

FINAL REPORT

FOR

**A GENERAL BIOLOGICAL SURVEY
OF THE NATCHEZ TRACE PARKWAY**

PREPARED BY
THE NATURE CONSERVANCY
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INTRODUCTION

The Natchez Trace is one of the best-remembered landmarks from the era of the United States' expansion into the Old Southwest. For over two decades in the early 1800's, it was one of the nation's most important roads. In 1995, the National Park Service in Tupelo, Mississippi contracted The Nature Conservancy to perform a reconnaissance-level, general biological survey of a selected stretch of the Natchez Trace Parkway. The Conservancy's survey spanned habitats in Mississippi, Alabama and Tennessee that have been altered by many millenia of human activity.

The portion of the Natchez Trace Parkway covered by the Conservancy's survey falls within two broad, natural regions, each having certain soils, geologic history, topography, vegetation types and climate. ~~In most of~~ Tennessee, the survey area lies on the Western Highland Rim province of the Interior Low Plateau (Martin et al. 1993). In Alabama and Mississippi, the survey area lies on the Southeastern Plains and within the northern province of the Gulf Coastal Plain. In northern Mississippi, the Southeastern Plains are briefly crossed by the Blackbelt Prairie (Martin et al. 1993, Harker et al. 1993).

A picture of the vegetation types that would predominate in these two natural regions if humans had not altered the landscape is provided by Kuchler's map of Potential Natural Vegetation. Under Kuchler's hypothetical classification scheme, most of the Highland Rim in Tennessee would revert to oak-hickory forest with some western mesophytic forest in ravines and on protected slopes. The Southeastern Plains in northern Alabama and Mississippi would be predominantly oak-hickory-pine forest with mixed hardwoods forest restricted to gorges and coves and southern floodplains forest restricted to large stream bottoms. While the Blackbelt Prairie seems related to parts of the Tallgrass Prairie, doubts about the latter's real climax nature led Kuchler to map the Blackbelt Prairie as a *Liquidambar-Quercus-Juniperus* type (Harker et al. 1993).

A history of habitat disturbance in the Southeast, however, precludes the Natchez Trace Parkway lands from assuming the composition of these natural regions. Around 6000 BC, American Indians of the Archaic tradition were using fire along the Natchez Trace corridor to drive game, create game habitat, and promote growth of plants they gathered. By 1000 BC, people of the Woodland tradition used fire to clear land for agriculture and habitation, with even more widespread ecological effects:

"Frequent burning encouraged a herbaceous understory and restricted development of woody vegetation, thereby maintaining an open appearance in both hardwood and pine forests. By inhibiting, but not eliminating, hardwood regeneration, fire helped maintain pine stands where they did occur. Frequent fires also favored oak regeneration over competing hardwood species, which allowed new hardwood stands developing after major perturbations to be dominated by oak" (Martin et al. 1993).

Then, as the Native American populations declined from the late 1500's to the late 1700's, there was probably extensive reforestation of these abandoned lands throughout the Southeast and along the Natchez Trace corridor. After European settlement, however, lumbering and conversion to agriculture substantially reduced the Southeast's forested areas again. By 1860, most of the oak-hickory-pine forest in the Southeastern Plains portion of the Natchez Trace had been cleared as hardwood stands occupying the most fertile soils were replaced by crops. As agricultural fields were retired due to declining productivity, pine seed sources established themselves in openings as old field pine forests, and eastern red cedar filled the niche in Tennessee Highland Rim fields' limestone soils. Wildfires also contributed to the Southeast's growing amount of pine, but by the 1950's, industries had made large investments in southeastern pine plantations and fire suppression increased. From the mid-1960's to the present, hardwood regeneration in the Southeast has expanded as fire exclusion, partial cuttings, and even harvest cuttings in pine stands have encouraged the natural succession to hardwoods. A concurrent population boom in rural areas has placed yet another fragmenting force on the developing forests. Today, as a consequence of the past's myriad of disturbances, the Natchez Trace Parkway's landscape contains many forests that are third and fourth (or more) growth (Martin 1993).

This report details the species and communities identified on the Natchez Trace Parkway study area by the Conservancy field team during the 1995 field season.

