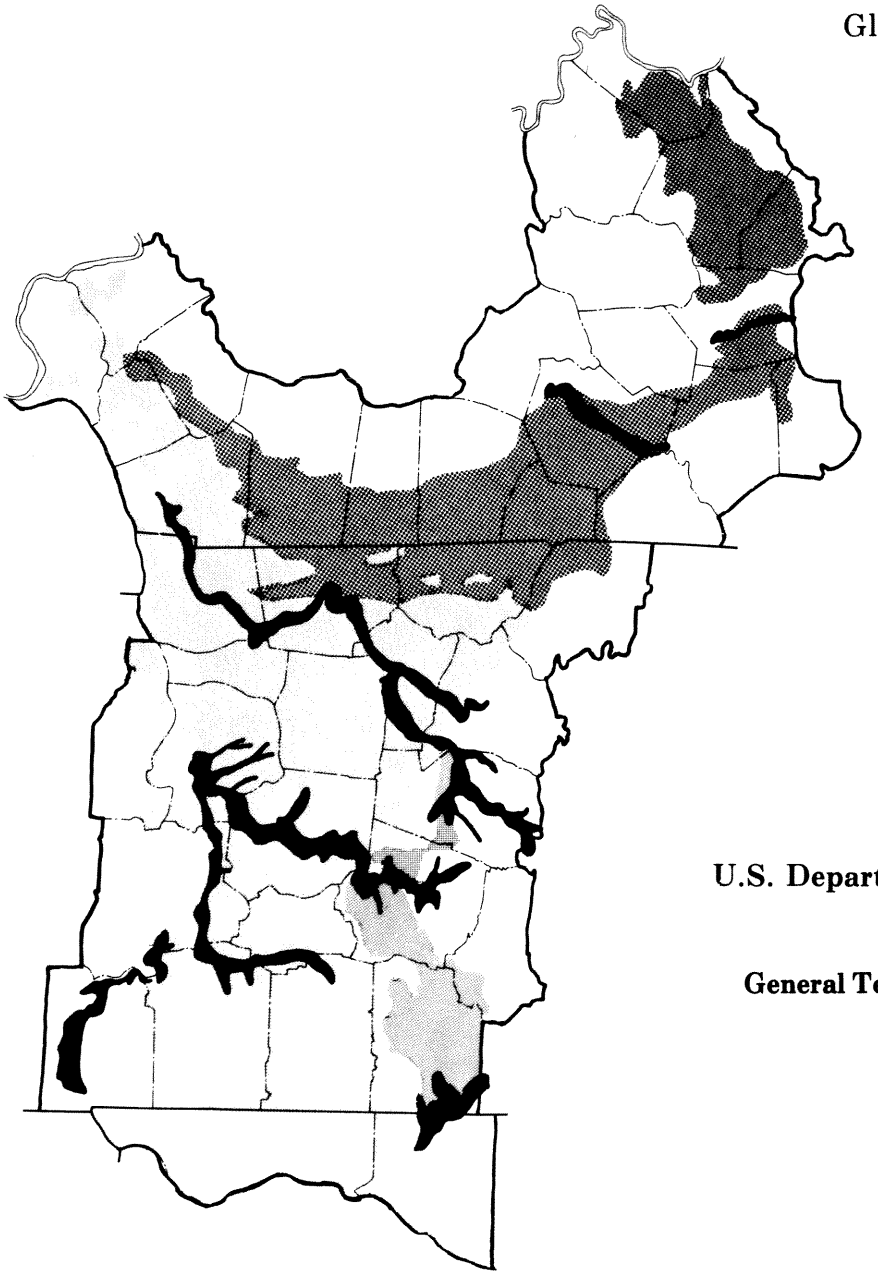
Classification and Evaluation of Forest Sites on the Western Highland Rim and Pennyroyal

Glendon W. Smalley



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SUMMARY

This paper presents a comprehensive forest site classification system for the Western Highland Rim and Western Pennyroyal-Limestone area in northern Alabama, central Tennessee, and western Kentucky. The system is based on physiography, geology, soils, topography, and vegetation. Forty-nine landtypes are described, and each landtype is evaluated in terms of productivity and desirability of selected pines and hardwoods for timber production. Also, each landtype is rated for five soil-related problems that can affect forest management.

ACKNOWLEDGMENTS

I am indebted to my colleagues, past and present, for their scientific input, reviews, and stimulating discussions. I am also grateful to the soil scientists, silviculturists, and practicing foresters who have reviewed this guide.

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TABLE OF CONTENTS

	Page
Introduction	1
Western Highland Rim and Pennyroyal Region	1
Subregions and Landtype Associations	5
Landtypes	9
Forest Management Interpretations	10
Using the System	18
Landtype Descriptions and Forest Management Interpretations	20
Footnotes for Tables	118
Literature Cited	118
Appendix—County Soils Surveys Available for the Western Highland Rim and Pennyroyal	120

