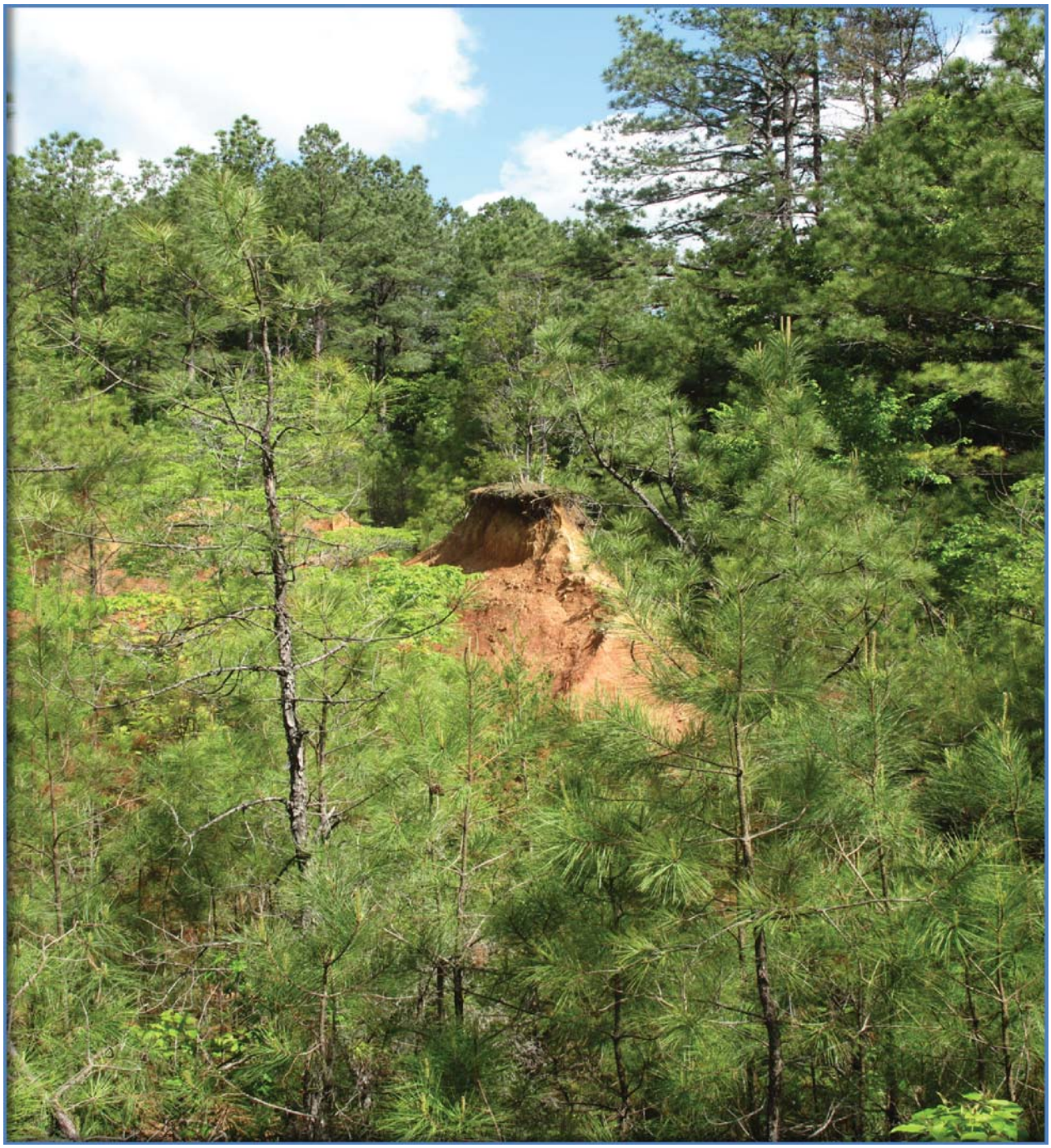
31st ANNUAL CENTRAL STATES FOREST SOILS WORKSHOP
October 11-13, 2011
Natchez Trace State Forest, Wildersville, Tennessee



Pine trees on severely eroded "gullied land" in the Natchez Trace State Forest

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Location

Natchez Trace State Park is located off Interstate Highway 40 exit 116, which is 93 miles west of Nashville and 119 miles east of Memphis, TN. (see map on registration form). Natchez Trace State Park is in the southern part of the Natchez Trace State Forest.

Entrance to Natchez Trace State Park

Tentative Program Includes

- ♦ White Oak Regeneration
- ♦ Forest Best Management Practices
- ♦ Timber Stand Improvement
- ♦ Bottomland Hardwoods research project on University of Tennessee Experiment Station
- ♦ Eroded and depositional soils site restoration and carbon sequestration
- ♦ Water and sediment movement in stream floodplains
- ♦ Soils on Sandstone formed in Cretaceous Age marine sediments
- ♦ Natchez Trace Agricultural and Civil War history
- ♦ West Tennessee cooking and hospitality

TENTATIVE AGENDA

Tuesday, Oct. 11:

Registration/Displays, 3:00 p.m.-5:00 p.m.
Social Hour, 5:00 p.m.-6:00 p.m.
Evening Program, 6:00 p.m.-9:00 p.m.
(meal not provided)

Wednesday, Oct. 12:

Field Trip Departs, 8:00 a.m.
Picnic Lunch at Maple Lake, 12 Noon
Busses return to Lodge, 5:30 p.m.
Banquet @ Pin Oak Lodge, 6:30 p.m.
Social Hour, 7:30 p.m.

Thursday, Oct. 13:

Field Trip departs, 8:00 a.m.
Busses return to Lodge, 1:00 p.m.
Times listed are Central Time.

Workshop Lodging and Meetings

Pin Oak Lodge
567 Pin Oak Lane
Lexington, TN 38351
731-968-8176 | Toll Free 1-800-250-8616
GPS coordinates: 35.70850, -88.28987
For more Park Information go to:
http://www.tn.gov/environment/parks/NatchezTrace/

Sponsors

- ♦ Kentucky-Tennessee Society of American Foresters
- ♦ Tennessee Department of Agriculture, Division of Forestry
- ♦ Soil Scientists Association of Tennessee
- ♦ Tennessee Department of Environment and Conservation, Tennessee State Parks
- ♦ University of Tennessee at Martin
- ♦ Sewanee University of the South
- ♦ University of Tennessee Experiment Stations
- ♦ USDA - Natural Resources Conservation Service-Tennessee

A Brief History of the Central States Forest Soils Workshop

The Central States Forest Soils Workshops came into existence during a Lake States Forest Soils Council Meeting at Bloomington, Indiana in the fall of 1979. Individuals from Illinois, Indiana, Ohio, Missouri, and Kentucky met and decided to form their own group in order to focus more on the soils and forests of the Central States Region. The name "Central States Forest Soils Workshop" was chosen for the group as a means of identifying the geographic region and to signify the intent that the organization was to be a working group dedicated to field trips, on-site discussions, and learning experiences. Six states are involved: Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee.

The Central States Forest Soils Workshop (CSFSW) is a loosely structured organization without officers or a charter. It has operated quite successfully on an informal, volunteer basis. Each year, someone or a group of individuals, volunteer to organize and host the next year's workshop. Currently, we are at the end of the second cycle; with the conclusion of this meeting, all states will have hosted two workshops.

Generally, each workshop has begun with a social hour, followed by a session with guest speakers presenting overviews on the geology, physiography, soils, vegetation of the featured area. The ensuing 1- to 2-day field trips have featured a wide variety of soil-site - forest conditions. Generally, soil pits have been dug or exposed soil surfaces such as road cuts have been used at most stops for examination. Usually, a soil scientist leads a discussion of the morphological, physical, and chemical soil properties and a forester leads a discussion of the surrounding forest stand. A discussion of the soil-site-forest relations normally follows. A dinner usually concludes the first full day field trip; occasionally, a speaker or entertainment is part of this soil event. A short business meeting is held to identify the state, location, and leaders of the next workshop.

Locations of Central States Forest Soils Workshops

1st 1980·Berea, KY
2nd 1981-Salem, MO
3rd1982-Wooster, OH
4th 1983-Carbondale, IL
5th 1984-Jasper, IN
6th 1985 Cadiz, KY
7th 1986-Cleveland, TN
8th 1987-Sikeston, MO
9th 1988-Pere Marquette State Park, IL
10th 1989-Chillicothe, OH
11th 1990-Seymour, IN
12th 1991-Jackson, TN
13th 1992-Park City. Kentucky
14th 1993-Jefferson City, Missouri
15th 1994-Marion, Illinois
16th 1995-Nelsonville, Ohio
17th 1996-Bloomington, Indiana
----- 1997-Not Held
18th 1998-Red River Gorge, Kentucky
19th 1999-Standing Stone State Park, TN
20th 2000-Hannibal, Missouri
21th 2001-Matteson, Illinois
22th 2002-Toledo, Ohio
23th 2003-Scottsburg, Indiana
24th 2004-Hazard, Kentucky
25th 2005-Great Smoky Mts. National Park
26th 2006-Poplar Bluff, Missouri
27th 2007-Carbondale. Illinois
24th 2008-Columbus, Ohio
29th 2009-Santa Claus, Indiana
30th 2010-London, KY
31st 2011-Natchez Trace State Forest, TN

A Brief History of the Western Spur of the Natchez Trace 1/

The Natchez Trace was a historic north-south route from Natchez, Mississippi to Nashville, Tennessee and used by boatmen to return home overland in the late 1700's and early 1800's. These boatmen did not always continue northeastward toward Nashville. To reach Kentucky or the Chickasaw Bluffs (now Memphis), they left the main route of the Trace near Tupelo, Mississippi and traveled northward keeping west of the Tennessee River. The path eventually crossed the Tennessee River east of Camden at the old village of Reynoldsburg (now extinct). A portion of the old Western Spur of the Trace is now within the Natchez Trace State Forest, State Resort Park, and Wildlife Management Area (NTSF).

The Western Spur was used by Andrew Jackson's Tennessee Volunteers--four companies under the command of General John Coffee--during their victorious march northward after the battle of New Orleans in 1815. According to local legend, the giant pecan tree located north of Interstate 40 grew from a pecan given to Sulkey Morris by one of the homeward marching militiamen. That is a romantic legend, but, the origin of the towering pecan tree remains in speculation since the species is not indigenous to the state and had to have been imported. The famous pecan tree was 18.1 feet in circumference (69 inches d.b.h.) and had an average crown spread of 132 feet.

In 1815, William H. Crawford, United States Secretary of War, appointed Thomas Johnson and Michael Dickson of Dickson County, Tennessee, to lay out a 129-mile stretch of road beginning opposite of Reynoldsburg on the Tennessee River and ending near Old Chickasaw Town (near present-day Tupelo, Mississippi). In surveying the road, the commissioners fairly well followed the old Lower (West) Harpeth and West Tennessee Indian trails. The men tried to run the road on "high, dry ground," while keeping it near convenient water supplies. This high ground forms the spine of NTSF where streams flowing east empty into the Tennessee River and those flowing west empty into the Big Sandy River. It was later said that a traveler could go from the Mississippi River along the Western Spur without crossing a single creek. On March 3, 1817, Congress appropriated $4,000 for the American southern army soldiers to cut the new road southward. In early 1818, Secretary of War John C. Calhoun reported that the Western Spur of the Trace was complete and ready for travel. The old roadway has been obliterated, except for a portion near Eva, Tennessee, and a prominent section about 6 miles south of Camden, Tennessee just west of Highway 69 south.

The 1816 surveyor's report recorded that 100 miles of the roadway was uninhabited. The first settlers to arrive in the area of the present NTSF were led by Joseph Morris in 1832. They had left the depleted land of North Carolina for the rich soil of West Tennessee. Erosive soils and lack of practicing soil conservation resulted in the same depletion in West Tennessee, less than 100 years later. The sandy clay hills were soon scarred by deep gullies, aggraded valleys, and generally "burned - out" soil.

The modern history of the area begins in 1935, when about 40,000 acres was purchased by the Resettlement Administration as part of Franklin D. Roosevelt's New Deal Program. The average price per acre was $6.10. The Natchez Trace Project was established to demonstrate how eroded land could be reclaimed through proper conservation practices. The land purchase enabled about 350 families to relocate on richer, more productive, less erosive farmland.

By November 1935, the Project employed five men. As the Depression deepened, the need for jobs became more acute, and by April, 1936 there were 1,399 persons on the payroll. In 1939, the land was leased to the Tennessee Department of Conservation for 50 years with an option for renewal; the Division of Forestry was designated as the administering agency. The lease was terminated in October 1955 and the entire property was deeded to the State of Tennessee.

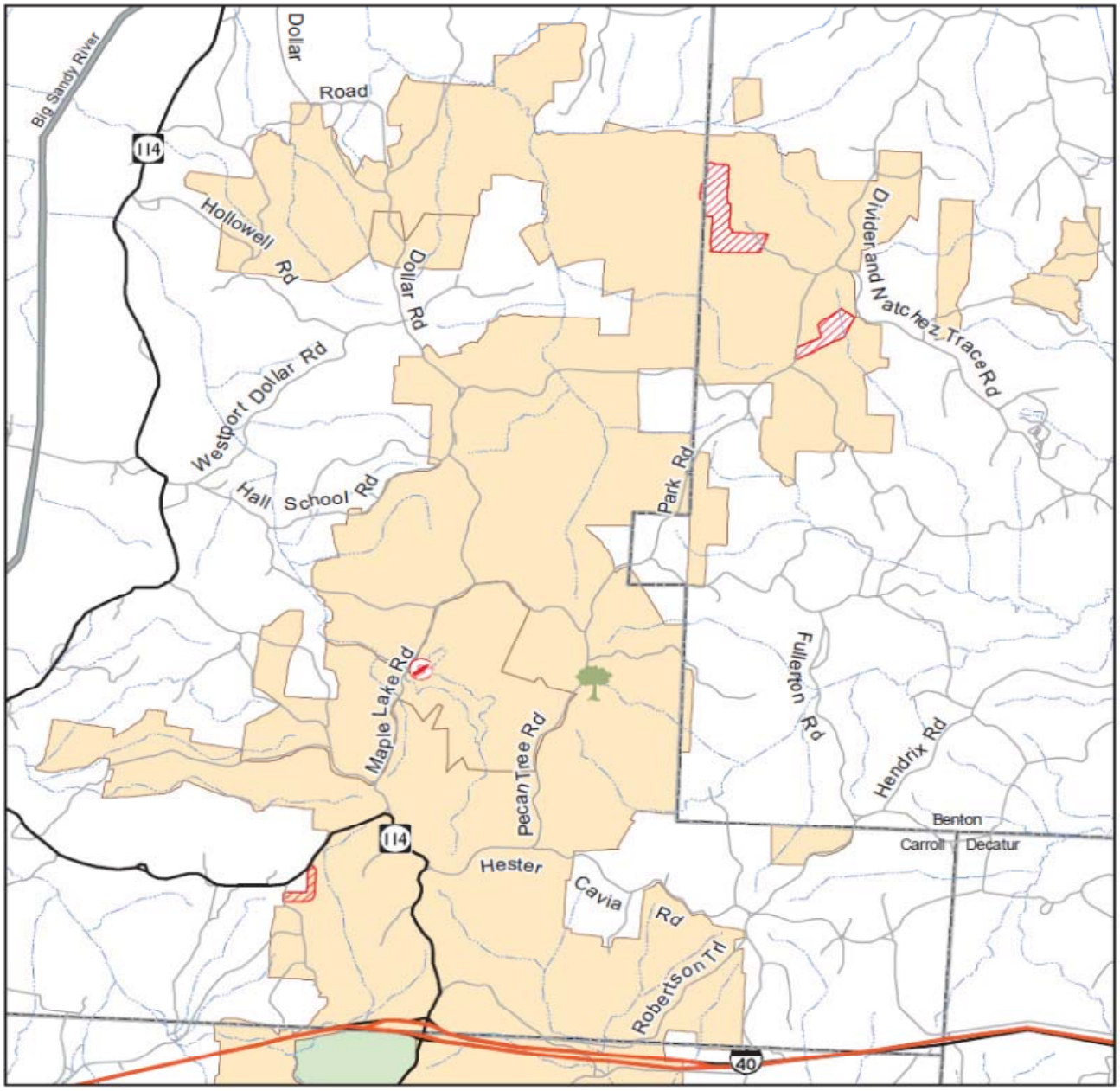
1/ From 12th Annual Central States Forest Soils Workshop Guidebook, Oct. 1991, Author unknown