METHODS

General Biological Survey

The general biological survey inventoried 93 sites of variable size within the Natchez Trace Parkway boundary from Highway 32 in northeast Mississippi to Lieper's Fork, Tennessee (Table 1). Site locations were delineated on aerial photos and ground-truthed for community reconnaissance. Site selection sought to balance upland and lowland sites, and most sites chosen were limited to pure or almost pure hardwood forest due to the pine stands' lower diversity and heavy *Lonicera japonica* infestation. All sites are denoted by purple triangles on the Natchez Trace Parkway Land Use and Maintenance Plans (Appendix IV). The size of the sites surveyed varied as a function of the estimated boundary of the vegetation community being surveyed.

Data was collected by traversing the sites on foot and noting total flora species (Appendix III), vegetation strata, socialbilty, and percent cover class for dominant species observed for every site. Flora species not identified in the field were collected for later identification by field staff or by Dr. Kral, Curator, Vanderbilt University Herbarium. Photographs were taken of most sites with a 35 mm camera (Appendix VI). All sites were visited at least once during the growing season, and sites representative of different community types were visited at least twice at different times throughout the growing season. Additional information recorded included location, presence of exotic species, presence of animal species, possible threats to the community, hydrologic alterations, and, if determinable, the slope, aspect, soil type and historical land use of the site. Using the Conservancy's Biological & Conservation Data (BCD) System, an Observation Point Form containing community and other information was completed for each of the 93 sites surveyed (Appendix II).

Table 1.

Total Time and Effort	
Number of Sites Surveyed	93
Mississippi	35
Alabama	17
Tennessee	41
Total Hours	1,612
Field Hours	870
Community Work	700
RTE Work	170
Taxonomic Lab Work	160
Mapping and Data Management	582

Rare, Threatened and Endangered Plant Survey

The methods for the RTE plant survey portion of the study are detailed in Appendix I to this report.

Community Classification

Using site flora lists, species dominance data, vegetation strata information, and percent cover data and in consultation with Alan Weakley, Senior Regional Ecologist with The Nature Conservancy, the representative communities at each site were classified according to a hierarchical system used by the Conservancy's Community Ecology Group at the Southeastern Regional Office in Chapel Hill, North Carolina. This system is part of the national classification designed by the national and regional Ecology Teams of The Nature Conservancy for the National Park Service and the United States Forest Service (The Nature Conservancy 1996).

Determination and Nomenclature

The plant names used in this report follow the nomenclature of the Checklist of Vascular Plants of Tennessee (Wofford and Kral 1993). The following references were used for final determinations: Manual of Vascular Plants of Northeastern United States and Adjacent Canada (Gleason and Cronquist 1991), Manual of the Vascular Flora of the Carolinas (Radford, Ahles and Bell 1964) and An Illustrated Flora of the Northern United States and Canada (Britton and Brown 1970). Final determinations for some species were made at the Vanderbilt Herbarium and with consultation by Dr. Kral.

RESULTS & DISCUSSION

General Biological Survey

In the 93 sites surveyed, 556 plant species were identified on Natchez Trace Parkway property during the 1995 field season. The flora of the Natchez Trace Parkway is composed of at least 556 taxa in 111 families. Nineteen of these species of the taxa are not native. Coincident with urban sprawl and forest fragmentation has been an increasing encroachment of invasive exotic species, plant and animal, upon native populations and ecosystems. Early in the course of this survey, heavy infestation of exotic Japanese honeysuckle (*Lonicera japonica*) was found along much of the Parkway in Mississippi, Alabama and Tennessee. The heaviest honeysuckle infestations were invariably in pure or almost pure pine stands (Brown pers. comm.). See Appendix V for a complete flora list by family.

Seventy-two tree species were identified representing 25 vascular plant families. The Fagaceae family contained the most species (17) and consisted almost entirely of oaks.

Eighty-seven shrub and vine species were identified representing 35 families. The Rosaceae family contained the most species (11).

Three hundred and ninety-seven herbaceous and grass species were identified representing 74 families. The Asteraceae family contained the most species (74).