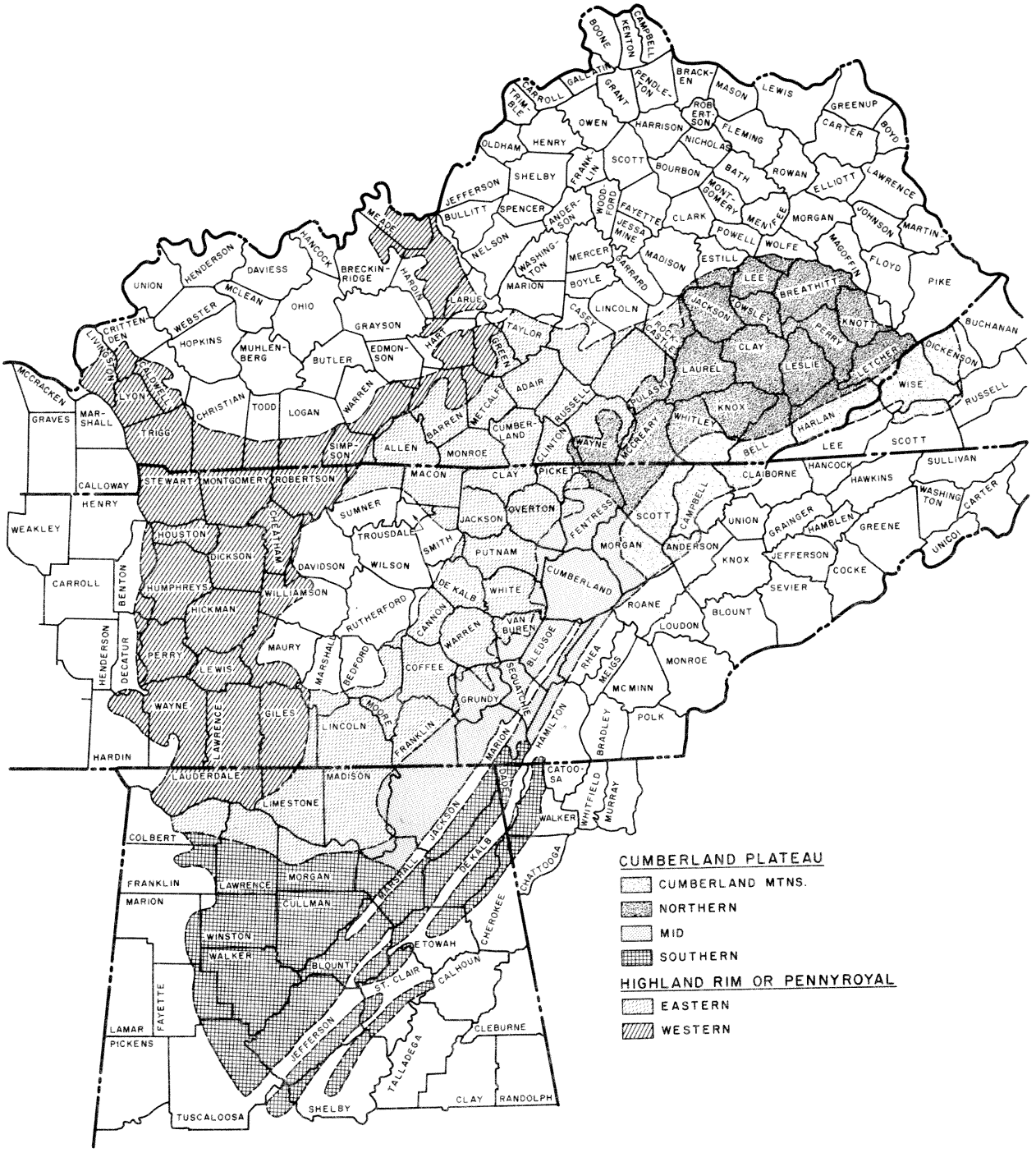

Figure 1.—*Physiographic provinces and regions of the Interior Uplands.*

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INTRODUCTION

This report classifies and evaluates forest sites on the Western Highland Rim and Western Pennyroyal-Limestone Area (fig. 1) for the management of several commercially valuable tree species. It provides forest managers with a land classification system that will enable them to subdivide forest land into logical segments (landtypes), allow them to rate productivity, and alert them to any limitations and hazards that the landtypes impose on forest management. Though soils information is an integral part of this system, users will not need to identify and classify soils or to make laboratory determinations. This report is oriented to timber production because timber is usually a major management objective. However, landtypes can also be the basis for the management and interpretation of other forest resources.

I have drawn freely on much published information on geology, physiography, soils, sites, and yields. In many cases, data specific to this area were not available, and information was extrapolated from adjacent regions. Extrapolation was particularly necessary with productivity data. All sources of data are documented so the user can gage the accuracy and reliability of the information.

Productivity and management problem information is presented in a format that follows the outline used by the Soil Conservation Service (SCS) in the Woodland Suitability sections of county soil surveys. This similarity should facilitate the integration of information contained in county soil surveys[1] into this classification system.

This guide represents the best information and collective judgment now available. Nevertheless, it is still incomplete. I trust that forest managers, after applying this site classification system, will share their experience with me and make me aware of any shortcomings or needed revisions.

The rationale and methodology for the development of a site classification system for the Interior Uplands appeared in the proceedings of the Second Central Hardwood Forest Conference (Smalley 1978) and the Forest Soils and Site Quality Workshop (Smalley 1979a). A site classification guide for the Southern Cumberland Plateau Region has been published (Smalley 1979b).

WESTERN HIGHLAND RIM AND PENNYROYAL REGION

The Western Highland Rim and Pennyroyal region covers about 10,850 square miles in all or portions of 2 counties in Alabama, 18 in Kentucky, and 20 in Tennessee. The region extends south to north from about north latitude 34°45′ to 38°3′ and east to west from about west longitude 86°35′ to 88°15′. It extends from the Ohio River in Meade County, Kentucky, to the Tennessee River in Lauderdale County, Alabama, a distance of about 220 miles (fig. 2).

In Tennessee the Western Highland Rim includes the upland that surrounds the Nashville Basin on the west (Fenneman 1938). Also included is the knobby transition from the Rim to the Basin and interspersed portions of the Outer Basin. The Western Highland Rim extends west of the Tennessee River in a narrow band from Henry to Hardin Counties while some of the Upper Coastal Plain physiographic province lies east of the River in the Land Between the Lakes, in Humphreys and Wayne Counties, Tennessee, and in Lauderdale County, Alabama.

In Alabama the Western Highland Rim extends

[1]See Appendix for available soil surveys.

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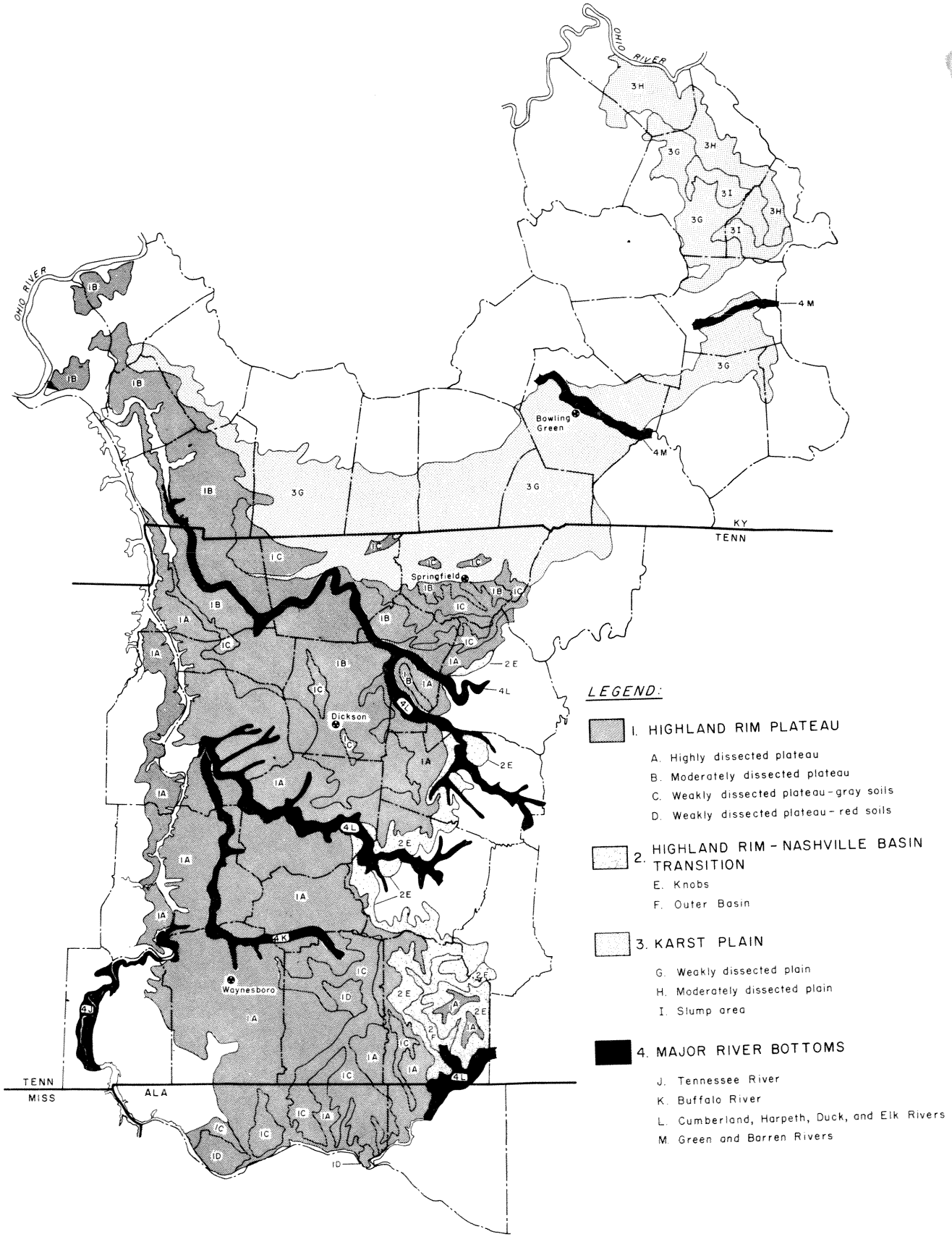

Figure 2.—*Subregions and landtype associations of the Western Highland Rim and Western Pennyroyal-Limestone area and location of weather stations.*

southward to the Tennessee River. The arbitrary division between the Eastern and Western Rim in Alabama and Tennessee is the Elk River to near Dellrose, Tennessee, and then north along the Giles-Lincoln County line to the Nashville Basin near Lewisburg, Tennessee.