About the Natchez Trace State Forest

Size: 36,642 acres / 14,829 ha. The Forest is located in central-western Tennessee, in portions of Henderson, Carroll, and Benton Counties. It is approximately 30 miles east of Jackson and is bisected by I-40. The Forest originated from lands purchased by the Resettlement Administration and became a State Forest in 1949. At the time of purchase the land was severely abused by poor agricultural practices that caused severe erosion and resulted in a deeply gullied landscape. When the Tennessee Department of Agriculture, Forestry Division took over management of the land, the emphasis for many years was on fire control and establishment of vegetation to prevent erosion. Loblolly pine, because of high rates of litter production, proved very satisfactory for that purpose and hundreds of acres of pine plantations were established. The Forest now consists of 67% hardwood types and 30% pines. Hardwood stands exceeding 60 years of age occur on 39% of the forest on land that was never cleared for agriculture or had been abandoned for farming. On the other hand, 57% support trees whose age are 10 to 60 years and probably originated on former farmland. Large areas have been salvaged as a result of approximately 7,300 acres of older age class stands being blown down to various degrees by a severe thunderstorm in 1999. There are 16 cemeteries, 62 historic sites, 1 prehistoric site, 4 ponds, and 1 primitive campsite on the forest. Hunting has been a traditional use of the forest. Other recreational uses include 28 miles of hiking trails, camping, picnicking, horseback riding and OHV use are allowed on certain marked forest roads.

Article source:
http://www.tn.gov/agriculture/forestry/stateforest02.shtml

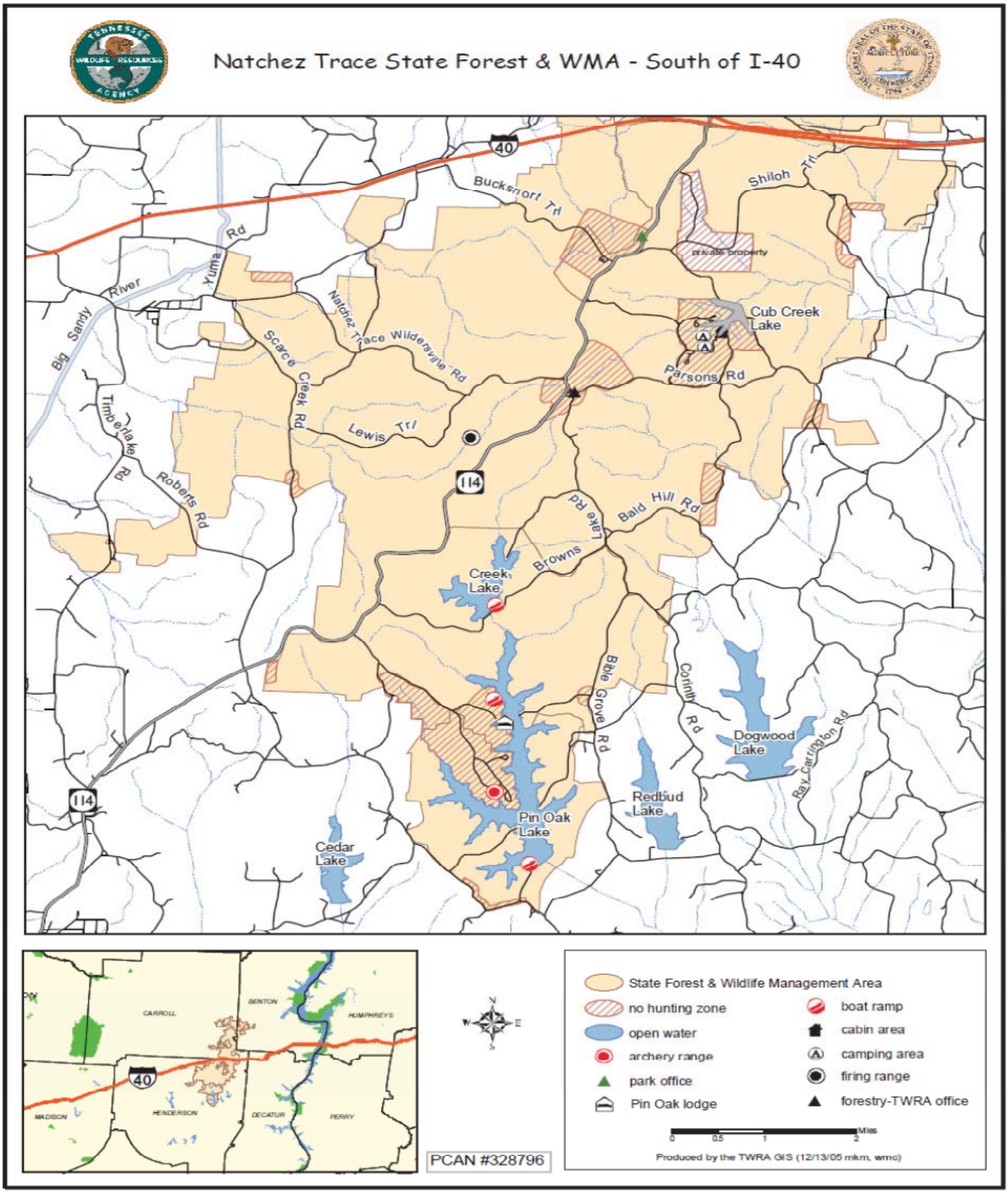
Natchez Trace State Forest & WMA - North of I-40
Carroll and Benton Counties, Tennessee



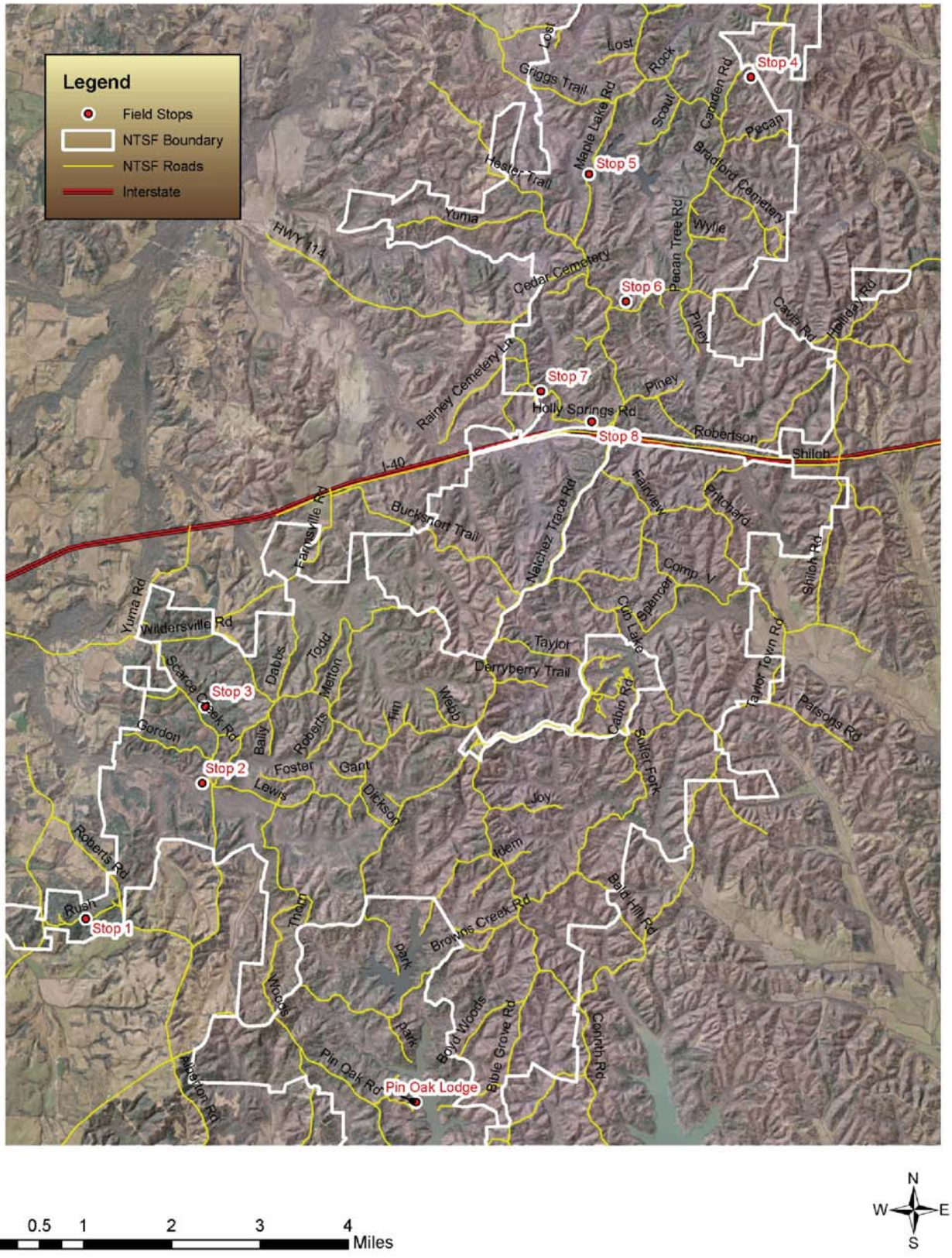
Produced by TWRA GIS (12/07/05 mkm, wmc)

- state forest and wma
- state park
- no hunting zone
- boat ramp
- big pecan tree
- interstate

PCAN #328796


Natchez Trace State Forest & WMA - South of I-40
40
Bucksnort Trl
Shiloh Trl
Yuma Rd
Big Sandy River
Natchez Trace Wildersville Rd
Scarce Creek Rd
Cub Creek Lake
Parsons Rd
Lewis Trl
Timberlake Rd
Roberts Rd
114
Bald Hill Rd
Lake Rd
Browns Creek Lake
Bible Grove Rd
Corinth Rd
Dogwood Lake
Ray Carrington Rd
Redbud Lake
Pin Oak Lake
Cedar Lake
CARROLL
BENTON
HUMPHREYS
MADISON
HENDERSON
DECATUR
PERRY
PCAN #328796
State Forest & Wildlife Management Area
no hunting zone
open water
archery range
park office
Pin Oak lodge
boat ramp
cabin area
camping area
firing range
forestry-TWRA office
Miles
Produced by the TWRA GIS (12/13/05 mkm, wmc)

Field Tour Map



Natchez Trace State Forest Stop 1

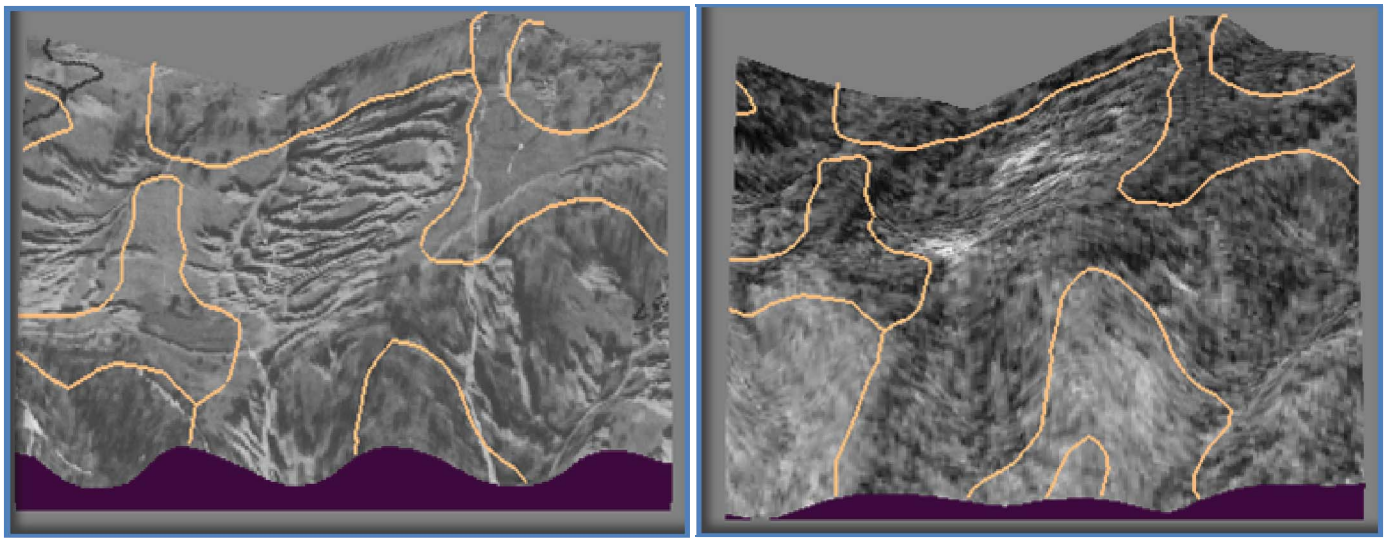
SEVERELY GULLIED LAND REFORESTATION SITE

Coordinates: N 35° 44' 15.7" W 88° 21' 28.4"

A close network of gullies has largely destroyed the original Lexington, Providence, and Smithdale soils that occupied the areas. On narrow ridges and pinnacles between the gullies, remnants of the original soil profiles remain, and loess caps are still present. The exposed soil materials in the gullies are chiefly sand or sandy clay loam. Slope ranges from 5 to 35 percent, but most of this land type has slopes of 12 to 25 percent.