Several sites surveyed involved Parkway areas warranting special attention, protection, and possibly management due to their rare species and/or wide diversity of genera and species: Rock Creek, Snowball Branch, Jack's Branch, Little Buffalo River, Little Swan Creek and Big Swan Creek.

Rare, Threatened and Endangered Plant Survey

The results for the RTE plant survey portion of the study are detailed in Appendix I to this report.

Community Classification

Twenty-eight different community types (*i.e.*, alliances) were identified within the study area according to A Vegetation Classification for the Southeastern United States (Table 2). 18 community types were described for Tennessee sites, nine community types for Alabama sites and 13 community types for Mississippi sites. Seventeen of the 28 community types had not been previously recorded for one or more of its Natchez Trace Parkway states in A Vegetation Classification for the Southeastern United States. The community types identified included evergreen forest, deciduous forest, deciduous woodland, mixed evergreen-deciduous woodland and perennial forb vegetation. All alliances found are described in Table 3.

Table 2. Community Types Identified on the Natchez Trace Parkway.

Community Alliance	Site		
	Mississippi	Alabama	Tennessee
<i>Pinus taeda</i> Planted Forest			1C/20B
<i>Pinus echinata</i> Forest 3E/14			
<i>Pinus taeda</i> Upland Forest 3E/5A 3E/5C			
<i>Acer saccharum-Liriodendron tulipifera-Fraxinus americana</i> Forest			1D/14A
<i>Fagus grandifolia-Quercus alba</i> Forest 3A/19	2A/10A 2A/10C 2C/24B 2C/24C	1B/8 1C/14 1E/5A 1E/16 1F/16 1G/18B 1G/18C 1H/16 1H/18	
<i>Fagus grandifolia-Quercus rubra-Quercus alba</i> Piedmont Forest			1B/12B
<i>Liquidambar styraciflua</i> Forest 3E/6 3E/7			
<i>Liquidambar styraciflua-Quercus [alba, falcata]</i> Forest 3C/7C			1C/20A
<i>Liriodendron tulipifera-Acer rubrum-Quercus spp.</i> Forest			1J/11B
<i>Quercus alba-Carya alba-(Carya glabra)</i> Forest 3A/26 3A/33			
<i>Quercus alba-Quercus (coccinea, velutina, rubra)-Carya (alba, glabra, ovata)</i> Forest 3A/8	2D/20	1E/5D 1E/27 1E/32 1G/13 1G/17 1H/12B 1H/12C 1H/17A 1H/17B	
<i>Quercus alba-Quercus rubra-(Carya ovata, glabra, alba)</i> Forest	2C/24A 2D/8A	1A/18B 1D/10 1E/5B 1E/5C 1H/12A	

Table 2. Community Types Identified on the Natchez Trace Parkway.

Community Alliance	Site		
	Mississippi	Alabama	Tennessee
<i>Quercus falcata-Quercus alba-(Quercus stellata)-Carya</i> (<i>glabra, alba, pallida</i>) Forest	3A/16B 3A/23 3B/8A 3B/8B 3B/19 3C/7B 3C/9 3C/16 3C/18 3C/30A 3C/30B 3E/11A 3E/16A 3E/16B 3E/23 3-F1/28	2A/15 2A/16 2C/13A 2C/13B	
<i>Quercus muehlenbergii</i> Forest		2D/8B	1D/14C
<i>Quercus prinus-Quercus (alba, falcata, rubra, velutina)</i> Forest		2D/14 2D/17	1E/27 1E/32 1G/13 1J/12B 1J/22
<i>Quercus shumardii-Quercus pagoda</i> Upland Forest	3E/5B		
<i>Acer saccharinum</i> Forest		2C/24C	
<i>Betula nigra-(Platanus occidentalis)</i> Forest	3C/7A		1F/13B 1F/15
<i>Fraxinus pennsylvanica-(Ulmus americana)-Celtis</i> (<i>occidentalis, laevigata</i>) Forest			1B/12A
<i>Liquidambar styraciflua-(Liriodendron tulipifera, Acer</i> <i>rubrum)</i> Wetland Temporarily-Flooded Forest	3A/16A 3B/24	2A/25 2A/32	1J/12A 1F/13A
<i>Platanus occidentalis-(Fraxinus pennsylvanica, Celtis</i> <i>laevigata, Acer saccharinum)</i> Temporarily-Flooded Forest			1D/14B 1E/21A 1G/18A
<i>Quercus (michauxii, pagoda, shumardii)-Liquidambar</i> <i>styraciflua</i> Temporarily-Flooded Forest	3B/11		
<i>Quercus nigra-Quercus pagoda</i> Forest	3B/7 3B/11 3B/24 3C/27 3C/28		
<i>Acer rubrum-Fraxinus nigra</i> Saturated Forest			1J/11A