In Kentucky this section is known as the Western Pennyroyal-Limestone Area (Bailey and Winsor 1964; Fenneman 1938; Soil Conserv. Serv. 1975). The section is named for the Pennyroyal of America (*Hedeoma pulegioides* (L.) Pens.), a wild member of the mint family that grows abundantly in the area. The Pennyroyal forms a broad horseshoe south and east of the Western Coalfields and the Sandstone-Shale-Limestone area of the Western Pennyroyal, and its boundary is the Dripping Springs escarpment. North of the Green River, the Western Pennyroyal curves northwestward in a strip 15 to 20 miles wide between the Muldraugh's Hill and Dripping Springs escarpments.

North of the Nashville Basin in Tennessee, the arbitrary division between the Eastern and Western Highland Rims, is the eastern edge of soil association D42 in Sumner County. This boundary merges with the Western Pennyroyal-Limestone Area and the Eastern Pennyroyal boundary in Kentucky (Bailey and Winsor 1964; Soil Conserv. Serv. 1975).

Climate

The region has a temperate climate characterized by long, moderately hot summers and short, mild winters. According to Thornthwaite's (1931) classification of climate, it is humid mesothermal. Daily and seasonal weather is controlled largely by alternating cold, dry continental air masses from Canada and warm, moist air from the Gulf of Mexico. During the summer, complete exchanges of air masses are few, and tropical maritime air masses persist for extended periods. Tables 1 and 2 show average monthly and annual precipitation and temperature values, average frost-free periods, and elevation above sea level for three stations in Tennessee and one in Kentucky (fig. 2).

Mean temperature for the region is about 58° F. The average date of last freeze is early to mid April and the average date of first freeze is mid to late October. Therefore, most of the region has an average frost-free period of 190 to 205 days. The temperature often falls below freezing at night in December, January, and February. The ground freezes to a depth of 2 to 6 inches several times during the average winter season and commonly remains frozen for 2 to 12 days. Air temperature does not appear to vary much across the region. However, local temperature may vary considerably because of elevation, aspect, and cloud cover.

Southerly winds prevail from May to September and northerly ones from November to March; average velocity ranges from 5 to 10 mph. Severe winds are infrequent, and most are associated with summer thundershowers.

Annual precipitation averages about 50 inches and ordinarily is fairly well distributed throughout the year. Rainfall decreases slightly south to north. Precipitation is greatest from December through

Table 1.—*Average monthly and annual precipitation in inches for four weather stations on the Western Highland Rim and Pennyroyal*[1]

Station and county	Years of record	Elevation Ft	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Waynesboro Wayne, TN	90	750	5.5	5.8	5.7	5.4	4.2	4.0	4.0	3.8	3.2	2.7	4.8	5.4	54.6
Dickson Dickson, TN	82	814	5.1	4.8	5.5	4.6	4.2	3.6	4.1	4.0	2.8	2.5	4.0	4.8	50.1
Springfield Robertson, TN	42	745	4.8	4.6	4.8	4.3	4.2	3.4	3.7	3.2	2.8	2.7	4.0	4.5	47.0
Bowling Green Warren, KY	93	535	4.6	4.4	5.5	4.2	4.2	4.2	4.1	3.0	3.0	2.4	4.0	4.4	48.1

[1]U.S. Department of Commerce (1974a, 1974b).

Table 2.—*Average monthly and annual temperature in °F and length of warm period for four weather stations on the Western Highland Rim and Pennyroyal*[1]

Station and county	Years of record	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Warm period days[2]
Waynesboro Wayne, TN	89	38	40	48	59	66	74	77	76	70	58	47	39	58	189
Dickson Dickson, TN	78	38	41	49	60	68	76	79	78	71	61	49	40	59	193
Springfield Robertson, TN	31	36	39	47	59	67	75	78	77	71	60	48	39	58	206
Bowling Green Warren, KY	93	36	38	46	58	67	75	78	77	70	59	46	38	57	191

[1]U.S. Department of Commerce (1974a, 1974b).
[2]Mean period from last 32° F to first 32° F (U.S. Department of Agriculture 1941).

March. Least precipitation is from August through October. Short periods of very wet or very dry weather are common. Thunderstorms with high intensity rainfall, occasionally hail, occur on over 50 days each year, mostly in the summer months. Snowfall seldom exceeds a few inches and melts in a few days. Soils are wettest from December to April and driest from July to October. Tree growth is commonly retarded for periods of a few to several days up to six times each growing season.

Soil dryness during the growing season can also be shown by "frequency of drought days" data (Knetsch and Smallshaw 1958). A drought day is a day when precipitation and evapotranspiration data indicate that soil moisture content is below the wilting point. Drought days are most likely in August when the probability of 10 drought days per month is 50 percent. The next highest probability of drought days is in July and September when the probability of 10 drought days is about 34 percent.

Geology, Topography, and Soils

In general, the Western Highland Rim and Pennyroyal region is underlain by a series of Mississippian limestones of varying coarseness, purity, and solubility. The boundary between the Rim and the Upper Coastal Plain is indistinct and irregular because unconsolidated Cretaceous sands and gravels cap broad uplands in practically all parts of the Rim (Hajek and others 1975, Soil Conserv. Serv. 1975, Elder and Springer 1978). A thin layer (4 feet or less) of loess overlies parts of both the Rim and Coastal Plain. Alluvial deposits of Quaternary age occur along the Tennessee, Cumberland, Harpeth, Duck, Buffalo, Elk, Green, and Barren Rivers. In the transition from the Rim to the Outer Nashville Basin, phosphatic limestones and shales of Devonian, Silurian, and Ordovician age are exposed.

Topography of the region ranges from gentle to rugged and complex. Slope varies from nearly level to very steep. On the Rim west of the Nashville Basin a dendritic drainage pattern indicates that dissection is about mature. Ridgetops are about 800 to 1,000 feet above sea level, and local relief is 200 to 300 feet. In places, remnants of the once broad undulating plateau remain. Here ridges extend for 0.5 mile or more and relief is 50 feet or less. In northern Alabama the Rim surface ranges from 500 to 800 feet above sea level.

In the northern tier of counties in Tennessee and the Pennyroyal of Kentucky, topography gradually becomes less rugged. Uplands consist of broad rolling to gently sloping interstream areas dotted with sinkholes and depressions. In this karst area, permanent streams are few and drainage is mostly underground in an extensive system of caverns.

In the more rugged section of the Western Highland Rim, upland soils are derived from loess, cherty limestone, noncherty limestone, and Coastal Plain sediments. Soils are generally well drained and low to moderate in fertility. However, fragipans restrict root growth and impede internal drainage in some soils. Typical upland soils are

Mountview, Dickson, Bodine, and Baxter. About 68 percent of this rugged area is forested ranging from 40 percent in Giles County to 80 percent in Wayne County, Tennessee (Hedlund and Earles 1971).

In the smoother section of the Rim and Pennyroyal, upland soils developed in loess and thick underlying layers of clay weathered from relatively chert-free limestone. Soils are generally well drained with moderately high fertility. Common soils are Pembroke, Crider, Baxter, and Nicholson. This area is well suited to agriculture, but forests occupy about 38 percent of the area ranging from 15 percent in Simpson to 50 percent in Lyon County, Kentucky (Hedlund and Earles 1971, 1973; Kingsley and Powell 1978).

Fertile soils that developed on floodplains and low terraces along the major rivers have been covered by the lakes constructed by the Tennessee Valley Authority and the Corps of Engineers. High terraces are seldom flooded, and soils are deep and moderately high in fertility. Common soils are Pickwick, Armour, Huntington, Arrington, Beason, Newark, and Dunning. These floodplains and terraces are well suited to agriculture. Seasonal wetness limits their use in places. The normal level of Kentucky Lake and Lake Barkley is 359 feet above sea level, Pickwick Lake is 414 feet, Wilson Lake is 508 feet, and Wheeler Lake is 556 feet.

In the transition to the Outer Nashville Basin, topography is complex, consisting of knobs and narrow, meandering hills that are erosional remnants of the Mississippian plateau. Bodine soils occur on the hilltops and steep upper slopes while Sulphura, Dellrose, and Mimosa constitute the common sequence of soils on slopes into the Outer Basin. Maury, Braxton, and Harpeth soils are common on Outer Basin ridges and valleys.