Present use and management.- The eroded gullies are now mostly in pine. These sites have been altered to the point that hardwoods are not suitable either from a productivity or soil conservation point-of-view. The long overlapping litter layer of pine needles do a much better job of preventing soil erosion than hardwood leaves. Although the pines have almost stabilized areas between the gullies, erosion in the gullies is still active. Cutting back at the heads of gullies is injuring adjacent upland soils und the lower bottom and local alluvial soils are being damaged by the sandy gully wash.

Management requirements.- Check dams were used extensively in these areas to trap sediments and to help form soil material that pine trees could be established on. This site is classified as a Low Intensity Management (LIM) site because of the soil conditions. In this management type, the primary consideration is to keep the soils stable, and the pines growing here are doing that. This classification means that the site is not productive enough in its current forest type to economically justify expending funds on its regeneration. Also, the site does not lend itself to intermediate silvicultural practices , such as thinning. When a LIM stand is harvested, all merchantable timber will be cut. LIM stands will be managed on longer rotation lengths. This land type is in capability unit VIIe.

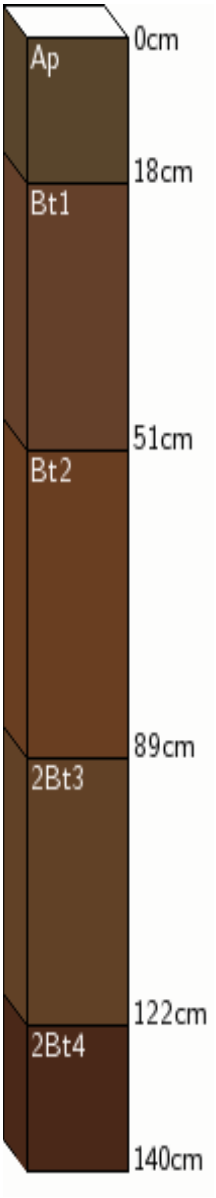


1937 and 2008 aerial imagery showing a gullied land area in Natchez Trace State Forest, before and after reforestation

Check dams were installed by CCC crews and others to trap sediments and to help form soil materials in the bottoms of gullies

Early 1900's and 2011 photographs showing severely gullied land areas

LEXINGTON SERIES



Typical profile

Soil Taxonomy

Order:	*Alfisols*
Suborder:	*Udalfs* [*Map of Suborders*]
Greatgroup:	*Hapludalfs*
Subgroup:	*Ultic Hapludalfs*
Family:	*ULTIC HAPLUDALFS, FINE-SILTY, MIXED, ACTIVE,THERMIC*
Soil Series:	*Lexington* *(Link to OSD)* *(Link to SM Tool)*
Data:	*[Lab Data]* *[Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component* *All Horizons*

Land Classification

Storie Index	*NOT RATED*
Land Capability Class **[non-irrigated]**	*7-e*
Land Capability Class **[irrigated]**	-
Ecological Site Description	
Forage Suitability Group	

Soil Suitability Ratings

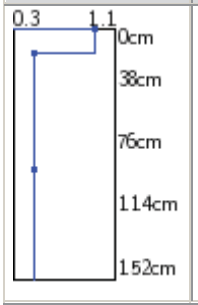
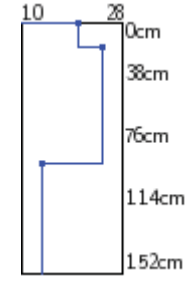
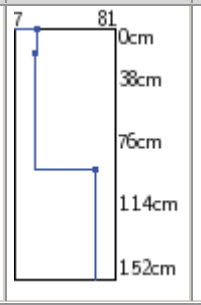
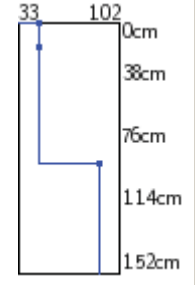
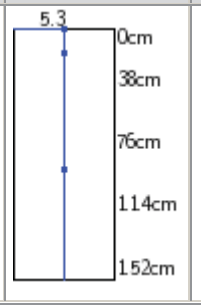
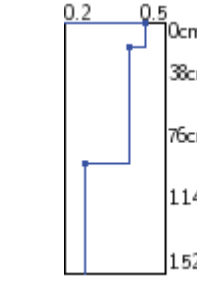
Waste Related	*Engineering*
Urban/Recreational	*Irrigation*
Wildlife	*Runoff*

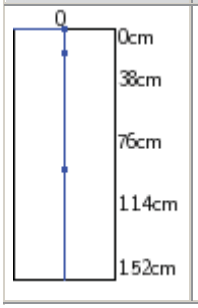
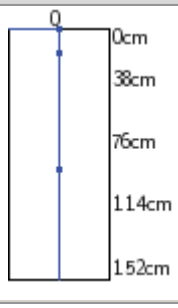
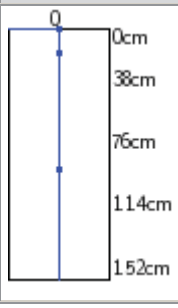
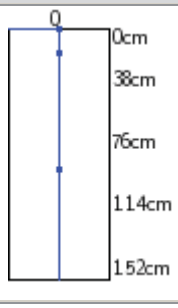
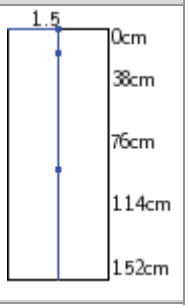
Hydraulic and Erosion Ratings

Wind Erodibility Group	
Wind Erodibility Index	
T Erosion Factor	*4*
Runoff	
Drainage	*Well drained*
Hydric Rating / Hydrologic Group	*No* *[Group B]*
Parent Material:	*loess over loamy marine deposits*
Total Plant Available Water (cm):	*21.77*

Geomorphology

Landscape	*coastal plains*
Landform	*hillslopes*

Organic Matter (%)	Percent Clay	Percent Sand	K_{sat} (mm/hr)	pH (1:1 H_2O)	K_f Factor
					

EC (dS/m)	SAR	$CaCO_3$ (%)	Gypsum (%)	CEC at pH7 (cmol + /kg soil)	Linear Extensibility (%)
				no data	

From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

LEXINGTON SILT LOAM – soil profile described on a pinnacle in an area of severely gullied land

A --- 0 to 3 centimeters (0 to 1.2 inches); dark yellowish brown (10YR 4/4) moist, silt loam; weak fine granular structure; very friable; very strongly acid (pH 5.0); abrupt smooth boundary.

E --- 3 to 13 centimeters (1.2 to 5.1 inches); light yellowish brown (10YR 6/4) moist, silt loam; weak coarse granular structure; very friable; very strongly acid (pH 4.8); clear smooth boundary.

Bt1 --- 13 to 38 centimeters (5.1 to 15 inches); strong brown (7.5YR 4/6) moist, silty clay loam; moderate medium subangular blocky structure; friable; strongly acid (pH 5.3); gradual smooth boundary.

Bt2 --- 38 to 63 centimeters (15 to 24.8 inches); strong brown (7.5YR 5/6) moist, silt loam; moderate medium subangular blocky structure; friable; strongly acid (pH 5.3); gradual smooth boundary.

2Bt3 --- 63 to 84 centimeters (24.8 to 33.1 inches); strong brown (7.5YR 4/6) moist, silt loam; moderate medium subangular blocky structure; friable; > 15% sand; strongly acid (pH 5.3); gradual smooth boundary.

2Bt4 --- 84 to 119 centimeters (33.1 to 46.9 inches); strong brown (7.5YR 4/6) moist, loam; moderate coarse subangular blocky structure; friable; strongly acid (pH 5.2); gradual smooth boundary.

2Bt5 --- 119 to 155 centimeters (46.9 to 61 inches); yellowish red (5YR 4/6) moist, loam; moderate coarse subangular blocky structure; friable; 10 percent (common) medium distinct reddish yellow (7.5YR 7/6), moist, masses of oxidized iron in matrix and 10 percent (common) medium distinct strong brown (7.5YR 4/6), moist, masses of oxidized iron in matrix; strongly acid (pH 5.1); gradual smooth boundary.

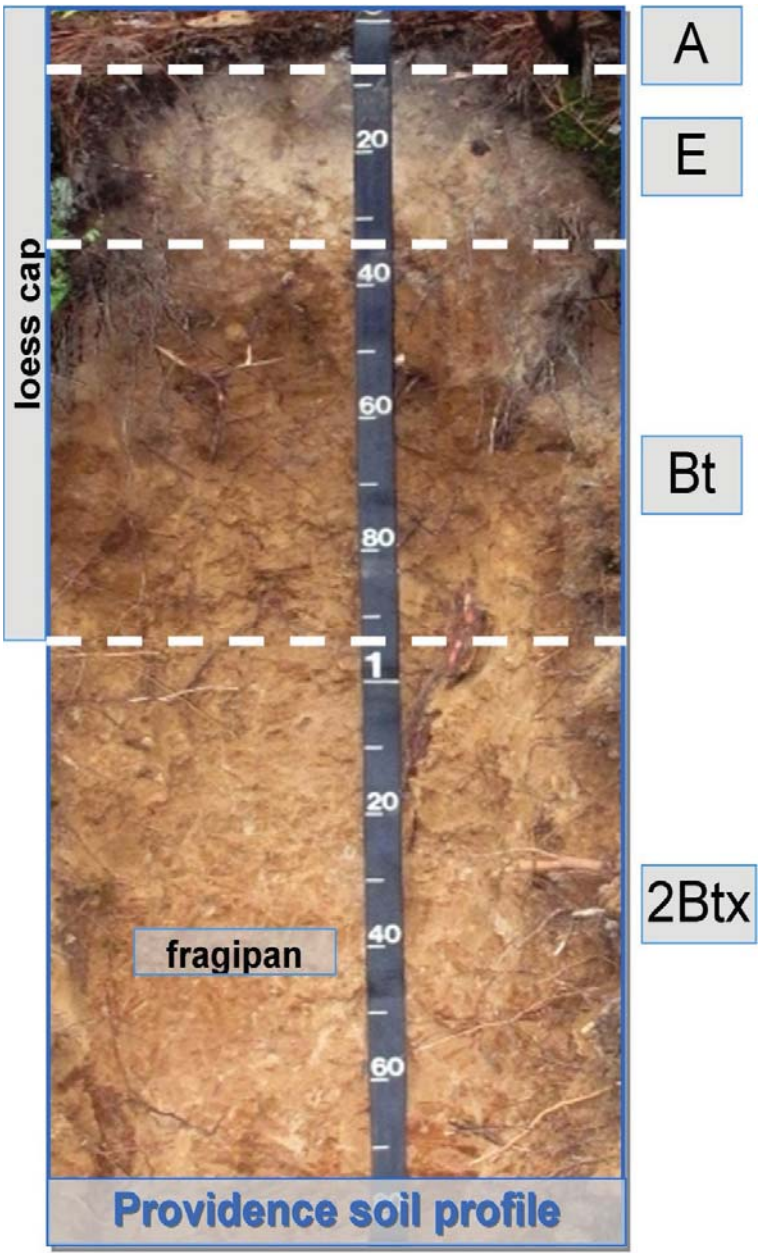
2Bt6 --- 155 to 206 centimeters (61 to 81.1 inches); yellowish red (5YR 4/6) moist, loam; strong coarse subangular blocky structure; friable; 10 percent (common) medium distinct light brown (7.5YR 6/4), moist, iron depletions in matrix, 10 percent (common) medium distinct reddish yellow (7.5YR 7/6), moist, masses of oxidized iron in matrix and 10 percent (common) medium distinct strong brown (7.5YR 4/6), moist, masses of oxidized iron in matrix; strongly acid (pH 5.3); gradual smooth boundary.

2Bt7 --- 206 to 264 centimeters (81.1 to 103.9 inches); red (2.5YR 4/6) moist, loam; strong coarse subangular blocky structure; friable; 10 percent (common) medium distinct light brown (7.5YR 6/4), moist, iron depletions in matrix; strongly acid (pH 5.4); gradual smooth boundary.

BC --- 264 to 305 centimeters (103.9 to 120.1 inches); red (2.5YR 4/8) moist, sandy loam; moderate coarse subangular blocky structure; firm; 5 percent (common) medium distinct light brown (7.5YR 6/4), moist, iron depletions in matrix; strongly acid (pH 5.5).

Selected Soil Characterization Data

Pedon ID: 11TN077003 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
A	0--3	SIL	11.9	61.9	26.2	10.9	7.23	9	19	5.0
E	3--13	SIL	12.3	64.4	23.3	9.6	1.17	67	18	4.8
Bt1	13--38	SICL	34.3	58.6	7.1	3.8	0.43	22	37	5.3
Bt2	38--63	SIL	25.4	59.7	14.9	7.1	0.12	24	33	5.3
2Bt3	63--84	SIL	21.3	52.3	26.4	13.2	0.09	33	32	5.3
2Bt4	84--119	L	20.6	42.9	36.5	14.4	0.08	33	29	5.2
2Bt5	119--155	L	19.1	32.7	48.2	27.7	0.09	37	29	5.1
2Bt6	155--206	L	19.1	36.6	44.3	24.5	0.05	30	33	5.3
2Bt7	206--264	L	20.8	30.3	48.9	27.2	0.05	27	35	5.4
BC	264--305	SL	13.1	6.4	80.5	42.9	0.04	29	44	5.5



Lexington and Providence soil profiles on loess capped remnants in an area of severely gullied land

Natchez Trace State Forest Stop 2

DEPOSITIONAL BOTTOMLAND HARDWOOD SITE

Coordinates: N 35° 45’ 38.8” W 88° 20’ 02.1”

Bottomland hardwood Forest Type:

Hardwood Forest Type Definition: Stands in which 70% or more of the crowns in the dominant or co-dominant position and hardwoods with specific type species prevailing.

The species composition of bottomland hardwood stands is extremely variable, and primarily based on historical land use and soil drainage conditions. Because these sites are comprised of old agricultural fields light seeded (wind blown seed) hardwood species predominate the stands. Yellow Poplar are on the well drained sites, and on the poorly drained sites Sweetgum and Red Maple are most common. In addition to the primary species listed above a wide variety of other (heavy seeded) bottomland hardwoods comprise a very small percentage of the species represented in this forest type:

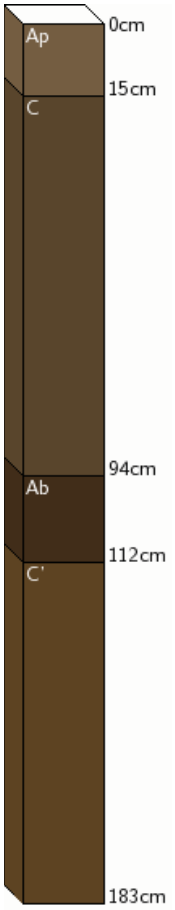
Oaks:	Hickory:	True Obligate Hydrophytes (wetland species)
Overcup	Bitter Pecan	Baldcypress
Swamp chestnut	Shellbark	Swamp Tupelo
Cherrybark	Shagbark	
Willow		
Pin		

Due to sedimentation and altered drainage patterns these sites are a patchwork of tree species on small areas within the stands Natchez Trace State Forest has about 6000 acres of this Forest Type.

