plain Bald-cypress Pondshore	CEGL004046
FBCS	Bald-cypress Swamp	CEGL002420
FWTS	Water Tupelo Swamp Forest	CEGL002419
FCPS	Southern Upper East Gulf Coastal Plain Seepage Forest	CEGL008477
FPFS	Coastal Plain Planertree Floodplain Swamp Forest	CEGL007394
FIAS	Interior Forested Acidic Seep	CEGL004425
FXMF	Ruderal Mixed Floodplain Forest	CEGL007330, CEGL007380
FXTW	Ruderal Chinese Tallow Wet Forest	CEGL007412
SXPU	Chinese Privet Invasive Upland Shrubland	CEGL003807
SXGS	Ruderal Groundsel-tree Shrubland	CEGL004657
SXBB	Ruderal Blackberry - Greenbrier Shrub Thicket	CEGL004732
SXVL	Vine-Shrubland	CEGL003882, CEGL004620, CEGL008568
HXMG	Ruderal Mixed Grassland	CEGL003866, CEGL004035, CEGL004044, CEGL004048, CEGL004108, CEGL004673, CEGL004700, CEGL004833, CEGL006333
HPBB	Black Belt Prairie	CEGL004664
HJCP	Mississippi Jackson Calcareous Clay Prairie	CEGL004020
SCBF	Floodplain Canebrake	CEGL003836
HSFP	Smartweed Floodplain & Pond	CEGL004290, CEGL004699, CEGL008555
SBWR	Black Willow Riverbank Shrubland	CEGL003901
SSBP	Southern Buttonbush Pond	CEGL002191
SSAS	Southeastern Alder Swamp	CEGL008474
HGCM	Giant Cutgrass Slough Marsh	CEGL004139
HCRM	Common Rush Marsh	CEGL004112
SXPW	Ruderal Chinese Privet Wet Shrubland	CEGL003837
HAFV	Aquatic Floating Herbaceous Vegetation	CEGL002386, CEGL004305, CEGL004725
HAAL	American Lotus Aquatic Wetland	CEGL004323
HXAV	Aquatic Ruderal Herbaceous Vegetation	CEGL003858, CEGL007671, CEGL007835

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 604/133665, August 2016

National Park Service
U.S. Department of the Interior



Natural Resource Stewardship and Science
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

2016
National Park Service
CENTENNIAL

EXPERIENCE YOUR AMERICA ™