Gradient, aspect, slope length, and soil moisture are important in the delineation of landtypes described later. Slope and topography affect the rate and amount of both surface runoff and subsurface movement of soil water. Soil loss by erosion increases as gradient and length of slope increase. Although surface runoff is rare under forested conditions, it is important during road construction, logging, and other forest management operations. Soils on steep slopes are often shallower than soils on more nearly level terrain. Deposition of sediments on gentle terrain by surface runoff is greatest below the longer and steeper slopes.

Generally, the steeper the gradient and the longer the slope, the greater is the subsurface flow of soil water downslope. As a consequence, plants on lower slopes grow for longer periods without moisture stress. Subsurface flow may result in excessively wet soil with poor aeration at the base of long slopes. Areas of karst topography are an exception. Here, soil water percolates deep into the porous limestone instead of moving downslope in the soil.

Aspect affects air and soil temperatures. Soil temperatures are lower on north-facing than on south-facing slopes. Because soils on north-facing slopes retain moisture longer during the growing season, both rate of tree growth and species composition are better on north-facing than on south-facing slopes.

In soil taxonomy, temperature regime is one of several differentiae used to place soils into a subgroup having similar physical and chemical properties (Soil Survey Staff 1975). For the Western Highland Rim and Pennyroyal, two soil temperature classes are recognized – mesic and thermic. Temperature regime of mesic soils ranges from 8° to 15° C (47° to 59° F), and the regime of thermic soils ranges from 15° to 22° C (59° to 72° F). Both classes also have a difference of 5° C (9° F) or more between mean summer and mean winter soil temperature. All temperature measurements are at a depth of 50 cm or at a lithic or paralithic contact, whichever is shallower.

Accordingly, all soils mapped in the Alabama portion of the Western Highland Rim are thermic. In Tennessee, the 15° C isotherm passes through Sumner and Robertson Counties and nearly all Western Highland Rim soils are thermic. The Western Pennyroyal-Limestone Area in Kentucky is a transition zone because both mesic and thermic soils are recognized.

SUBREGIONS AND LANDTYPE ASSOCIATIONS

I have divided the Western Highland Rim and Pennyroyal region into four subregions: 1) Highland Rim plateau, 2) Highland Rim-Nashville Basin transition, 3) Karst plain, and 4) Major river bottoms (fig. 2). Each subregion was further divided into two to four landtype associations (LTA) that correspond closely to soil associations shown on general soil maps for Alabama, Kentucky, and Tennessee (Hajek and others 1975; Soil Con-

serv. Serv. 1975; Elder and Springer 1978; Edwards and others 1974) (table 3). A description of these landtype associations follows.

Subregion 1: Highland Rim Plateau

Landtype Association-A: Strongly Dissected Plateau.—This landtype association corresponds to soil associations D11 (Bodine-Mountview-Dickson) and D12 (Bodine-Talbott) in Tennessee and extends south into northern Alabama where it merges mostly with soil association 11 (Minvale-Fullerton). Portions of LTA-A extend west of the Tennessee River in Tennessee.

Also included in LTA-A is soil association D31 (Brandon-Lax) in Lewis, Dickson, and Humphreys Counties, Tennessee and soil association C23 (Shubuta-Silverton-Bodine-Dulac) in southern Wayne County, Tennessee. I included association C23 to improve coincidence between the Highland Rim and Upper Coastal Plain physiographic provinces at the Tennessee-Alabama State boundary. A small area of soil association D31 on Tennessee Ridge in northwest Stewart County, Tennessee, was merged with an extensive area of soil association B3 (Brandon-Loring-Saffell) in Trigg County, Kentucky, and placed in the Upper Coastal Plain physiographic province.

Landtype association-A consists of narrow winding to moderately broad undulating ridges flanked by steep side slopes. Valleys in the upper reaches of intermittent streams are narrow and V-shaped, but gradually become U-shaped with bottoms as wide as 250 to 500 feet before merging with major river bottoms (Subregion 4).

Hilly and steep parts of LTA-A have well-drained to excessively drained, cherty, loamy and clayey soils derived from cherty limestone. Undulating parts have well drained to moderately well drained silty soils developed in 2 to 4 feet of loess over clayey residuum from cherty limestone or over gravelly, mostly unconsolidated, Coastal Plain sediments.

Most of LTA-A is forested. Only the smoother ridges have been cleared for agriculture and some of these have been abandoned. Eleven landtypes are recognized: 1-11.

Landtype Association-B: Moderately Dissected Plateau.—This LTA corresponds to soil association D21 (Baxter [Fullerton]-Mountview-Dickson) in Tennessee and soil association D2 (Baxter-Crider) in Kentucky.

Landtype association-B consists of broad, rounded hills interspersed with narrow, winding ridges flanked by moderately steep to steep side slopes. Near the heads of intermittent streams, valleys are V-shaped, but gradually become U-shaped with bottoms as wide as 500 to 800 feet before merging with major river bottoms (Subregion 4).

Hilly and rolling parts of LTA-B have mostly well drained, cherty, and clayey soils derived from lime-

Table 3.—*Subregions and landtype associations of the Western Highland Rim and Pennyroyal region*

Subregion	Landtype association
1. Highland Rim plateau	A. Strongly dissected plateau B. Moderately dissected plateau C. Weakly dissected plateau-gray soils D. Weakly dissected plateau-red soils
2. Highland Rim-Nashville Basin transition	E. Knobs F. Outer Basin
3. Karst plain	G. Weakly dissected plain H. Moderately dissected plain I. Slump area
4. Major river bottoms	J. Tennessee River bottom K. Buffalo River bottom L. Cumberland, Harpeth, Duck, and Elk River bottoms M. Green and Barren River bottoms

stone residuum, and the smoother parts have well drained and moderately well drained silty soils developed in 2 to 3 feet of loess over limestone residuum.

The smoother, broader ridges and mild slopes are in agriculture. Steep or wet areas are in woodland. Nine landtypes are recognized: 1-6 and 9-11.

Landtype Association-C: Weakly Dissected Plateau-Gray Soils.—This LTA corresponds to soil association D32 (Dickson-Mountview-Guthrie) in Tennessee and soil association 7 (Dickson-Fullerton) in Alabama. Soil association D32 was extended into Kentucky in southeastern Trigg and southwestern Christian Counties, although it is not recognized on the Kentucky general soil map.

Landtype association-C consists of broad, nearly level to undulating ridges with some depressions and sinkholes. These uplands are dissected by a weak to moderately well developed dendritic drainage system. Bottoms of intermittent streams are saucer-shaped with little gradient. Many intermittent streams empty into sinkholes. Bottoms of permanent streams are U-shaped. Short moderately steep slopes surround most sinkholes and separate bottoms of permanent streams from broad ridges.

The silty and cherty soils are well drained to poorly drained and derived from 2 to 6 feet of loess overlying old alluvium or from clayey residuum from limestone.

Most of LTA-C has been cleared and is used for crops and pasture. Steep slopes and wet areas are in woodland. Nine landtypes are recognized: 5, 6, 9, 10, 12, 14, 15, 27, and 28.

Landtype Association-D: Weakly Dissected Plateau-Red Soils.—This LTA corresponds to soil association D51 (Waynesboro-Decatur-Bewleyville-Curtistown) in Tennessee and soil association 5 (Decatur-Dewey) in Alabama. It is limited to three isolated areas—two in Lauderdale County, Alabama, and one in Lawrence County, Tennessee. This LTA is extensive in the Eastern Highland Rim region of northern Alabama and central Tennessee.

Landtype association-D consists of broad, gently sloping ridges bounded by generally short, sloping and moderately steep side slopes. Uplands are pitted with sinkholes and depressions. Many shallow intermittent drainages and a few permanent streams comprise the weakly developed dendritic drainage pattern.

The mostly well drained and clayey soils are derived from a layer of loess overlying old alluvium or clayey residuum from moderately high-grade limestone.