Soils: New soil materials have accreted in this depositional bottomland with thicknesses of two to three feet. There are first and second level flood plains and alluvial fans present in this area. The new sediments present still reflect the parent material colors and textures of the Smithdale and Lexington soils upstream that they were eroded from. Buried soils from more stable and uniform depositional periods are identified by a darker colored former surface layer with higher organic carbon content than the overlying new materials. The buried soils also have a significantly lower sand content, and more grayish color patterns indicative of prolonged saturation.

Hydrology: The stream channel at this site has many sand bars formed in it. Beaver dams help to trap the sand sediments. The sand sediments also build natural levees which cause backswamp areas to form. Sand transport fills in the channels and causes a braided stream pattern to form. There are also natural channel cutoffs that are smaller than the existing channel. This reflects an earlier point in time with lower discharges.

OCHLOCKONEE SERIES



Typical profile

Soil Taxonomy

Order:	*Entisols*
Suborder:	*Fluvents* [*Map of Suborders*]
Greatgroup:	*Udifluvents*
Subgroup:	*Typic Udifluvents*
Family:	*TYPIC UDIFLUVENTS, COARSE-LOAMY, SILICEOUS, ACTIVE, ACID, THERMIC*
Soil Series:	*Ochlockonee* *(Link to OSD)* *(Link to SM Tool)*
Data:	*[Lab Data]* *[Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component* *All Horizons*

Land Classification

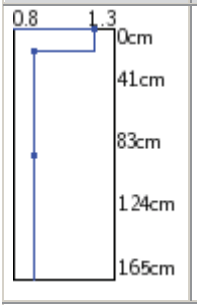
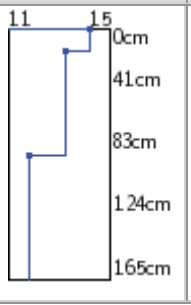
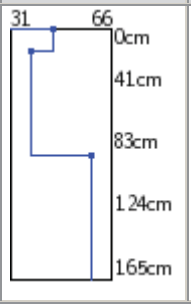
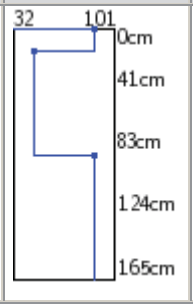
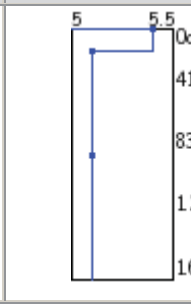
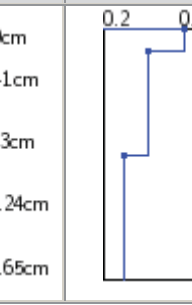
Storie Index	*NOT RATED*
Land Capability Class [non-irrigated]	*1-*
Land Capability Class [irrigated]	*-*
Ecological Site Description	
Forage Suitability Group	

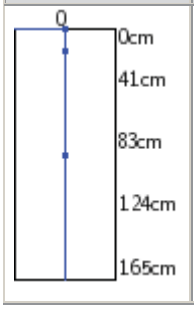
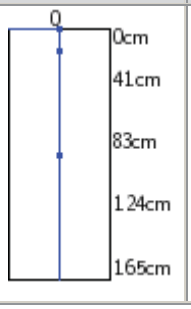
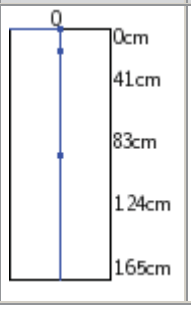
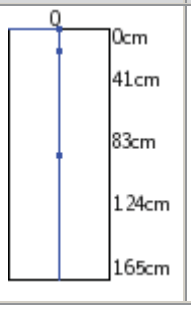
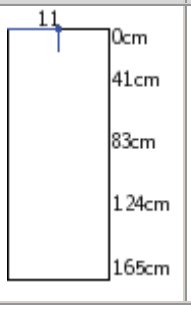
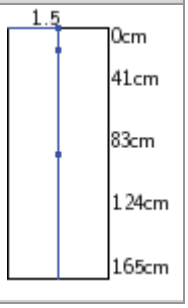
Hydraulic and Erosion Ratings

Wind Erodibility Group	*5*
Wind Erodibility Index	
T Erosion Factor	*5*
Runoff	
Drainage	*Well drained*
Hydric Rating / Hydrologic Group	*No [Group B]*
Parent Material:	*loamy alluvium*
Total Plant Available Water (cm):	*19.89*

Geomorphology

Landscape	*coastal plains*
Landform	*flood plains*

Organic Matter (%)	Percent Clay	Percent Sand	K_{sat} (mm/hr)	pH (1:1 H_2O)	K_f Factor
					

EC (dS/m)	SAR	CaC03 (%)	Gypsum (%)	CEC at pH7 (cmol + /kg soil)	Linear Extensibility (%)
					

From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

OCHLOCKONEE LOAM – soil profile described on current first level floodplain

A --- 0 to 3 centimeters (0 to 1.2 inches); brown (10YR 4/3) moist, silt loam; weak fine granular structure; very friable; very strongly acid (pH 5.0); abrupt smooth boundary.

C1 --- 3 to 25 centimeters (1.2 to 9.8 inches); dark yellowish brown (10YR 4/4) moist, silt loam; massive; very friable; extremely acid (pH 4.3); clear smooth boundary.

C2 --- 25 to 43 centimeters (9.8 to 16.9 inches); dark yellowish brown (10YR 4/4) moist, sandy loam; massive; friable; extremely acid (pH 4.4); clear smooth boundary.

C3 --- 43 to 56 centimeters (16.9 to 22 inches); brown (7.5YR 5/4) moist, loamy sand; massive; friable; 4 percent (common) medium distinct brown (7.5YR 5/3), moist, iron depletions in matrix; very strongly acid (pH 4.5); clear smooth boundary.

C4 --- 56 to 69 centimeters (22 to 27.2 inches); brown (10YR 5/3) moist, silt loam; massive; friable; 2 percent (common) medium distinct brown (10YR 4/3), moist, iron depletions in matrix and 3 percent (common) medium distinct pale brown (10YR 6/3), moist, iron depletions in matrix; extremely acid (pH 4.3); clear smooth boundary.

Ab --- 69 to 84 centimeters (27.2 to 33.1 inches); very dark grayish brown (10YR 3/2) moist, silt loam; weak fine subangular blocky structure; friable; 2 percent (common) medium distinct grayish brown (10YR 5/2), moist, iron depletions in matrix and 3 percent (common) medium distinct dark grayish brown (10YR 4/2), moist, iron depletions in matrix; extremely acid (pH 4.4); gradual wavy boundary.

Bwb --- 84 to 114 centimeters (33.1 to 44.9 inches); yellowish brown (10YR 5/4) moist, silt loam; weak fine subangular blocky structure; friable; 2 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, iron depletions in matrix and 4 percent (common) medium distinct pale brown (10YR 6/3), moist, iron depletions in matrix; extremely acid (pH 4.4); gradual smooth boundary.

Bgb --- 114 to 203 centimeters (44.9 to 79.9 inches); light brownish gray (10YR 6/2) moist, loam; weak fine subangular blocky structure; friable; 1 percent (few) medium prominent black (10YR 2/1), moist, manganese masses in matrix, 2 percent (common) medium distinct yellowish brown (10YR 5/6), moist, masses of oxidized iron in matrix and 6 percent (common) medium distinct pale brown (10YR 6/3), moist, masses of oxidized iron in matrix; extremely acid (pH 4.4).

Selected Soil Characterization Data

Pedon ID: 11TN077004 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
A	0--3	SIL	18.4	61.6	20	9	4.09		59	5.0
C1	3--25	SIL	17.1	56.4	26.5	12.2	0.68	24	31	4.3
C2	25--43	SL	7.5	31.3	61.2	27.5	0.18	32	39	4.4
C3	43--56	LS	3.8	10	86.2	43	0.09	20	27	4.5
C4	56--69	SIL	16.2	74.6	9.2	2.8	0.67	55	13	4.3
Ab	69--84	SIL	18.4	58.8	22.8	8.6	0.83	53	11	4.4
Bwb	84--114	SIL	13.7	50.2	36.1	12.8	0.21	36	18	4.4
Bgb	114--203	L	9.4	41.9	48.7	19.2	0.08	33	24	4.4

Sand is being transported and re-deposited in the channels, causing natural levees, backswamps, and braided stream patterns to form and altering the hydrology

Stop 3

CHERRYBARK OAK PLANTATION

Coordinates: N 35° 46’ 28.2” W 88° 20’ 09.0”

Cherrybark oaks were planted in 1969 as part of a south-wide tree improvement seed source study to develop genetically improved cherrybark oak for planting in western Tennessee. The plantation was mowed 2 or 3 times a year for the first 5 years. Seedlings were planted on a 9 X 9 foot spacing. There have been no other cultural treatments besides the mowing. Site index for this area is estimated to be 90 to 100 feet at 50 years for cherrybark oak. An area of similar soils adjacent to the plantation is cleared of trees and is overgrown with kudzu. Samples were also collected there to compare soil organic carbon contents.

- **Growth and development:** Stand was planted with 967 trees. In 1994 Russ Cox selected the tress representing the most promising genetic families to be retained after the plantation was thinned.
- **Form:** The best formed and fastest growing trees were left for a seed production area. By leaving the best families of Cherrybark oak to breed with each other the seed collected will produce better trees than wild seed.
- **Spacing:** What appears to be an erratic spacing of leave trees after the thinning is because the trees were planted in four tree family groupings. By leaving the best families you have four trees in a row with gaps between.
- **Intermediate treatments:** Other than the mowing early on the only intermediate treatment was a thinning which was accomplished in 1994 leaving 384 trees.
- **Final product:** Genetically improved Cherrybark Oak seedlings to be sold to the public from our Nursery at Delano. Currently there have not been any large enough crops of seed here to be commercially viable.

Age (years)	Avg. DBH (in)	Avg. Height (ft)
4		2.3
6		6.9
10	2.6	19.3
15	4.5	37.3
21	6	60
42	14	*

*2.5 16 foot logs per acre volume; 9500 board feet per acre (international ¼ inch scale)

Collins-like soil profile - Coarse-silty, mixed, nonacid, thermic Aquic Udifluvent**:**
Sampled by: JT Ammons & DF Clendennon on April 16, 1991 (35 deg 38 min 57 sec N, 88 deg 20 min 10 sec W)

Ap--0 to 7 cm, (0-3"); brown (10YR 4/3) silt loam; moderate medium granular structure; very friable; many very fine and fine roots; medium acid; abrupt smooth boundary.

C1--7 to 32 cm, (3-13"); dark yellowish brown (10YR 4/6) silt loam; massive; friable; common very fine and fine roots; common fine tubular pores; medium acid; clear smooth boundary.

C2--32 to 92 cm, (13-36"); dark yellowish brown (10YR 4/6) silt loam with noticeable high silt content; common medium prominent light brownish gray (l0YR 6/2) and few fine prominent strong brown (7.5YR 5/8) mottles; massive; friable; few very fine and fine roots; few fine tubular pores; few black stains; medium acid; clear smooth boundary.

Ab--92 to 112 cm, (36-44"); dark brown (7.5YR 3/4) silt loam; moderate medium granular structure; friable; few very fine and fine roots; few fine tubular pores; few black stains; medium acid; abrupt smooth boundary.

Bwbl--112 to 120 cm, (44-47"); dark yellowish brown (l0YR 4/6) silt loam with noticeable sand content; few medium prominent light brownish gray (l0YR 6/2) mottles; weak medium subangular blocky structure; friable; few very fine and fine roots; common fine tubular pores; medium acid; clear smooth boundary.

Bwb2--120 to 140 cm, (47-55"); dark yellowish brown (l0YR 4/6) silt loam; few medium prominent light brownish gray (10YR6/2) mottles; weak medium subangular blocky structure; friable;few very fine and fine roots; common fine tubular pores; apparent water table at 122 cm; medium acid.

Soil Organic Carbon Percent - 1991-2011

Horizon	OC % 1991	OC % 2011 - Trees	OC % 2011 - Kudzu
Ap	1.77	4.89	2.26
C1	0.39	1.10	1.13
C2	0.39		
Ab	0.48		
Bwb1	0.30		
Bwb2	0.29		

Natchez Trace State Forest Stop 4

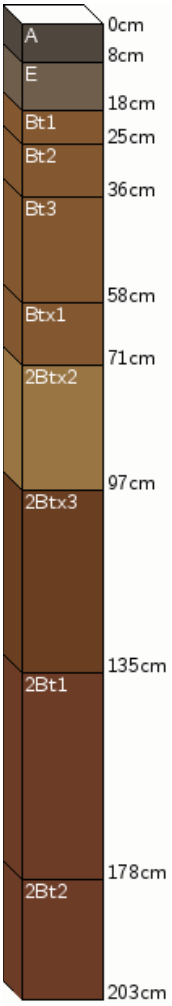
Rock Ledges Geology Site

Coordinates: N 35° 52’ 44.3” W 88° 13’ 26.0”

Forest management on these sites is the same as other stands on the State Forest. Management activities are based on species composition and site productivity. Soils on ridge tops that have a loess cap have pines trees, which indicate they were once cropland. The Tennessee Department of Environment and Conservation Natural heritage data base is used to determine if there are any unusual plants or animals in need of special consideration. If there are, the environmental factors, these species require are managed within the regular management activities.