<i>Quercus falcata-Quercus alba-(Quercus stellata)-Carya (glabra, alba, pallida)</i> Forest	3A/16B	2A/15	
	3A/23	2A/16	
	3B/8A	2C/13A	
	3B/8B	2C/13B	
	3B/19		
	3C/7B		
	3C/9		
	3C/16		
	3C/18		
	3C/30A		
	3C/30B		
	3E/11A		
	3E/16A		
	3E/16B		
	3E/23		
	3-F1/28		
<i>Pinus taeda-Quercus nigra</i> Forest	Witch-Dance		
<i>Quercus stellata-Quercus velutina-Quercus alba-(Quercus falcata)</i> Woodland		2D/8C	
<i>Juniperus virginiana</i> var. <i>virginiana-Quercus muehlenbergii</i> Woodland			1E/21B
<i>Justicia americana</i> Herbaceous			1F/13B

Table 3. Community Descriptions.	
Community Alliance	Description
<i>Pinus taeda</i> Planted Forest	Plantations of <i>P. taeda</i> with little understory. Distribution: AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, TX, VA.
<i>Pinus echinata</i> Forest	Forests dominated by <i>P. echinata</i> (more than 75%). Some associations are successional (NC, AR) or of anthropogenic origin; some are more natural (AR). Distribution: AL, AR, GA, KY, LA, MS, NC, OK, SC, TN, VA. May also be referred to as pine-oak heath.
<i>Pinus taeda</i> Upland Forest	Includes both successional forests following cropping or site conversion in some parts of the Southeast, and natural forests (especially in the deep South). Some associations may occur as plantations, on old fields, or after blowdowns. Distribution: AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, TX, VA. May also be referred to as lowland pine-oak forest.
<i>Acer saccharum</i> - <i>Liriodendron tulipifera</i> - <i>Fraxinus americana</i> Forest	Nonpalustrine bottom forests dominated by <i>A. saccharum</i> , <i>L. tulipifera</i> and <i>F. americana</i> . Distribution: TN, VA, others? (To date.)
<i>Fagus grandifolia</i> - <i>Quercus alba</i> Forest	Forests with more than 25% of both <i>Q. alba</i> and <i>F. grandifolia</i> that typically occur on mesic slopes and small stream bottoms in the Coastal Plain. Distribution: AL, AR?, FL, GA, KY?, LA, MS, NC, OK?, SC, TN, TX, VA. May also be referred to as Coastal Plain beech forest or American beech-white oak series.
<i>Fagus grandifolia</i> - <i>Quercus rubra</i> - <i>Quercus alba</i> Piedmont Forest.	Forests in the low mountains, Piedmont and low plateau. Includes the mesic Piedmont beech-oak slopes of NC, typically with <i>Aesculus sylvatica</i> ; <i>Q. rubra</i> and <i>Q. alba</i> each with greater than 25% total canopy coverage. Distribution: AL, GA?, KY?, LA?, NC, SC, TN? (To date.) May also be referred to as mesic mixed hardwood forest, Piedmont subtype.
<i>Liquidambar styraciflua</i> Forest	Less than 10% other species; follows logging and in old fields in uplands and Coastal Plain. Distribution: AL, AR, GA, LA, MS, NC, SC, VA, others. (To date.)
<i>Liquidambar styraciflua</i> - <i>Quercus (alba, falcata)</i> Forest	Similar to, but more xeric than <i>Liriodendron tulipifera</i> - <i>Acer rubrum</i> - <i>Quercus spp.</i> Forest. A disturbance forest successional to mixed oak-hickory forest. Potentially widespread. Distribution: SC, others. (To date.)
<i>Liriodendron tulipifera</i> - <i>Acer rubrum</i> - <i>Quercus spp.</i> Forest	Successional forests following cropping or other severe disturbance. Similar to, but more mesic than <i>Liquidambar styraciflua</i> - <i>Q. (alba, falcata)</i> Forest. Potentially widespread. Distribution: GA, NC, SC, TN, VA, others. (To date.)
<i>Quercus alba</i> - <i>Carya alba</i> -(<i>Carya glabra</i>) Forest	Dry and dry-mesic, mainly Coastal Plain, oak-hickory forests, without <i>Q. rubra</i> and <i>C. ovata</i> . Distribution: AL, AR?, FL, GA, LA, KY?, MS, NC, OK?, SC, TN, TX, VA. May also be referred to as <i>Q. alba</i> -mixed hardwoods.
<i>Quercus alba</i> - <i>Quercus (coccinea, velutina, rubra)</i> - <i>Carya (alba, glabra, ovata)</i> Forest	Dry oak-hickory forests mainly of the interior highlands, Piedmont and Blue Ridge. Distribution: AL, GA, NC, SC, TN, VA? (To date.) May also be referred to as montane oak-hickory forest.