Most of the LTA-D has been cleared for crops and pasture. Steeper slopes and poorly drained areas are in woodland. Nine landtypes are recognized: 5, 6, 9, 10, 13-15, 27, and 28.

Subregion 2: Highland Rim-Nashville Basin Transition

Landtype Association-E: Knobs.—This LTA corresponds to soil association E11 (Dellrose-Mimosa-Bodine) in Tennessee.

Landtype association-E consists of a nearly continuous belt of high cherty ridges and knobs with steep side slopes, as much as 1,000 feet long, and narrow valleys. Ridges are remnants of the Highland Rim plateau and are capped with Ft. Payne chert. Valleys are mainly V-shaped at the heads, but become U-shaped downstream, and do not exceed ¼ mile in width; most are ⅛ mile or less. Elevation ranges from 900 to 1,200 feet above sea level and relief is 180 to 300 feet. This strongly dissected belt ranges in width from about 2 miles in Davidson County in north central Tennessee to about 25 miles in the Elk River basin in south central Tennessee and northern Alabama.

The area is hilly to steep with deep, well drained loamy and clayey soils that are mostly cherty. They formed in residuum from cherty limestone, shale, and phosphatic limestone, and in colluvium. Thin layers of Chattanooga and Maury shales and the lower shaly facies of Ft. Payne chert are exposed in places on steep slopes.

Agriculture is limited by slope steepness, high chert content, or rockiness. Considerable cleared acreage is reverting to woodland. Seven landtypes are recognized: 1, 11, 12, and 16–19.

Landtype Association-F: Outer Basin.—This LTA corresponds to that portion of soil association E31 (Maury-Braxton-Harpeth) in Giles County, Tennessee which is surrounded by LTA-E.

Landtype association-F consists of low broad uplands and hills and the associated bottomlands along Richland Creek and its larger tributaries. Soils are derived from limestone, which is moderate to high in phosphate, alluvium, and loess in some places. Soils are deep, well drained, and predominantly clayey with some silty ones. Topography is

undulating to rolling; few slopes exceed 25 percent. Relief is about 200 feet and the highest elevations are about 800 feet above sea level.

Most of LTA-F is in crops or pasture. Only the steepest slopes and shallower soils are in woodland. Six landtypes are recognized: 11 and 18–22.

Subregion 3: Karst Plain

Landtype Association-G: Weakly Dissected Karst Plain.—This LTA corresponds to soil association D1 (Crider-Baxter) and D3 (Fredonia-Pembroke) in Kentucky and D41 (Pembroke-Crider) and D42 (Baxter-Bewleyville-Pembroke) in Tennessee.

Landtype association-G consists of mostly deep, well drained intermingled clayey and silty soils some of which are cherty. They developed in thin loess, alluvium, and clayey residuum from moderately high-grade limestone situated on an undulating to rolling karst plain. This broad wavy plain is pitted with sinkholes and shallow depressions which connect in underground drainageways. Surface drainages are shallow and meandering; there are few permanent streams. In some areas, particularly in soil association D3, the landscape is slightly more complex, slopes are somewhat steeper, soils are predominantly less than 60 inches thick, and limestone outcrops and escarpments are common. Relief ranges from 30 to 90 feet. Steepest parts are near the Barren and Green Rivers (LTA-M), the Red River, and other major permanent creeks and rivers.

Most of the soils in LTA-G are quite fertile. Over 75 percent of the area is in agriculture. Woodlands usually occur on the steeper and poorly drained parts of the landscape. Twelve landtypes are recognized: 11, 12, and 23–32.

Landtype Association-H: Moderately Dissected Karst Plain.—This LTA corresponds to soil association D4 (Crider-Vertress) in Kentucky.

Landtype association-H consists of deep, moderately well drained and well drained soils formed in thin loess over limestone residuum, and deep well drained soils formed in clayey residuum from limestone and thin bedded shale and siltstone on a rolling upland dissected by many small streams and sinkholes. The surface drainage network is more defined than in LTA-G, although many streams drain into sinks and depressions.

Relief commonly exceeds 100 feet and ranges up to 160 feet in the vicinity of larger streams. Slopes are 200 to 400 feet long.

This LTA is extensively farmed, but woodlands are scattered throughout the area. Some abandoned farmland is reverting to woodland. Ten landtypes are recognized: 11, 23, 27, 28, and 31–36.

Landtype Association-I: Slump Area.—This LTA corresponds to soil association D5 (Sonora-Gatton) in Hardin, Hart, and Larue Counties, Kentucky. It is characterized by localized deposits of sandstone, siltstone, shale, and limestone that overlaid the St. Genevieve limestone (dominant baserock of the Pennyroyal) and slumped into sinkholes and caverns during an earlier cycle of karst erosion. In places these deposits range up to 210 feet thick, and in other places they are shallow and mixed with residual soil materials. A thin capping of loess occurs in some parts of the area.

Landtype Association-I consists of mostly well drained soils formed in loamy, unconsolidated residuum of sandstone, siltstone, and shale origin. Topography is undulating to rolling and hilly with a dendritic drainage pattern. Relief is commonly about 60 feet but may range up to 100 feet in the vicinity of larger streams.

This LTA is used mainly for farming. Small woodlots are common and there are a few large wooded tracts. Some abandoned fields are reverting to woodland. Eight landtypes are recognized: 11, 31, 32, and 37–41.

Subregion 4: Major River Bottoms

Landtype Association-J: Tennessee River Bottom.—This LTA corresponds to soil association A41 (Wolftever-Egam-Beason-Lindside) along the Tennessee River in Hardin, northwestern Wayne, and southeastern Perry Counties, Tennessee.

Landtype association-J consists mostly of moderately well drained and somewhat poorly drained clayey soils, and some silty soils that formed in mixed alluvium on nearly level to rolling terraces and floodplains.

Most of LTA-J has been cleared for agriculture. Only the steeper and wetter areas are in woodland. Two landtypes are recognized: 42 and 43.

Landtype Association-K: Buffalo River Bottom.—This LTA corresponds to soil association A42 (Ennis-Humphreys-Lobelville) along the Buffalo River in west central Tennessee.

Landtype association-K consists mostly of deep, well drained and moderately well drained cherty and loamy soils formed in alluvium on level to moderately steep footslopes, terraces, and floodplains. The entire watershed of the Buffalo River drains

the Western Highland Rim plateau. Alluvium is washed from soils derived from cherty low-grade limestone and a capping of loess.

About 60 percent of LTA-K is in agriculture. The remainder is woodland or abandoned fields. The lower lying portions are frequently flooded, particularly in late winter and spring. Two landtypes are recognized: 44 and 45.

Landtype Association-L: Cumberland, Harpeth, Duck, and Elk River Bottoms.—This LTA corresponds to soil association A43 (Arrington-Lindell-Egam-Armour) along the Cumberland, Harpeth, Duck, and Elk Rivers in Tennessee and northern Alabama.

Landtype association-L consists mostly of well drained and moderately well drained silty soils and a few clayey soils on footslopes, terraces, and floodplains of rivers which originate in or flow through the Nashville Basin. Most soils are moderate to high in phosphate. On the floodplains, coarse-textured and better drained soils are on the highest areas adjacent to the rivers and as distance from the rivers increases, the soils become progressively more clayey and less well drained.

Fluctuating water tables and occasional flooding limit the use and affect the management of this LTA. Except for a few wooded tracts on poorly drained soils, all of this LTA has been cleared for agriculture. Two landtypes are recognized: 46 and 47.

Landtype Association-M: Green and Barren River Bottoms.—Bottoms in the middle and upper reaches of major rivers were not delineated on the general soil map of Kentucky. However, these two river bottoms are similar to LTA's-J, K, and L and should be recognized, although they only traverse the Western Pennyroyal-Limestone Area for short distances. The upper portion of these two rivers drain part of the Eastern Highland Rim and Pennyroyal region in Kentucky and northern Tennessee.