The rock ledges in this area were described in the Journal of Geology, Volume 28, 1920 as:
“ Conspicuous large masses of quartzite or very hard, fine-grained, white sandstone of irregular occurrence are found at several isolated localities in Henderson, Carroll, and Henry Counties in the lower part of the McNairy sand member. These masses are exceedingly resistant to erosive agencies and are often left lying bare on the surface after the softer sands and clays which formerly enclosed these masses have been washed away. They occur in irregular, cavernous, and often grotesque shapes that attract the attention of travelers and the natives in these regions. The well-known "hollow rock" at Hollow Rock Junction in Carroll County has served as a landmark since early settlers first went into that part of the state. The most extensive occurrences of this quartzite are two miles south of Dollar in Carroll County where masses as large as a two-story house may be observed in an area of two or three square miles. The origin of these masses is due to the cementation of local accumulations of very fine and pure quartz sands deposited along with the other McNairy sediments. Large masses of highly ferruginous hard sandstones are common in the Ripley, but the quartzites under discussion are characterized by a very low iron content. “

PROVIDENCE SERIES



Typical profile

Soil Taxonomy

Order:	*Alfisols*
Suborder:	*Udalfs* [*Map of Suborders*]
Greatgroup:	*Fragiudalfs*
Subgroup:	*Oxyaquic Fragiudalfs*
Family:	*OXYAQUIC FRAGIUDALFS, FINE-SILTY, MIXED, ACTIVE, THERMIC*
Soil Series:	*Providence* *(Link to OSD)* *(Link to SM Tool)*
Data:	*[Lab Data]* *[Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component* *All Horizons*

Land Classification

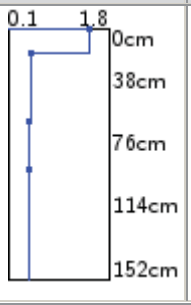
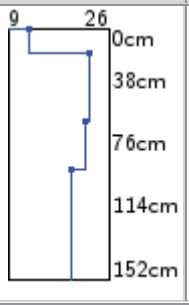
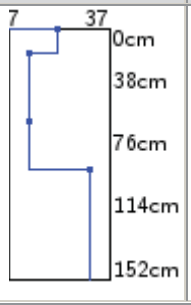
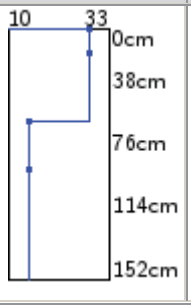
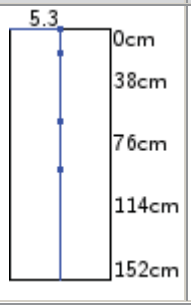
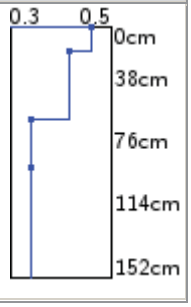
Storie Index	*NOT RATED*
Land Capability Class **[non-irrigated]**	*3-e*
Land Capability Class **[irrigated]**	*-*
Ecological Site Description	
Forage Suitability Group	

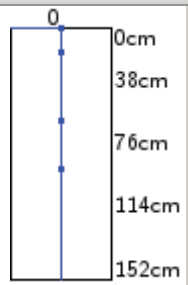
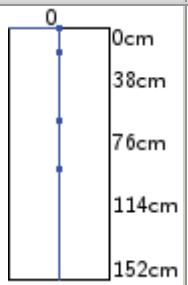
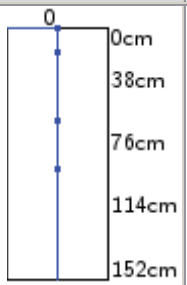
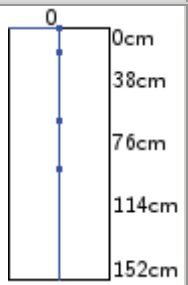
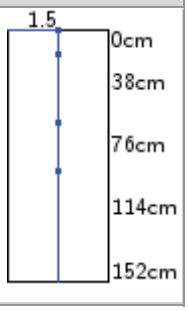
Hydraulic and Erosion Ratings

Wind Erodibility Group	
Wind Erodibility Index	
T Erosion Factor	*4*
Runoff	
Drainage	*Moderately well drained*
Hydric Rating / Hydrologic Group	*No [Group C]*
Parent Material:	*loess over loamy marine deposits*
Total Plant Available Water (cm):	*20.4*

Geomorphology

Landscape	*coastal plains*	
Landform	*interfluves*	

Organic Matter (%)	Percent Clay	Percent Sand	K_{sat} (mm/hr)	pH (1:1 H_2O)	K_f Factor
					

EC (dS/m)	SAR	$CaCO_3$ (%)	Gypsum (%)	CEC at pH7 (cmol + /kg soil)	Linear Extensibility (%)
				no data	

From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

Typical profile of Providence silt loam

A --- 0 to 4 centimeters (0 to 1.6 inches); brown (10YR 4/3) moist, silt loam; moderate medium granular structure; very friable; abrupt smooth boundary.

E --- 4 to 19 centimeters (1.6 to 7.5 inches); light yellowish brown (10YR 6/4) moist, silt loam; weak fine subangular blocky structure; very friable; clear smooth boundary.

Bt1 --- 19 to 47 centimeters (7.5 to 18.5 inches); strong brown (7.5YR 4/6) moist, silty clay loam; moderate medium subangular blocky structure; friable; gradual smooth boundary.

Bt2 --- 47 to 64 centimeters (18.5 to 25.2 inches); strong brown (7.5YR 5/6) moist, silt loam; moderate medium subangular blocky structure; friable; clear smooth boundary.

2Btx1 --- 64 to 99 centimeters (25.2 to 39 inches); brown (7.5YR 5/4) moist, loam; moderate coarse prismatic parting to moderate coarse subangular blocky structure; firm; 2 percent (common) medium yellowish brown (10YR 5/6), moist, masses of oxidized iron in matrix, 4 percent (common) medium pale brown (10YR 6/3), moist, iron depletions in matrix, 6 percent (common) medium strong brown (7.5YR 4/6), moist, masses of oxidized iron in matrix and 3 percent (common) medium light brownish gray (10YR 6/2), moist, iron depletions in matrix; gradual smooth boundary.

2Btx2 --- 99 to 135 centimeters (39 to 53.1 inches); brown (7.5YR 5/4) moist, sandy loam; moderate very coarse prismatic parting to moderate coarse subangular blocky structure; firm; 4 percent (common) medium pale brown (10YR 6/3), moist, iron depletions in matrix, 4 percent (common) medium brownish yellow (10YR 6/6), moist, masses of oxidized iron in matrix, 7 percent (common) medium yellowish brown (10YR 5/8), moist, masses of oxidized iron in matrix and 6 percent (common) medium light brownish gray (10YR 6/2), moist, iron depletions in matrix; clear smooth boundary.

R --- 135 centimeters (53.1 inches).

Typical profile of Smithdale fine sandy loam

A --- 0 to 5 centimeters (0 to 2 inches); dark grayish brown (10YR 4/2) moist, fine sandy loam; weak fine granular structure; very friable; extremely acid (pH 4.4); abrupt smooth boundary.

BE --- 5 to 29 centimeters (2 to 11.4 inches); brownish yellow (10YR 6/6) moist, loam; weak fine subangular blocky structure; very friable; very strongly acid (pH 4.8); clear smooth boundary.

Bt1 --- 29 to 58 centimeters (11.4 to 22.8 inches); strong brown (7.5YR 4/6) moist, loam; 27 percent clay; moderate medium subangular blocky structure; very friable; strongly acid (pH 5.0); gradual smooth boundary.

Bt2 --- 58 to 81 centimeters (22.8 to 31.9 inches); brown (7.5YR 4/4) moist, loam; 21 percent clay; moderate medium subangular blocky structure; very friable; common fine tubular pores; 3 percent (very few) discontinuous distinct strong brown (7.5YR 4/6), moist, clay films on surfaces along pores; 4 percent (common) medium distinct light red (2.5YR 6/6), moist, iron depletions in matrix; 2 percent nonflat subrounded moderately cemented 2 to 5 millimeters (0.1 to 0.2 inches) ironstone nodules; strongly acid (pH 5.1); diffuse smooth boundary.

Bt3 --- 81 to 110 centimeters (31.9 to 43.3 inches); yellowish red (5YR 5/8) moist, fine sandy loam; weak medium subangular blocky structure; very friable; 3 percent (common) medium prominent yellowish red (5YR 4/6), moist, iron depletions in matrix; strongly acid (pH 5.1); diffuse smooth boundary.

BC --- 110 to 155 centimeters (43.3 to 61 inches); red (2.5YR 4/6) moist, fine sandy loam; weak fine subangular blocky structure; very friable; 3 percent (common) medium prominent light red (2.5YR 6/6), moist, iron depletions in matrix; strongly acid (pH 5.1); diffuse smooth boundary.

C1 --- 155 to 203 centimeters (61 to 79.9 inches); red (2.5YR 5/6) moist, loamy sand; massive; very friable; 10 percent (common) medium prominent light red (2.5YR 6/6), moist, iron depletions in matrix; very strongly acid (pH 4.9).

Selected Soil Characterization Data

Pedon ID: 11TTN017002 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
A	0--5	FSL	4.9	41.1	54	16.9	6.53	41	11	4.4
BE	5--29	L	7.4	46.3	46.3	8.9	0.55	90	3	4.8
Bt1	29--58	L	24.5	35.2	40.3	11.2	0.33	75	11	5.0
Bt2	58--81	L	15.3	33.0	51.7	12.2		59	24	5.1
Bt3	81--110	FSL	17.2	14.0	68.8	20.7	0.18	56	28	5.1
BC	110--155	FSL	18.4	4.2	77.4	21.2	0.05	59	22	5.1
C1	155--203	LS	12.3	1.6	86.1	41.3	0.04	65	23	4.9

Natchez Trace State Forest Stop 5

Depositional floodplain site with headcut erosion

Coordinates: N 35° 51’ 41.1” W 88° 15’ 26.6”

Sediments eroded from areas upstream have deposited layers of new soil material 2 to 4 feet thick over the more stable soils that are buried beneath them. This has changed the hydrology and drainage patterns to result in flatter, stair-stepped bottoms with braided streams rather than a well defined stream channel. Deep head cuts form between floodplain levels.

A tunneling head cut has formed where the poorly defined drainage way drops to a lower floodplain level

Natchez Trace State Forest Sediment Source Inventory
November 15, 1996 Progress Report

Timothy H. Diehl[1] and Daniel A. Marion[2]

In cooperation with Tennessee Division of Forestry, a reconnaissance-level survey of sediment sources was performed in two study basins in Natchez Trace State Forest. This inventory included both terrestrial sediment sources and those parts the channel system judged capable of transporting significant amounts of sand. The two basins were selected as being reasonably representative of conditions in the Forest as a whole. One basin (in Compartment 10) has been relatively undisturbed since creation of the Forest, while the other (in Compartment 11) has had a variety of activities occur within it, including timber harvesting, wildlife improvements, and fire. Data collection has been completed and data compilation is underway, so quantitative results from this study are not yet available.

However, based on our field notes, observations prior to and during the survey activities, and extensive discussions with the Division of Forestry personnel who did the data collection, we can offer some preliminary conclusions about sediment sources and transport in the study basins. We are reasonably confident these conclusions will be confirmed for the two study basins when the data are fully analyzed.

1. In both basins, sand is being transported as bed load within the channel system. Extensive amounts of sand remain in temporary storage in the channel bed.

2. Group-selection units that were harvested in 1994 through 1996 show no evidence of sand having been exported to the channel system, and little erosion or sediment movement within the units. The erosion that was observed in the units is associated with skid trails and roads, and appears to be adequately controlled by the Best Management Practices which were used.

3. Erosion is common on roads and trails outside the harvest units. In some steep sections gully erosion is advanced. However, very little sediment from roads and trails appears to be delivered to the channel system; most is deposited on the roads and trails themselves, or near the eroding area in small deposits on the forest floor.

4. The predominant sand source in the channel system is the bed and banks of the channel system itself. Normal streamflow processes are capable of detaching, moving, and re-depositing this sediment within the channel system.

5. Pending completion of our analyses, the only current management activity we are certain produces significant short-term increases in sediment delivery out of the Forest is the removal of obstructions in the channels. Specifically, beaver dam removal eliminates ponds that trap significant amounts of sand, and facilitates movement of this sand downstream.

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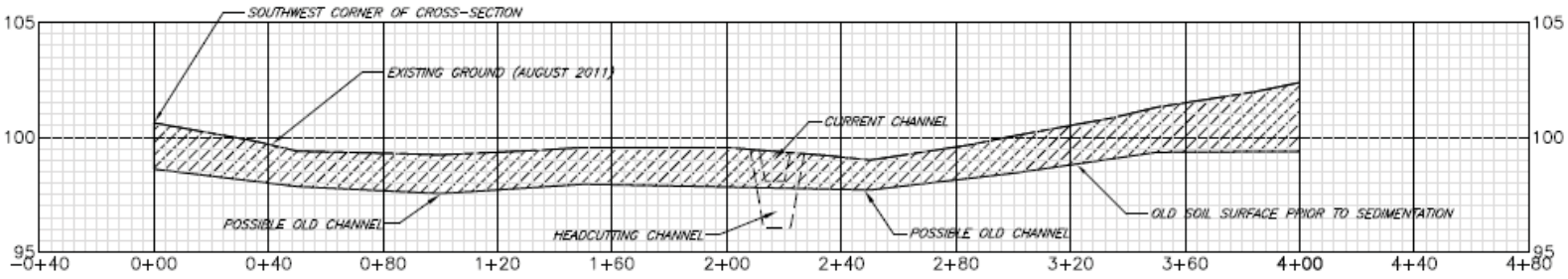
[1] Research Hydrologist, U.S. Geological Survey, Nashville, TN
[2] Research Hydrologist, USDA Forest Service, Oxford, MS



CROSS-SECTION SOIL SURFACE

20 0 20 40 60
Scale in Feet

		Date
Designed	PINSON	08/2011
Drawn	PINSON	08/2011
Checked	HARRIS	08/2011
Approved		

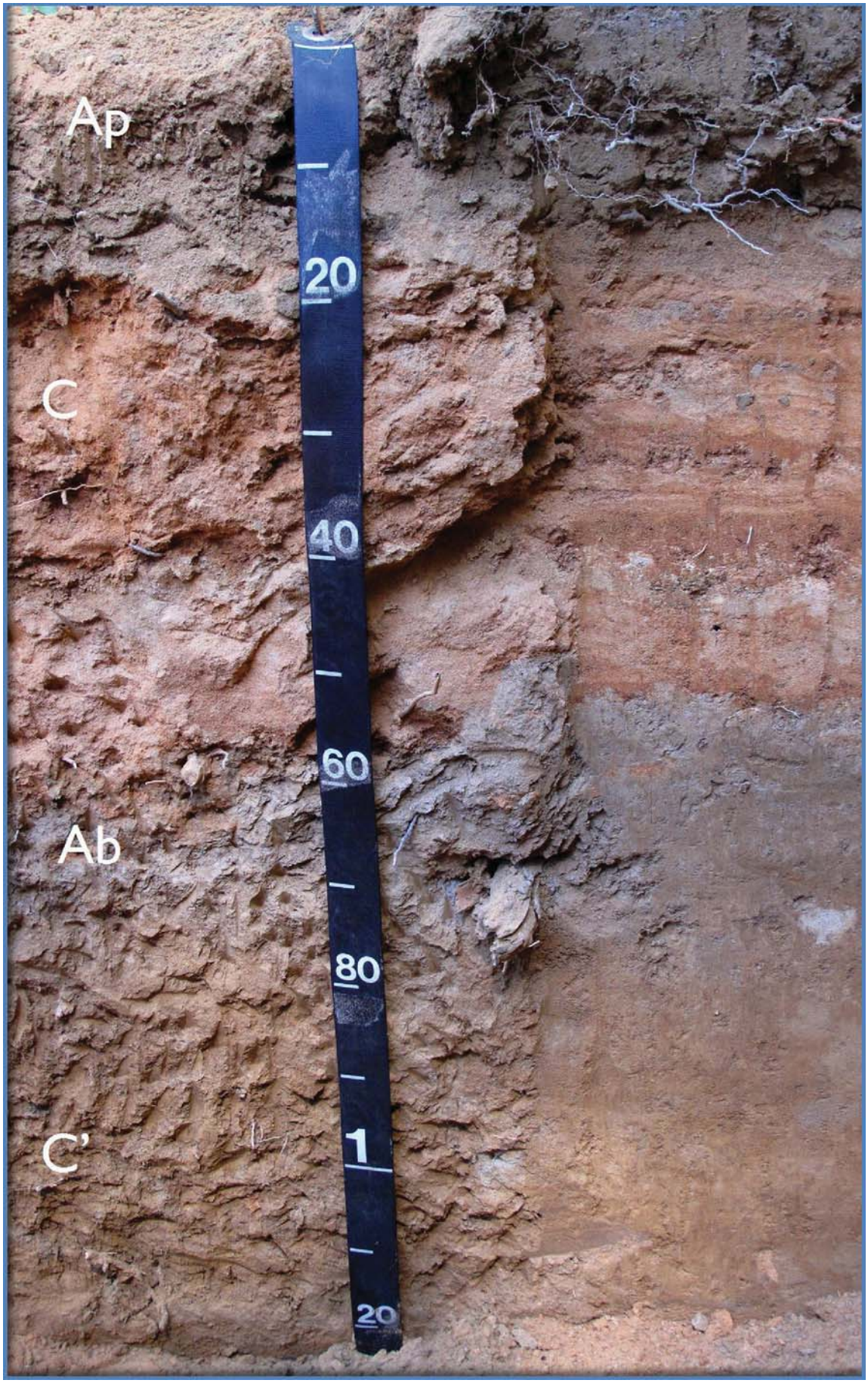
CENTRAL STATES FOREST SOILS WORKSHOP
SEDIMENTATION DISPLAY
CARROLL COUNTY, TENNESSEE
NATCHEZ TRACE STATE PARK

NRCS
Natural Resources Conservation Service
United States Department of Agriculture

File No.