Table 3. Community Descriptions.

Community Alliance	Description
<i>Quercus alba-Quercus rubra-(Carya ovata, glabra, alba)</i> Forest	Dry-mesic Piedmont/low plateau, oak-hickory forests; mesic oak-hickory in the interior uplands, dominant in Ouachita Mountain north-facing slopes. Distribution: AL, AR, GA, KY, NC, OK?, SC, TN, IL, MO, VA. (To date.) May also be referred to as mesic oak-hickory forest.
<i>Quercus falcata-Quercus alba-(Quercus stellata)-Carya (glabra, alba, pallida)</i> Forest	Dry oak-hickory forests of the East Gulf Coastal Plain, Piedmont, low mountains, and Eastern Interior Plateau. Distribution: AL, FL, GA, KY, LA, MS, NC, SC, TN, VA. May also be referred to as dry-mesic oak-hickory forest.
<i>Quercus muehlenbergii</i> Forest	Dry mesic forests, related to <i>Juniperus virginiana</i> var. <i>virginiana-Q. stellata-Q. muehlenbergii</i> Forest. Distribution: AL, AR, KY, OK, TN, IL, IN, MO, NE?, VA? (To date.)
<i>Quercus prinus-Quercus (alba, falcata, rubra, velutina)</i> Forest	Piedmont mixed chestnut oak forests and mountain forests which once had chestnut. Defined to accomodate dry-mesic <i>Q. prinus</i> -mixed oak forests of the Piedmont, Ridge and Valley and Blue Ridge. Distribution: AL, GA, NC, SC, TN, VA. (To date.) May also be referred to as dry-mesic oak-hickory forest.
<i>Quercus shumardii-Quercus pagoda</i> Upland Forest	Mesic calcareous forests. Distribution: LA. (To date.)
<i>Acer saccharinum</i> Forest	Sand bars along big rivers; sometimes described as infrequently-flooded bottomlands. Distribution: AR, KY, TN, IL, IN, MO, VA, not in NC or LA. May also be referred to as riverfront forest.
<i>Betula nigra-(Platanus occidentalis)</i> Forest	Riverfronts in areas with repeated, frequent, natural disturbances. May occur along larger streams and rivers, especially with a sandy substrate. Distribution: AL, AR, GA, KY, LA, MS, NC, OK, SC, TN, TX, IL, IN, MO, VA, WV. May also be referred to as riverfront forest.
<i>Fraxinus pennsylvanica-(Ulmus americana)-Celtis (occidentalis, laevigata)</i> Forest	Poorly-drained bottomlands. Distribution: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, [IL, KS, MO, NE, VA]. Synonymy: Sugarberry-American elm-green ash bottomland forest.
<i>Liquidambar styraciflua-(Liriodendron tulipifera, Acer rubrum)</i> Wetland Temporarily-Flooded Forest	Successional to sweetgum-mixed bottomland oaks, moderately wet floodplain forests of the lower Piedmont and Coastal Plain. Distribution: AL, AR?, FL, GA, KY, LA?, MS, NC, SC, TN, TN, not TX. May also be referred to as montane alluvial forest or Piedmont/low mountain alluvial forest, rocky bar and shore.
<i>Platanus occidentalis-(Fraxinus pennsylvanica, Celtis laevigata, Acer saccharinum)</i> Temporarily-Flooded Forest	Alluvial forests, mainly of the Coastal Plain and lower Piedmont, dominated by <i>P. occidentalis</i> and other alluvial hardwoods. Does not include alluvial forests of the upper Piedmont and Blue Ridge. Distribution: AL, AR?, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA. May also be referred to as montane alluvial forest.