Landtype Association-M consists of well drained to somewhat poorly drained silty soils formed in mixed old alluvium on gently sloping to strongly sloping terraces, and well drained to very poorly drained soils formed in young mixed alluvium on level to gently sloping floodplains. There is some evidence of loess in the alluvium.

Productivity and management interpretations are similar to LTA-L except soils in LTA-M are mostly in the mesic temperature regime and neither the Barren or Green River watersheds contain rocks with high contents of phosphate.

Seasonal high water tables and occasional flooding limit the use and affect the management of this LTA. Most of LTA-L has been cleared for agriculture. Two landtypes are recognized: 48 and 49.

LANDTYPES

I have divided each landtype association into landtypes, which are the smallest unit of the landscape recognized in this classification system. Wertz and Arnold (1975) describe landtypes as visually identifiable areas each being reasonably uniform in soils and productivity and having resulted from similar climatic and geological processes.

The Western Highland Rim and Pennyroyal region has 49 landtypes distributed among 4 subregions and 13 landtype associations (table 4). Some are common to as many as seven landtype associations while others are characteristic of only one association. Figures 3 to 7 depict how these landtypes occur on the landscape in landtype associations A to I. Only one major river bottom (LTA-J) is shown (fig. 3) because bottoms have simple landscapes with landtypes defined entirely on the basis of soil drainage.

Letters in the upper right-hand corner of each landtype description identify the landtype association(s) in which each landtype occurs.

Aspect distinguishes some landtypes and is recorded as either north or south. North aspects include all azimuths from 315° (northwest) to 135° (southeast). The remainder of the azimuth circle represents south aspects.

Each landtype is described in terms of nine elements. The **Geographic Setting** provides an overall description of the landtype, specifying both where it occurs on the landscape and its relation to other landtypes. Some key soil properties such as depth and texture are described in general terms. Texture refers to the upper part (about 2 feet) of the subsoil. Slope is classified in accordance with SCS standards (Soil Survey Staff 1951).

Slope Classes and Corresponding Percent of Slope

Slope percent	Class
0–2	Level or nearly level
2–6	Gently sloping
6–10	Sloping
10–15	Strongly sloping
15–25	Moderately steep
25–45	Steep
45 +	Very steep

The most prevalent soil series are listed under **Dominant Soils.** These series names reflect the most recent designations in soil classification and link this site classification system with county soil surveys published by the SCS. Users who wish more detailed information can refer to soil series descriptions issued by the SCS.

The kind of **Bedrock** or **Soil Parent Material** and **Depth to Bedrock** are listed next. **Texture** of the topsoil (upper 5 to 8 inches) is described in terms of the 12 conventional classes, which are based on percentages of sand, silt, and clay-size particles. Textural modifiers, such as cherty and gravelly, are used where the amount of rock fragments is significant (Soil Survey Staff 1951).

The seven conventional **Soil Drainage** classes are: *very poorly drained, poorly drained, somewhat poorly drained, moderately well drained, well drained, somewhat excessively drained,* and *excessively drained* (Soil Survey Staff 1951). **Relative Soil Water Supply** of each landtype is rated in five classes: *very low, low, medium, high,* and *very high.* This qualitative rating is based on the available water holding capacity of the dominant soils (a function of soil thickness and texture including rock fragments), but allowances are made for the influence of soil drainage, topographic position, and aspect.

Soil Fertility is described as: *very low, low, moderately low, moderate, moderately high, high,* or *very high.* Some soils (Bodine, Brandon, Dickson, and Mountview) are fairly acid and derived from rocks with few weatherable minerals while others (Braxton, Crider, Decatur, and Pembroke) are less acid and contain more weatherable minerals. Consequently, fertility of Western Highland Rim and Pennyroyal soils varies widely (Edwards and others 1974, Francis and Loftus 1977).

The most common woody species in approximate order of abundance are listed under **Vegetation.** Some distinctive herbaceous species are included. Species nomenclature follows Little (1979) and Fer-

Table 4.—*Summary of landtypes and their occurrence by subregions and landtype associations*

Landtype number and name by subregion	Landtype association[1]
Highland Rim Plateau	
1. Narrow ridges and convex upper slopes.	A,B
2. Broad undulating Coastal Plain uplands.	A,B
3. Broad ridges—north aspect.	A,B
4. Broad ridges—south aspect.	A,B
5. Cherty north slopes.	A,B,C,D
6. Cherty south slopes.	A,B,C,D
7. Shaly north slopes.	A
8. Shaly south slopes.	A
9. Footslopes, terraces, streambottoms, and upland depressions with good drainage.	A,B,C,D
10. Terraces, streambottoms, and upland depressions with poor drainage.	A,B,C,D
11. Limestone rockland and shallow soils.	A,B
12. Broad silty uplands.	C
13. Broad undulating uplands.	D
14. Broad ridges—north aspect.	C,D
15. Broad ridges—south aspect.	C,D
27. Upland flats, depressions, and sinkholes with good drainage.	C,D
28. Upland flats, depressions, and sinkholes with poor drainage.	C,D
Highland Rim-Nashville Basin Transition	
1. Narrow ridges and convex upper slopes.	E
11. Limestone rockland and shallow soils.	E,F
12. Broad silty uplands.	E
16. North slopes.	E
17. South slopes.	E
18. Footslopes, terraces, and streambottoms with good drainage.	E,F
19. Terraces and streambottoms with poor drainage.	E,F
20. Low broad ridges.	F
21. North slopes and narrow ridges.	F
22. South slopes and narrow ridges.	F

Table 4.—*Summary of landtypes and their occurrence by subregions and landtype associations—Continued*

Landtype number and name by subregion	Landtype association[1]
Karst Plain	
11. Limestone rockland and shallow soils.	G,H,I
12. Broad silty uplands.	G
23. Broad undulating uplands.	G,H
24. Broad ridges—north aspect.	G
25. Broad ridges—south aspect.	G
26. Narrow limestone ridges and knoblike hills.	G
27. Upland flats, depressions, and sinkholes with good drainage.	G,H
28. Upland flats, depressions, and sinkholes with poor drainage.	G,H
29. North slopes.	G
30. South slopes.	G
31. Terraces and streambottoms with good drainage.	G,H,I
32. Terraces and streambottoms with poor drainage.	G,H,I
33. Broad ridges—north aspect.	H
34. Broad ridges—south aspect.	H
35. North slopes.	H
36. South slopes.	H
37. Broad undulating uplands.	I
38. Broad ridges—north aspect.	I
39. Broad ridges—south aspect.	I
40. North slopes.	I
41. South slopes.	I
Major River Bottoms	
42. Terraces and floodplains with good drainage.	J
43. Terraces and floodplains with poor drainage.	J
44. Footslopes, terraces, and floodplains with good drainage.	K
45. Terraces and floodplains with poor drainage.	K
46. Terraces and floodplains with good drainage.	L
47. Terraces and floodplains with poor drainage.	L
48. Footslopes, terraces, and floodplains with good drainage.	M
49. Terraces and floodplains with poor drainage.	M

[1]See table 3.

nald (1950). Loblolly pine, which occurs on many landtypes, is native only in northern Alabama and southern Tennessee but has been planted north of its range on converted sites and abandoned fields.

FOREST MANAGEMENT INTERPRETATIONS

Each landtype is evaluated in terms of productivity for selected species of trees and species desirability for timber production. Also, each landtype is rated for five soil-related problems that may affect forest management.

Productivity

Productivity of commercially valuable species is expressed as site index and as average annual growth in cubic feet per acre. Site index is the total height attained by dominant and codominant trees at some specified age.