Drawing No.

Sheet 1 of 1



Buried soil beneath new soil materials

Natchez Trace State Forest Stop 6 –

UPLAND HARDWOODS SOIL CARBON DATA COLLECTION SITE

Coordinates: N 35° 50’ 21.5” W 88° 15’ 05.2”

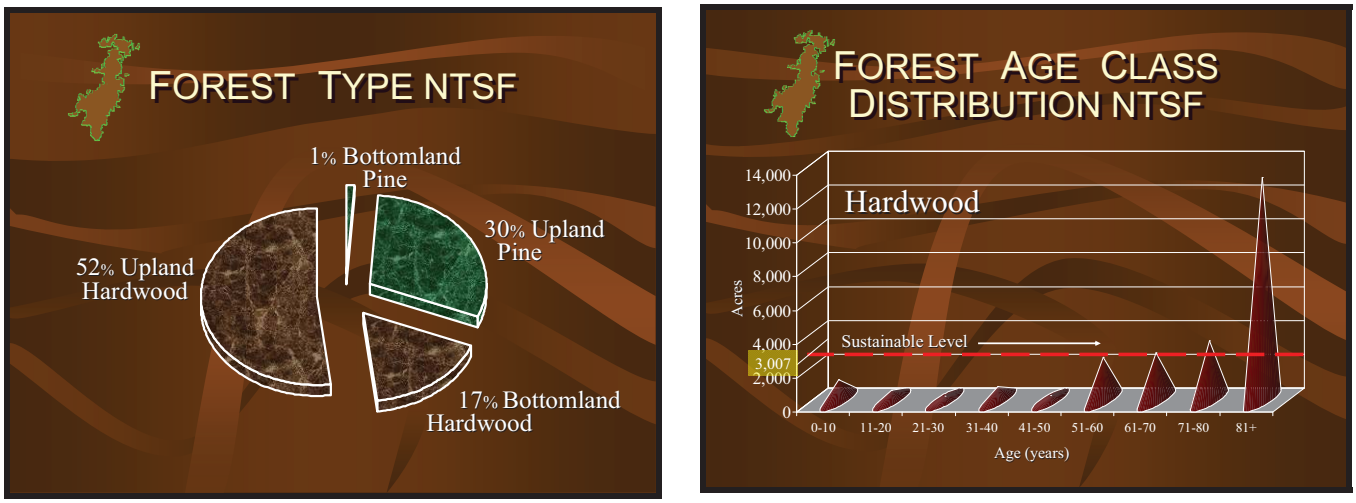
Stands in which 70% or more of the crowns in the dominant or co-dominant position and hardwoods with specific type species prevailing. Hardwood is managed on an 80 year rotation. This means that 1/80th of the hardwood management type acres are eligible for harvest each year.

This is a mature stand of upland oak approximately 130 years old. The species composition is primarily red oak, white oak, and hickory. As the chart below shows 52% (18,000 acres) of Natchez Trace State Forest is composed of this Forest Type.

There are a couple of large scale management issues with the upland hardwood type on Natchez Trace. Both are related to the upland forest type stands being over-mature. Please see the age class distribution chart below.

The first problem is that a large percentage of our upland hardwood is 100-130 years old. As a species group the red oaks are relatively short lived. By the time these stands are age 130 for all practical purposes red oak has died leaving only white oak and hickory. The mast (acorn) production capability of a predominantly oak forest type is the basis of the welfare of many species of wildlife. The key to this is the fact that red oak and white oak differ in the amount of time it takes to produce seed. Red oak species take two years to make an acorn and white oak takes one year to produce an acorn. If a late frost kills the blooms of one or the other type there is still a chance that the other one will still produce seed (mast) that year.

The second problem is soil related. Most hardwood stands are on such steep slopes that many of these areas were not cleared for row crops. As a result of this the soil profile was more or less left in place. The thin cap of more productive loess soil is taken advantage of by upland hardwood species and has provided for good growth of these trees. Unfortunately it also causes these trees to be shallow rooted and subject to wind damage. As the trees get taller with bigger crowns, under the right soil moisture conditions, hundreds of contiguous acres may blow over in a single wind event.



Forest Type and Forest Age Class Distribution

Two soil profiles were sampled at this site in 1991. Samples were analyzed for physical and chemical characterization properties, including organic carbon. Additional samples were collected in 2011 near the same sites.

Soil Organic Carbon Percent

Horizon	Ridgetop (4% slope) OC % 1991	OC % 2011 - Ridgetop	Horizon	Upper sideslope (12% slope) OC % 1991	OC % 2011 - Sideslop
A	5.03	2.46	A	5.26	4.89
E	0.59		E	0.35	1.1
Bt1	0.3		Bt	0.36	
2Bt2	0.13		BC	0.03	
2Btx	0.06		C1	0.05	
2C1	0.02		C2	0.05	
2C2	0.06				

Natchez Trace State Forest Stop 7

WHITE OAK REGENERATION SITE

Coordinates: N 35° 49’ 30.8” W 88° 16’ 00.8”

This is an area where White Oak seedlings are volunteering in the understory and are becoming the dominant overstory species with no intensive management inputs needed. These are sites which are poor enough such that other tree species are not able to out compete with the White Oaks, but not too poor for the White Oaks themselves to compete. Investigation of soils in this area indicated dominance of well drained Smithdale soils.

Even-age forest Management is practiced on our state forests and this stand is an upland hardwood stand which was regenerated by the clearcutting silvicultural method. The majority of the successfully regenerated trees are root sprouts. By cutting the trees with a stump height of less than one foot the incidence of defective sprouts in minimized. The instructions given to the logging contractors to accomplish this are as follows:

Within the sale areas that are to be harvested the PURCHASER shall cut all trees which are taller than 4.5 feet so that their stumps are less than one foot tall on all of the sale operation is complete (see the pictures below of different aged stands regenerated by this method).

1 year old hardwood clear cut

5 year old hardwood clear cut

10 year old hardwood clear cut

15 year old hardwood clear cut

Natchez Trace State Forest Stop 8

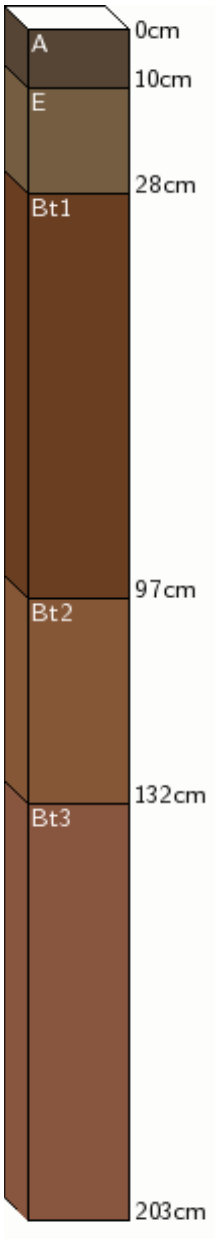
Pine Forest Type:

Investigation of soils in this area indicated dominance of well to excessively drained soils that formed in stratified sandy and loamy substratum materials of former Smithdale soils, which were exposed by erosion. These highly eroded sandy soils are very low in productivity for most hardwood species. Site capability is the primary deciding factor for which species group will be featured for management of a stand. Most stands with these soil conditions have already been planted to Loblolly pine to stabilize former erosion problems.

Stands in which 70% or more of the crowns in the dominant or co-dominant position and pine with specific type species prevailing. Pine is managed on a 60 year rotation. This means that $1/60^{th}$ of the pine management type acres are eligible for harvest each year.

Currently Natchez Trace State forest has approximately 10,000 acres of Pine Forest Type. Our most recent inventory estimates we have 160,000,000 board feet of Southern Yellow Pine timber on the forest.

SMITHDALE SERIES



Typical profile

Soil Taxonomy

Order:	*Ultisols*
Suborder:	*Udults [Map of Suborders]*
Greatgroup:	*Hapludults*
Subgroup:	*Typic Hapludults*
Family:	*TYPIC HAPLUDULTS, FINE-LOAMY, SILICEOUS, SUBACTIVE, THERMIC*
Soil Series:	*Smithdale (Link to OSD) (Link to SM Tool)*
Data:	*[Lab Data] [Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component All Horizons*

Land Classification

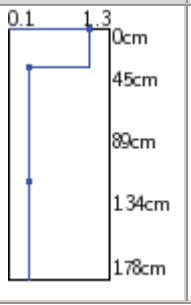
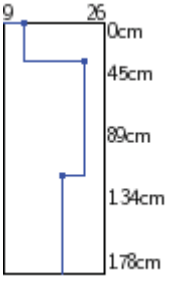
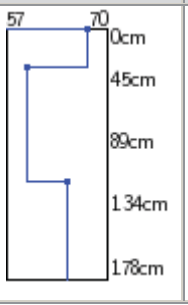
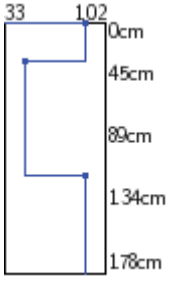
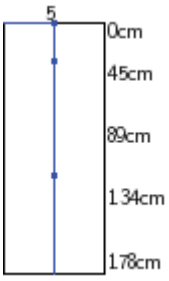
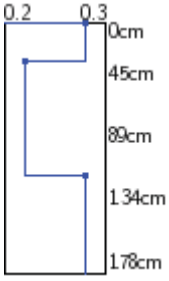
Storie Index	*NOT RATED*
Land Capability Class [non-irrigated]	*6-e*
Land Capability Class [irrigated]	*-*
Ecological Site Description	
Forage Suitability Group	

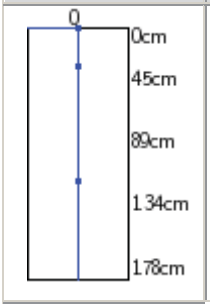
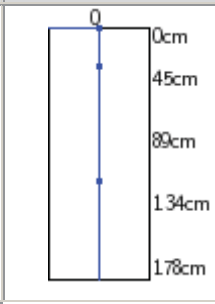
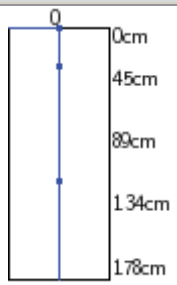
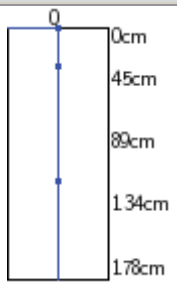
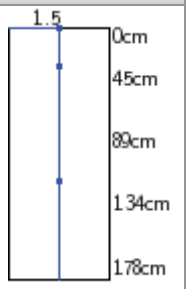
Hydraulic and Erosion Ratings

Wind Erodibility Group	
Wind Erodibility Index	
T Erosion Factor	*5*
Runoff	
Drainage	*Well drained*
Hydric Rating / Hydrologic Group	*No [Group B]*
Parent Material:	*loamy marine deposits*
Total Plant Available Water (cm):	*27.51*

Geomorphology

Landscape	*coastal plains*	
Landform	*hillslopes*	

Organic Matter (%)	Percent Clay	Percent Sand	K_{sat} (mm/hr)	pH (1:1 H_2O)	K_f Factor
					

EC (dS/m)	SAR	$CaCO_3$ (%)	Gypsum (%)	CEC at pH7 (cmol + /kg soil)	Linear Extensibility (%)
				no data	

From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

UNCLASSIFIED SOIL – soil profile formed in upland from stratified substratum materials of a former Smithdale soil
Coordinates: N 35° 49' 13.7" W 88° 15' 28.3"

A --- 0 to 5 centimeters (0 to 2 inches); brown (10YR 4/3) moist, fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; 2 percent nonflat angular 10 to 25 millimeters (0.4 to 1 inch) chert fragments; noneffervescent; clear smooth boundary.

Bt1 --- 5 to 33 centimeters (2 to 13 inches); strong brown (7.5YR 4/6) moist, fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; common very fine roots throughout, common fine roots throughout, common medium roots throughout and common coarse roots throughout; noneffervescent; clear smooth boundary.

Bt2 --- 33 to 46 centimeters (13 to 18.1 inches); reddish yellow (7.5YR 6/6) moist, fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; common medium roots throughout and common coarse roots throughout; noneffervescent; very strongly acid (pH 4.8); abrupt smooth boundary.

Bt and E1 --- 46 to 122 centimeters (18.1 to 48 inches); yellowish red (5YR 5/6) moist, sand; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; 6 percent (few) very pale brown (10YR 7/4), moist, skeletans on all faces of peds; lamellae; noneffervescent; strongly acid (pH 5.1); clear smooth boundary.

Bt and E2 --- 122 to 210 centimeters (48 to 82.7 inches); yellowish red (5YR 5/6) moist, sand; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; common medium roots throughout; 7 percent (few) distinct very pale brown (10YR 7/4), moist, skeletans on all faces of peds; noneffervescent; strongly acid (pH 5.4); clear smooth boundary.

Bt/E --- 210 to 236 centimeters (82.7 to 92.9 inches); yellowish red (5YR 4/6) moist, sand; moderate medium subangular blocky structure; friable, nonsticky, nonplastic; common medium roots throughout; noneffervescent; strongly acid (pH 5.3).