Table 3. Community Descriptions.	
Community Alliance	Description
<i>Quercus (michauxii, pagoda, shumardii)-Liquidambar styraciflua</i> Temporarily-Flooded Forest	The drier sweetgum-mixed bottomland oak forests, but moister than beech bottoms. <i>Q. michauxii</i> , <i>Q. pagoda</i> and <i>Q. shumardii</i> are generally the dominant oaks; <i>Q. phellos</i> may also be present, but in combination with other oaks. <i>Liquidambar styraciflua</i> is usually present and sometimes codominant with the oaks, especially following logging or other disturbance. Perhaps more common in brownwater than blackwater situations. Distribution: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, IL, VA. May also be referred to as lowland oak-hickory forest or swamp chestnut oak-willow oak series.
<i>Quercus nigra-Quercus pagoda</i> Forest	Forests along rivers in the Coastal Prairie region of southwestern LA. May be seasonally flooded, but hydrologic placement is uncertain. <i>Celtis laevigata</i> should probably be nominal in the association. Distribution: LA, TX? (To date.)
<i>Acer rubrum-Fraxinus nigra</i> Saturated Forest	Contains associations known as calcareous seepage swamps and hardwood swamps, in which <i>A. rubrum</i> and <i>F. nigra</i> are the dominant or prominent canopy members. Associated canopy trees are <i>Betula alleghaniensis</i> , <i>Ulmus rubra</i> , <i>Ulmus americana</i> , <i>Larix laricina</i> (farther north only) and <i>Pinus strobus</i> . <i>Lindera benzoin</i> , <i>Toxicodendron vernix</i> and <i>Rhamnus alnifolia</i> often occur in the shrub layer. The herbaceous layer is often quite diverse. These communities are semipermanently flooded or saturated and occur in poorly-drained depressions or along streams. Soils are generally muck, and although <i>Sphagnum</i> may occur, there is generally not substantial peat development. Associations often occur in areas where there is influence by calcareous bedrock, and soil pH is generally higher than that of other alliances containing <i>A. rubrum</i> . Distribution: MD, VA, others. (To date.) May also be referred to as black ash-American elm-red maple.
<i>Pinus taeda-Quercus nigra</i> Forest	Occur on occasionally flooded to dry sites, usually in the Coastal Plain. Distribution: AR, NC, [VA]. (To date.) Synonymy: lowland pine-oak forest.
<i>Quercus stellata-Quercus velutina-Quercus alba-(Quercus falcata)</i> Woodland	<i>Q. falcata</i> present in more southern woodlands. Distribution: AR?, MO. (To date.)
<i>Juniperus virginiana</i> var. <i>virginiana-Quercus muehlenbergii</i> Woodland	Open vegetation with canopies dominated by nominal trees but often existing as a complex of forest, woodland, shrubland and grassland on cliff margins, outcrop fringes and in rocky woods. Sometimes occurs with an admixture of <i>Q. stellata</i> as well. Distribution: AR, KY, OK? (To date.) May also be referred to as juniper-hardwood woodland.
<i>Justicia americana</i> Herbaceous	Rocky river shoals dominated by <i>J. americana</i> . Distribution: AL, AR, GA, NC, SC, TN, VA. (To date.)

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