For all naturally occurring species, site indices are the means of values from soil survey interpretations for dominant soils in each landtype. Interpretations are issued by the SCS as part of each soil series description. SCS personnel obtained height and age measurements in well-stocked, even-aged, essentially unmanaged stands that had not been damaged excessively by fire, insects, disease, or

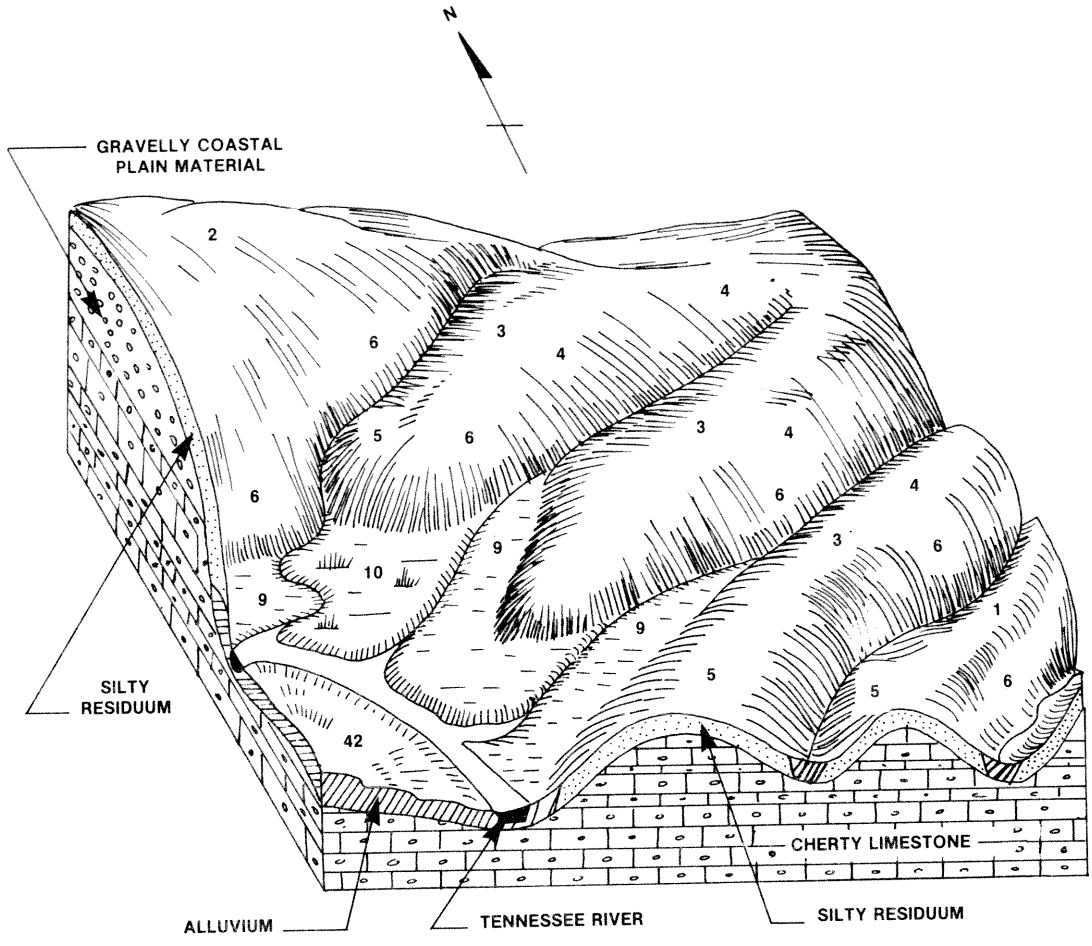

Figure 3.—*Landtypes characteristic of Landtype Associations A and B in Subregion 1 and Landtype Association J in Subregion 4.*

LEGEND

1. Narrow ridges and convex upper slopes.
2. Broad undulating Coastal Plain uplands.
3. Broad ridges—north aspect.
4. Broad ridges—south aspect.
5. Cherty north slopes.
6. Cherty south slopes.
9. Footslopes, terraces, streambottoms, and upland depressions with good drainage.
10. Terraces, streambottoms, and upland depressions with poor drainage.
42. Terraces and floodplains with good drainage.

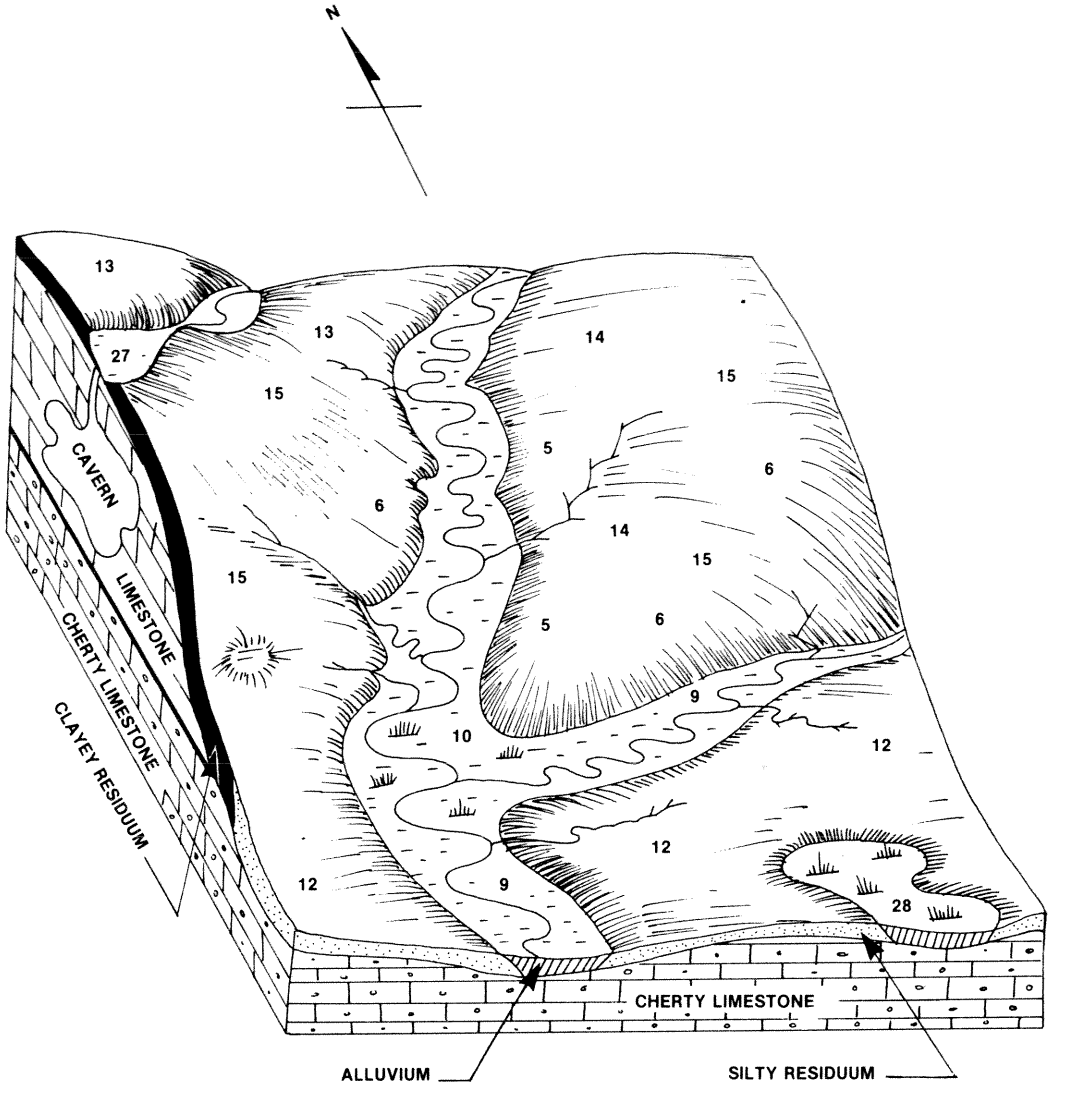

Figure 4.—*Landtypes characteristic of Landtype Associations C (bottom) and D (top) in Subregion 1.*

LEGEND

5. Cherty north slopes.
6. Cherty south slopes.
9. Footslopes, terraces, streambottoms, and upland depressions with good drainage.
10. Terraces, streambottoms, and upland depressions with poor drainage.
12. Broad silty uplands.
13. Broad undulating uplands.
14. Broad ridges—north aspect.
15. Broad ridges—south aspect.
27. Upland flats, depressions, and sinkholes with good drainage.
28. Upland flats, depressions, and sinkholes with poor drainage.