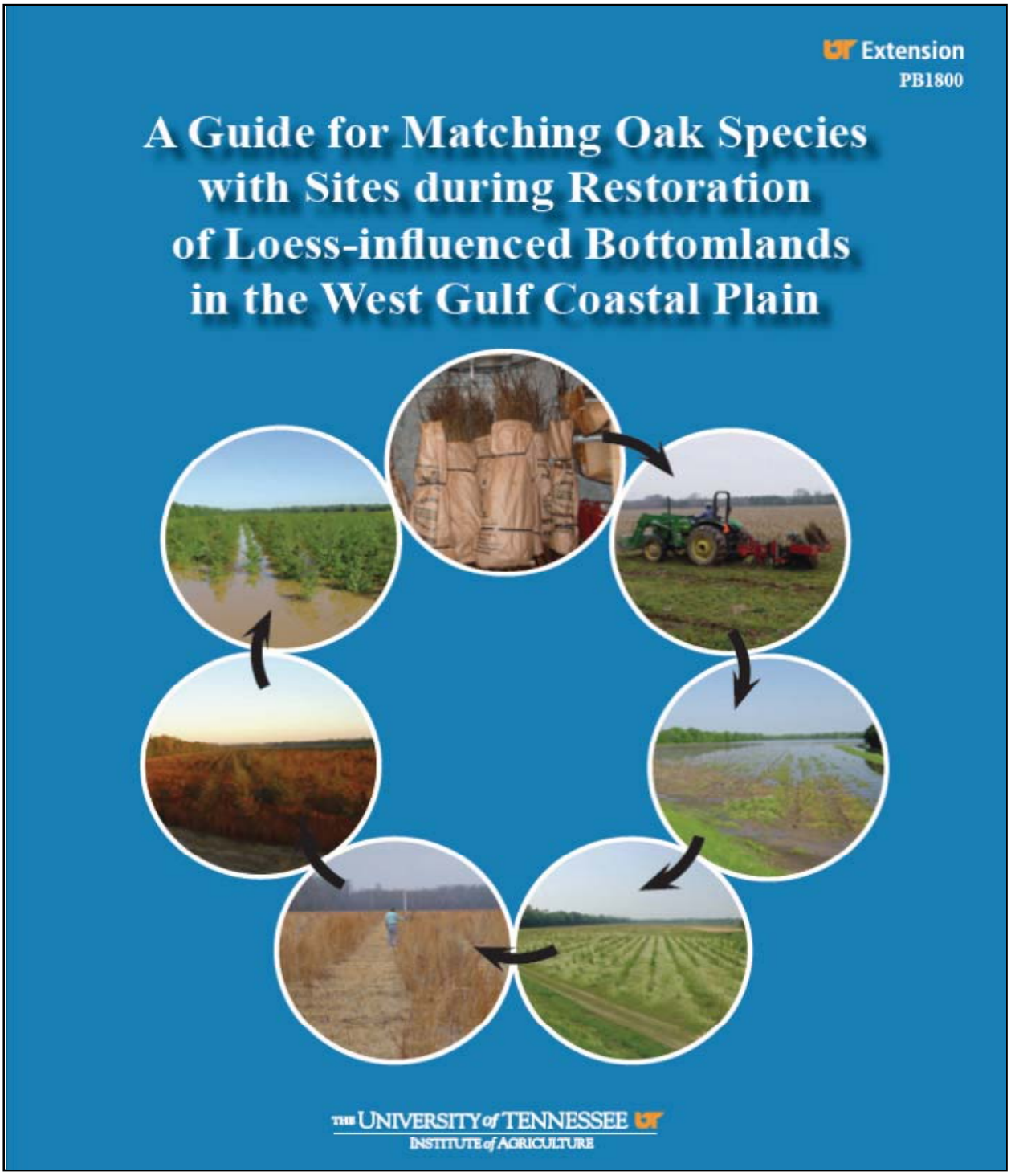
Selected Soil Characterization Data

Pedon ID: 11TN017001 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
A	0--5	FSL								
Bt1	5--33	FSL	11.8	11.2	77	19.8	0.28	94	3	
Bt2	33-46	FSL	11.5	10.3	78.2	21.2	0.19	81	10	4.8
Bt&E1	46--122	S	3.1	1.1	95.8	65.1	0.03	64	29	5.1
Bt&E2	122-210	S	5.2	0.3	94.5	45.1	0.03	37	37	5.4
Bt/E	210--236	S	6.2	0.7	93.1	65.1	0.04	53	53	5.3

Soil profile formed on upland from stratified sandy and loamy substratum materials of a former Smithdale soil

Botomland Hardwood Management Tour

UT Experiment Station, Jackson, TN



By David Mercker, Extension Specialist, Ryan Blair, Research Associate, Don Tyler, Professor, and Joshua Smith, Extension Intern Forestry, Wildlife and Fisheries

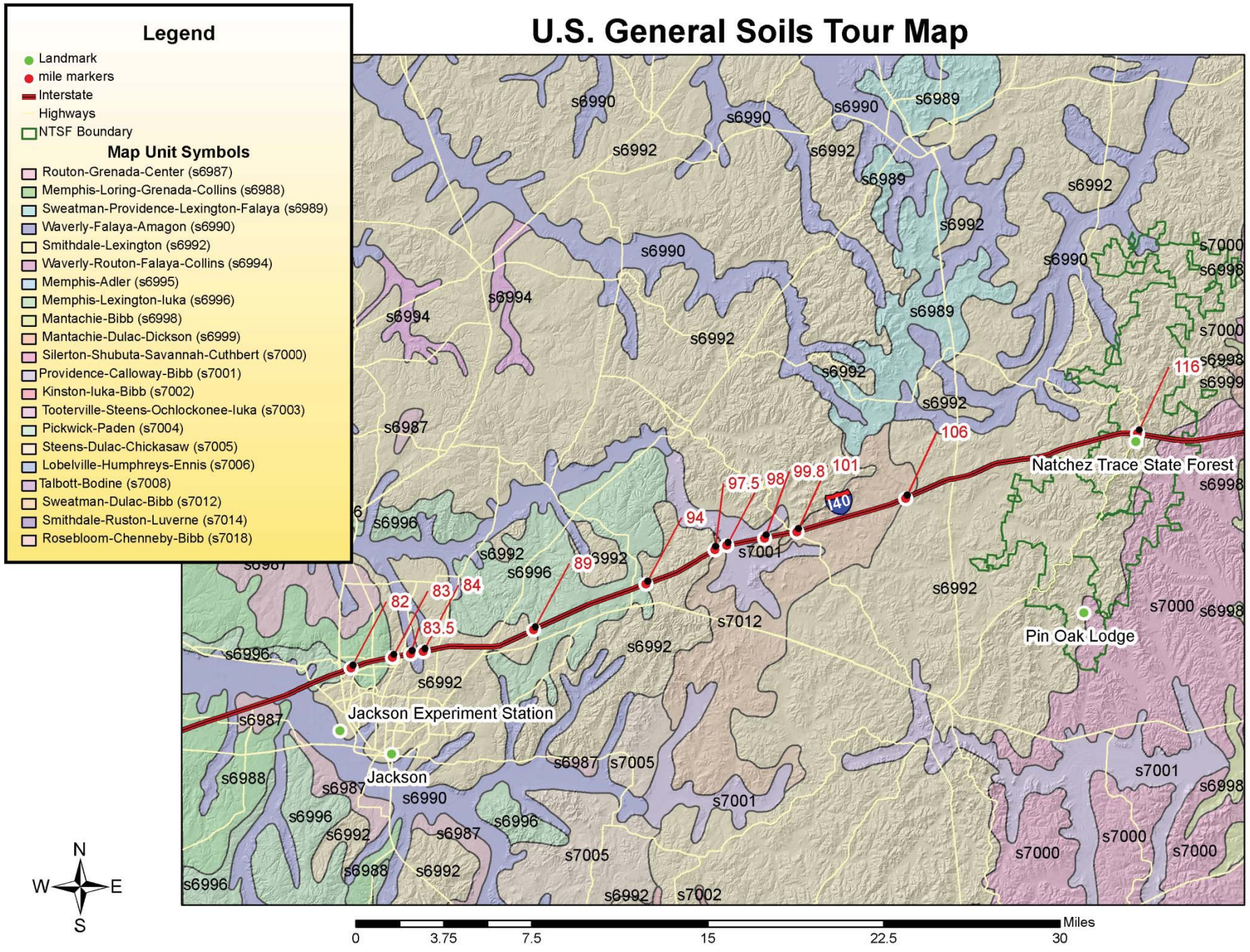
Abstract:

This guide has been prepared for natural resource professionals, both private and public, who advise on, develop and/or implement tree-planting plans to restore bottomland oak forests. Private landowners with advanced knowledge of forest management practices may find the guide helpful as well. Users will acquire information on matching 10 common bottomland hardwood species to different hydric soils based on *soil mottling*, specifically the *gleyed matrix*. *Soil mottling* and the presence of a *gleyed matrix* are important determinants when predicting high groundwater conditions and the resulting survival and growth of bottomland oaks. The findings suggest that practitioners plant Nuttall, pin and overcup oaks in poorly drained soils. As the drainage improves, begin mixing in willow oak. In the best-drained soils (if they exist), finish by including water, swamp chestnut, swamp white, Shumard, cherrybark and bur oaks. Potential species diversity should expand as the soil drainage improves.

Conclusions:

When making recommendations for the establishment of oaks (and other species) on bottomland sites, practitioners should evaluate the soil to determine at what depth the >50 percent gray matrix occurs. Because internal drainage so greatly affects tree survival and growth, the importance of matching species-to-site in bottomlands is paramount. **Practitioners should plant Nuttall, pin and overcup oaks in poorly drained soils. As the drainage improves, begin mixing in willow oak. In the best-drained soils (if they exist), finish by including water, swamp chestnut, swamp white, Shumard, cherrybark and bur oaks. Tree species diversity should expand as the soil drainage improves. The natural range of some of the species studied either ceases at or marginally extends into this physiographic region. Therefore, professionals should seek localized knowledge of the silvics of each species before incorporation into bottomland restoration regimes.**

U.S. General Soils Tour Map



TRANSECT DESCRIPTIONS FOR TRAVEL ROUTE

General Soil Areas on the trip from the Natchez Trace State Forest (NTSF) to West Tennessee Agricultural Experiment Station in Jackson via I-40:

General Soil Area s6988 – Memphis-Loring-Grenada-Collins: moderately well to well drained, silty soils, some with a Fragipan, on undulating to rolling thick loess uplands; and moderately well drained, deep, silty soils on nearly level flood plains

General Soil Area s6990 - Waverly-Falaya-Amagon: poorly drained to somewhat poorly drained, silty and loamy soils on nearly level flood plains and steam terraces along meandering rivers and creeks on the Coastal Plan

General Soil Area s6992—Smithdale-Lexington: undulating to rolling, red, well-drained loamy soils from Coastal Plain sediments, some with a thin loess mantle

General Soil Area s6996 - Memphis-Lexington-Iuka: well-drained, brown, silty soils from loess of medium thickness, and rolling, reddish, well-drained loamy soils from Coastal Plain sediments with a thin loess mantle on undulating to rolling uplands; and well drained, loamy soils on nearly level flood plains.

General Soil Area s6998 - Mantachie-Bibb: very deep, poorly to somewhat poorly drained, moderately permeable soils. They formed in loamy and sandy alluvium. These soils are on flood plains.

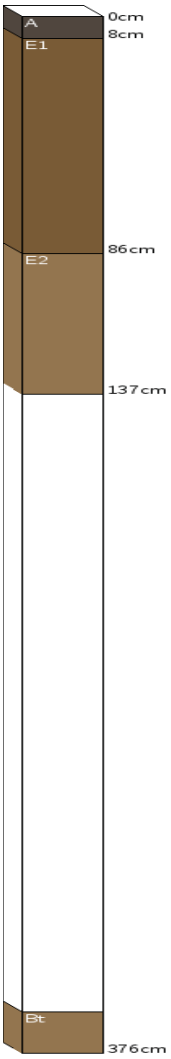
General Soil Area s7000—Silerton-Shubuta–Savanna-Cuthbert: well drained soils on undulating to rolling uplands with reddish, clayey subsoil layers from Coastal Plain sediments, some with a thin loess mantle; and some loamy soils with a Fragipan on uplands or stream terraces.

General Soil Area s7001 - Providence-Calloway-Bibb: somewhat poorly to moderately well drained soils with a Fragipan on undulating upland ridges and terraces; and very deep, poorly drained, moderately permeable soils that formed in loamy and sandy alluvium on flood plains.

General Soil Area s7012 – Sweatman-Dulac-Bibb: very deep, well to moderately well drained, moderately slowly permeable soils on upland ridges and hill slopes of the Southern Coastal Plain. They formed in marine sediment with some thin loess mantles. Drainageways are very deep, poorly drained, moderately permeable soils that formed in stratified loamy and sandy alluvium. These soils are on flood plains of streams on the Coastal Plain.

Experiment Station Soil Stop 1

ALPIN SERIES



Typical profile

Soil Taxonomy

Order:	*Entisols*
Suborder:	*Psamments* [*Map of Suborders*]
Greatgroup:	*Quartzipsamments*
Subgroup:	*Lamellic Quartzipsamments*
Family:	*Thermic, coated Lamellic Quartzipsamments*
Soil Series:	*Alpin* *(Link to OSD)* *(Link to SM Tool)*
Data:	*[Lab Data]* *[Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component* *All Horizons*

Land Classification

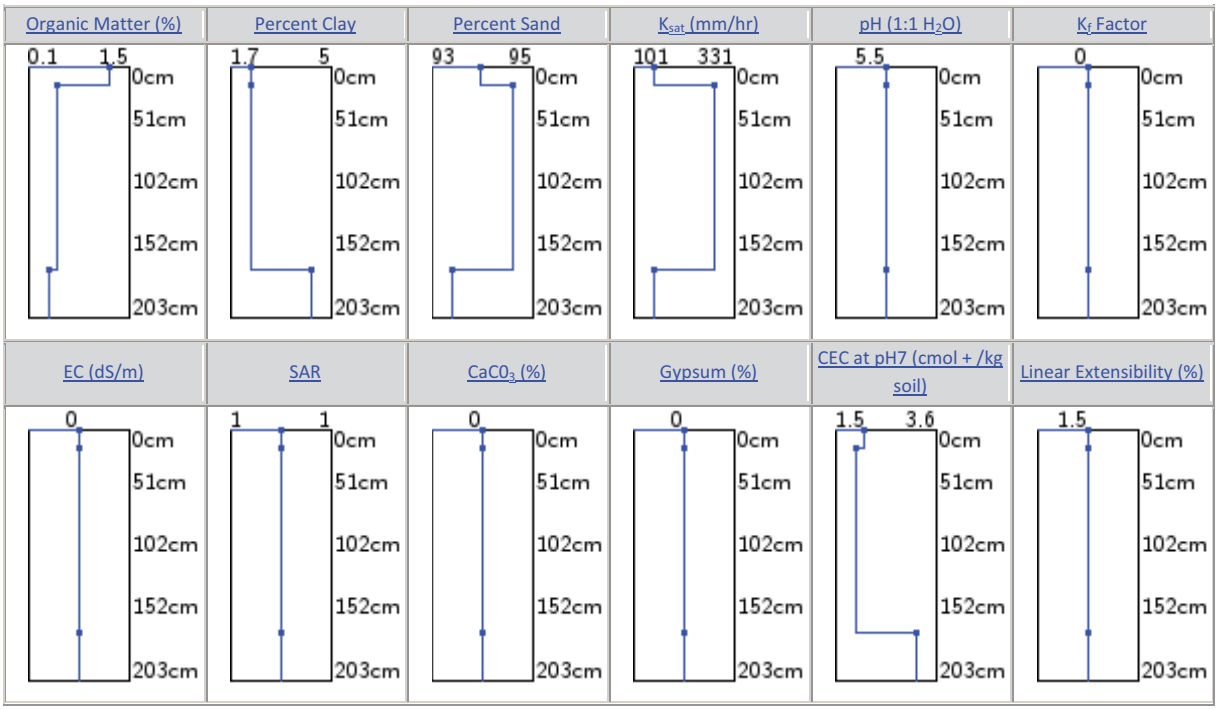
Storie Index	*NOT RATED*
Land Capability Class [non-irrigated]	*4-s*
Land Capability Class [irrigated]	-
Ecological Site Description	*Longleaf Pine-Turkey Oak Hills*
Forage Suitability Group	

Hydraulic and Erosion Ratings

Wind Erodibility Group	*1*
Wind Erodibility Index	*180*
T Erosion Factor	*5*
Runoff	*Very low*
Drainage	*Excessively drained*
Hydric Rating / Hydrologic Group	*No [Group A]*
Parent Material:	*sandy marine deposits*
Total Plant Available Water (cm):	*13.24*

Geomorphology

Landscape	*coastal plains*
Landform	*marine terraces*
Landform	*knolls*
Landform	*ridges*



From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

A somewhat excessively drained Alpin soil with lamellae formed on a stream terrace position

Coordinates: N 35° 37’ 37.96” W 88° 51’ 11.84”

A --- 0 to 7 centimeters (0 to 2.8 inches); very dark grayish brown (10YR 3/2) moist, sandy loam; moderate medium subangular blocky structure; friable extremely acid (pH 4.0); clear smooth boundary.

AE --- 7 to 21 centimeters (2.8 to 8.3 inches); yellowish brown (10YR 5/4) moist, sandy loam; weak medium subangular blocky structure; friable; extremely acid (pH 4.2); clear smooth boundary.

E1 --- 21 to 47 centimeters (8.3 to 18.5 inches); light yellowish brown (10YR 6/4) moist, sand; weak coarse subangular blocky structure; very friable; extremely acid (pH 4.3); gradual smooth boundary.

E2 --- 47 to 69 centimeters (18.5 to 27.2 inches); pale yellow (2.5Y 7/3) moist, sand; weak coarse subangular blocky structure; very friable; very strongly acid (pH 4.5); clear smooth boundary.

E and Bt1 --- 69 to 124 centimeters (27.2 to 48.8 inches); pale yellow (2.5Y 7/4) moist, sand; weak coarse subangular blocky structure; very friable; very strongly acid (pH 4.5); gradual smooth boundary.

E and Bt2 --- 124 to 195 centimeters (48.8 to 76.8 inches); pale yellow (2.5Y 8/4) moist, sand; weak coarse subangular blocky structure; very friable; very strongly acid (pH 4.5); gradual smooth boundary.

Bt and E --- 195 to 203 centimeters (76.8 to 79.9 inches); very pale brown (10YR 7/3) moist, sand; moderate coarse subangular blocky structure; very friable; 4 percent (common) medium distinct brownish yellow (10YR 6/8), moist, masses of oxidized iron in matrix and 3 percent (common) medium distinct light gray (10YR 7/2), moist, iron depletions in matrix; very strongly acid (pH 4.7).

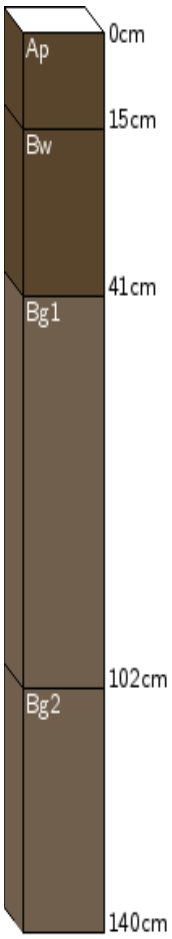
Selected Soil Characterization Data

Pedon ID: 11TN113005 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
A	0--7	SL	5.0	31.9	63.1	38.2	1.87	27	19	4.0
AE	7--21	SL	4.0	24.8	71.2	44.6	0.38	38	23	4.2
E1	21--47	S	0.5	4.5	95	52.1	0.04	67	5	4.3
E2	47--69	S		2.4	97.6	61.9	0.02			4.5
E&Bt1	69--124	S		1.4	98.6	61.1	0.01	50	10	4.5
E&Bt2	124--195	S			100	66.9	0.01		3	4.5
Bt&E	195--203	S	3.4	7.1	89.5	41.6	0.02	7	93	4.7

A soil profile of Alpin sand

Experiment Station Soil Stop 2

ARKABUTLA SERIES



Typical profile

Soil Taxonomy

Order:	*Inceptisols*
Suborder:	*Aquepts* [*Map of Suborders*]
Greatgroup:	*Endoaquepts*
Subgroup:	*Fluventic Endoaquepts*
Family:	*FLUVENTIC ENDOAQUEPTS, FINE-SILTY, MIXED, ACTIVE, ACID, THERMIC*
Soil Series:	*Arkabutla* *(Link to OSD)* *(Link to SM Tool)*
Data:	*[Lab Data]* *[Nitrate Groundwater Pollution Hazard Index]*
Raw Data	*Component* *All Horizons*

Land Classification

Storie Index	*NOT RATED*
Land Capability Class **[non-irrigated]**	*4-w*
Land Capability Class **[irrigated]**	-
Ecological Site Description	
Forage Suitability Group	

Hydraulic and Erosion Ratings

Wind Erodibility Group	
Wind Erodibility Index	
T Erosion Factor	*5*
Runoff	
Drainage	*Somewhat poorly drained*
Hydric Rating / Hydrologic Group	*Yes (Wooded under natural conditions)* *[Group C]*
Parent Material:	*silty alluvium*
Total Plant Available Water (cm):	*30.53*

Geomorphology

Landscape	*plains*	
Landform	*flood plains*	

From Soil Web via GMAPS! (http://casoilresource.lawr.ucdavis.edu/soilweb_gmap/)

Somewhat poorly drained Arkabutla soil on a floodplain
Coordinates: N 35° 37’ 29.98” W 88° 51’ 33.69”

Ap --- 0 to 17 centimeters (0 to 6.7 inches); brown (10YR 4/3) moist, silt loam; moderate fine subangular blocky structure; friable; strongly acid (pH 5.4); clear smooth boundary.

Bw --- 17 to 28 centimeters (6.7 to 11 inches); dark yellowish brown (10YR 4/4) moist, silt loam; moderate medium subangular blocky structure; friable; 2 percent (common) medium distinct irregular yellowish brown (10YR 5/8), moist, masses of oxidized iron on faces of peds and 2 percent (common) medium distinct irregular light brownish gray (10YR 6/2), moist, iron depletions on faces of peds; slightly acid (pH 6.2); clear smooth boundary.

Bg1 --- 28 to 52 centimeters (11 to 20.5 inches); light gray (10YR 7/1) moist, silt loam; moderate coarse subangular blocky structure; friable; 1 percent (few) medium distinct strong brown (7.5YR 5/6), moist, masses of oxidized iron, 5 percent (common) medium distinct yellowish brown (10YR 5/8), moist, masses of oxidized iron, 2 percent (common) medium distinct brownish yellow (10YR 6/6), moist, masses of oxidized iron and 2 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, masses of oxidized iron; very strongly acid (pH 5.0); gradual smooth boundary.

Bg2 --- 52 to 84 centimeters (20.5 to 33.1 inches); light brownish gray (10YR 6/2) moist, silty clay loam; moderate coarse subangular blocky structure; friable; 3 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, masses of oxidized iron, 3 percent (common) medium prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron and 8 percent (common) medium prominent yellowish brown (10YR 5/8), moist, masses of oxidized iron; very strongly acid (pH 4.6); gradual smooth boundary.

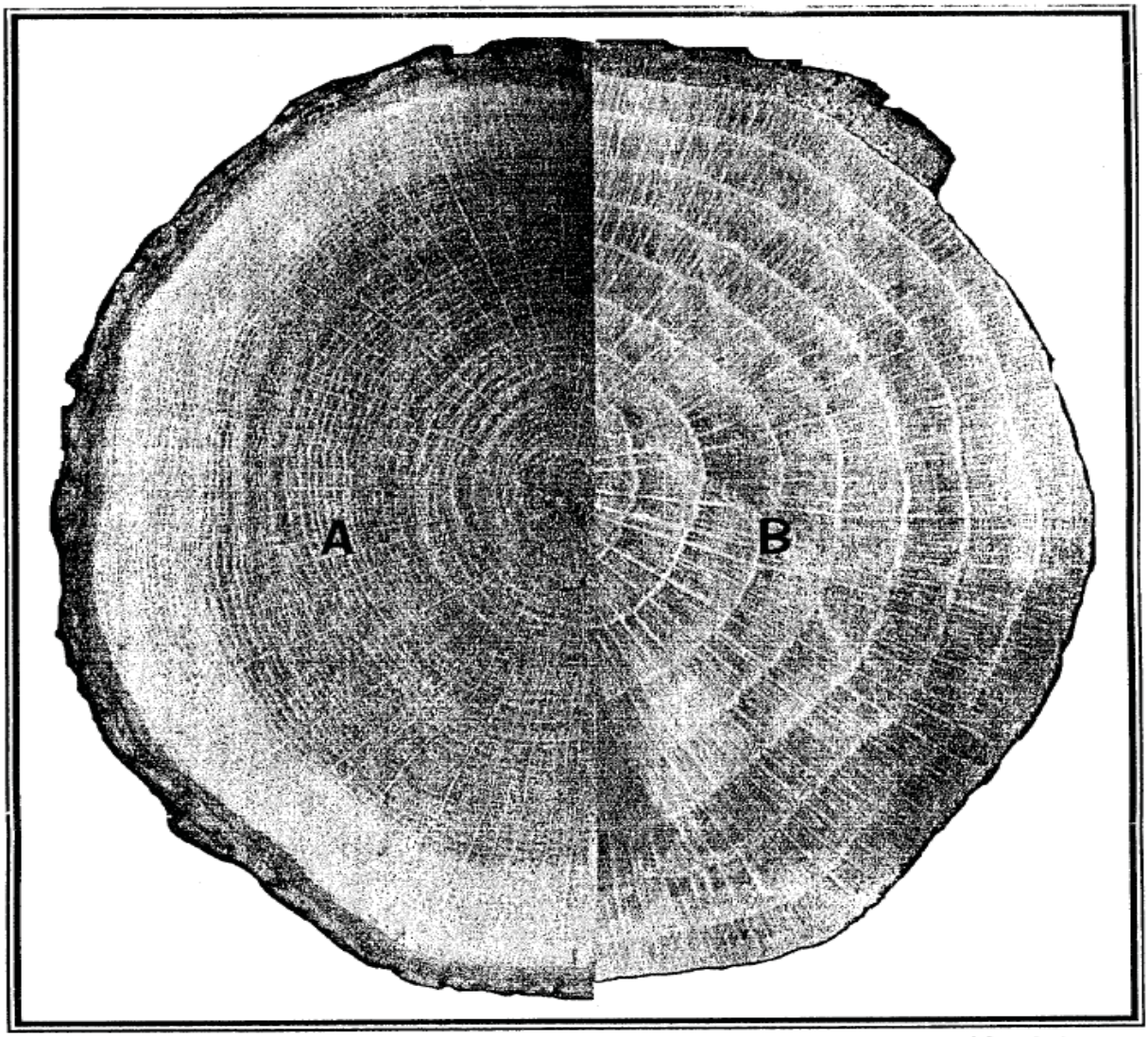
Bg3 --- 84 to 133 centimeters (33.1 to 52.4 inches); light brownish gray (10YR 6/2) moist, silty clay loam; moderate coarse subangular blocky structure; friable; 1 percent (few) medium distinct yellowish red (5YR 4/6), moist, masses of oxidized iron, 2 percent (common) medium distinct black (10YR 2/1), moist, manganese masses, 5 percent (common) medium distinct yellowish brown (10YR 5/6), moist, masses of oxidized iron, 2 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, masses of oxidized iron and 5 percent (common) medium distinct dark gray (10YR 4/1), moist, manganese coatings; very strongly acid (pH 4.8); gradual smooth boundary.

Bg4 --- 133 to 203 centimeters (52.4 to 79.9 inches); light brownish gray (10YR 6/2) moist, silty clay loam; moderate coarse subangular blocky structure; firm; 5 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, masses of oxidized iron, 4 percent (common) medium distinct black (10YR 2/1), moist, manganese masses, 1 percent (few) medium prominent yellowish red (5YR 4/6), moist, masses of oxidized iron, 3 percent (common) medium distinct light yellowish brown (10YR 6/4), moist, masses of oxidized iron and 8 percent (common) medium distinct yellowish brown (10YR 5/6), moist, masses of oxidized iron; very strongly acid (pH 4.9).

Selected Soil Characterization Data

Pedon ID: 11TN113006 USDA-NSSL, Lincoln, NE			Total			Sand	Total	Al	Base Sat.	pH
Horizon	Depth (cm)	Texture	Clay	Silt	Sand	Med	Carbon	Sat. %	Sum %	H20 1:1
Ap	0--17	SIL	24	59.5	16.5	3	1.08	5	42	5.4
Bw	17--28	SIL	26.6	59.2	14.2	2.3	0.66		54	6.2
Bg1	28--52	SIL	23.9	65.4	10.7	1.3	0.22	39	29	5.0
Bg2	52--84	SICL	36.6	50.6	12.8	0.7	0.16	67	17	4.6
Bg3	84--133	SICL	32.4	52.8	14.8	1.9	0.12	64	21	4.8
Bg4	133--203	SICL	29.7	54.7	15.6	1.7	0.11	52	27	4.9

A soil profile of Arkabutla silt loam



A. This 92 (plus) year old* white oak grew in the shade of larger trees it's entire life. It is a typical, old, slow growing tree that never had an opportunity to grow in full sunlight. If left behind after a harvest, it will block the sunlight and slow down the next generation.

B. This healthy, 12 year old white oak came from a clearcut harvest. Because it grew in the sunlight together with other trees it's size, it was never shaded by larger trees, and already has the same diameter as it's 92 year old cousin.

Which tree can best produce a healthy forest for Tommorrow's Tennesseeans?

TREES NEED SUNSHINE! ☼

TENNESSEE FORESTRY
DEPARTMENT OF AGRICULTURE

* Tree ages based on growth rings. Trees shown at actual size.