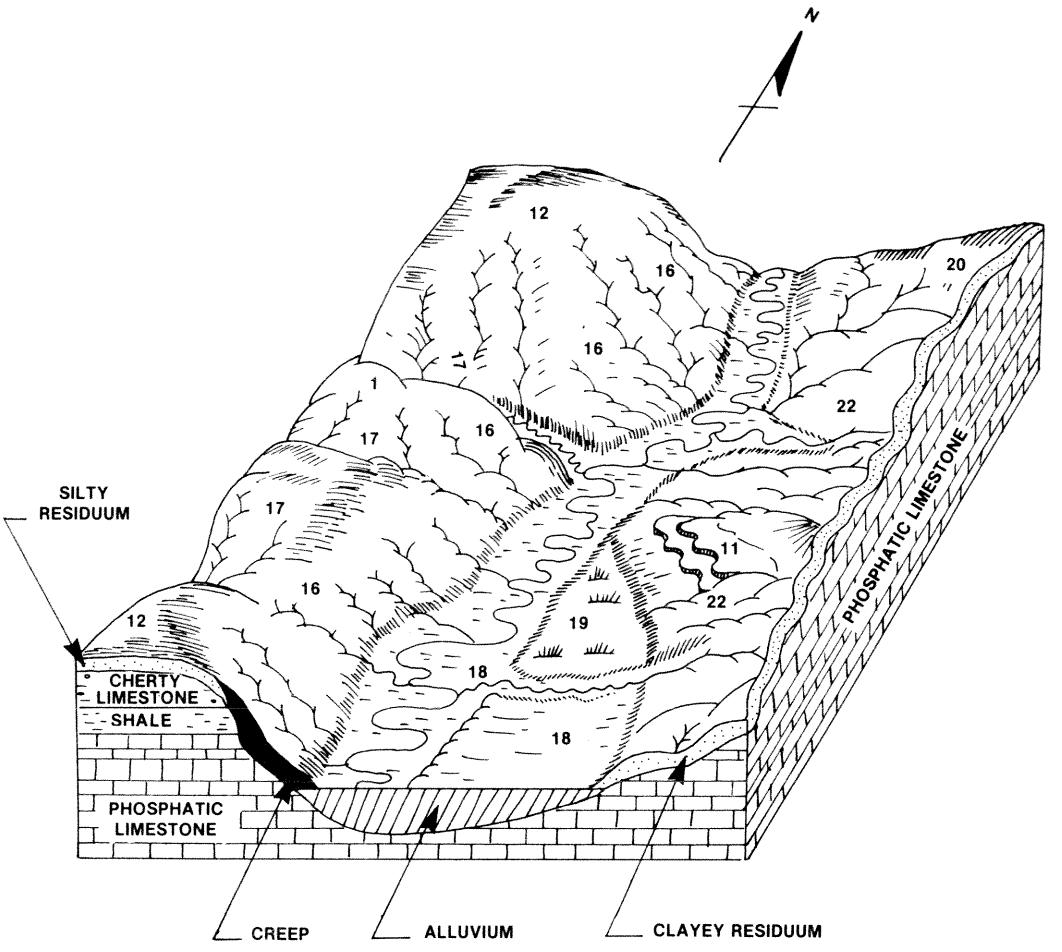

Figure 5.—*Landtypes characteristic of Landtype Associations E (left) and F (right) in Subregion 2. Adapted from figures 4 and 5 in Edwards and others (1974).*

LEGEND

1. Narrow ridges and convex upper slopes.
11. Limestone rockland and shallow soils.
12. Broad silty uplands.
16. North slopes.
17. South slopes.
18. Footslopes, terraces, and streambottoms with good drainage.
19. Terraces and streambottoms with poor drainage.
20. Low broad ridges.
22. South slopes and narrow ridges.

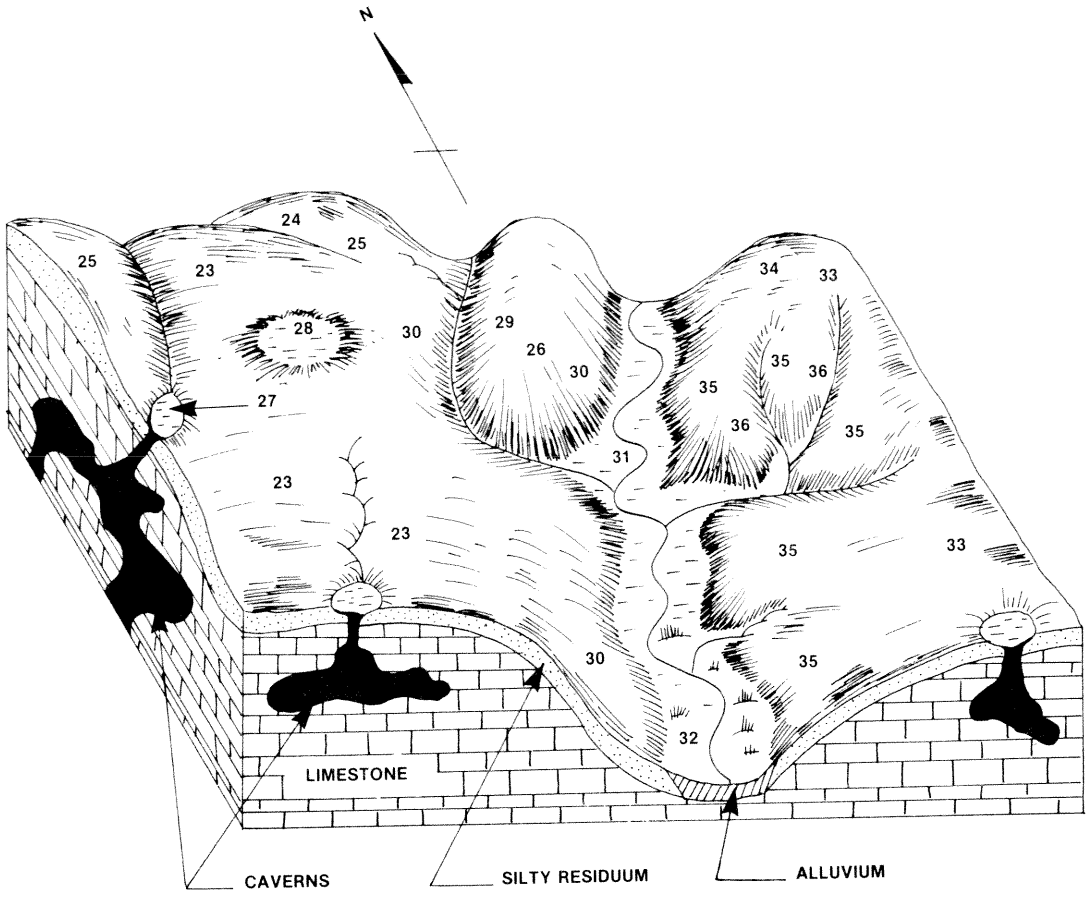

Figure 6.—*Landtypes characteristic of Landtype Associations G (left) and H (right) in Subregion 3.*

LEGEND

23. Broad undulating uplands.
24. Broad ridges—north aspect.
25. Broad ridges—south aspect.
26. Narrow limestone ridges and knoblike hills.
27. Upland flats, depressions, and sinkholes with good drainage.
28. Upland flats, depressions, and sinkholes with poor drainage.
29. North slopes.
30. South slopes.
31. Terraces and streambottoms with good drainage.
32. Terraces and streambottoms with poor drainage.
33. Broad ridges—north aspect.
34. Broad ridges—south aspect.
35. North slopes.
36. South slopes.

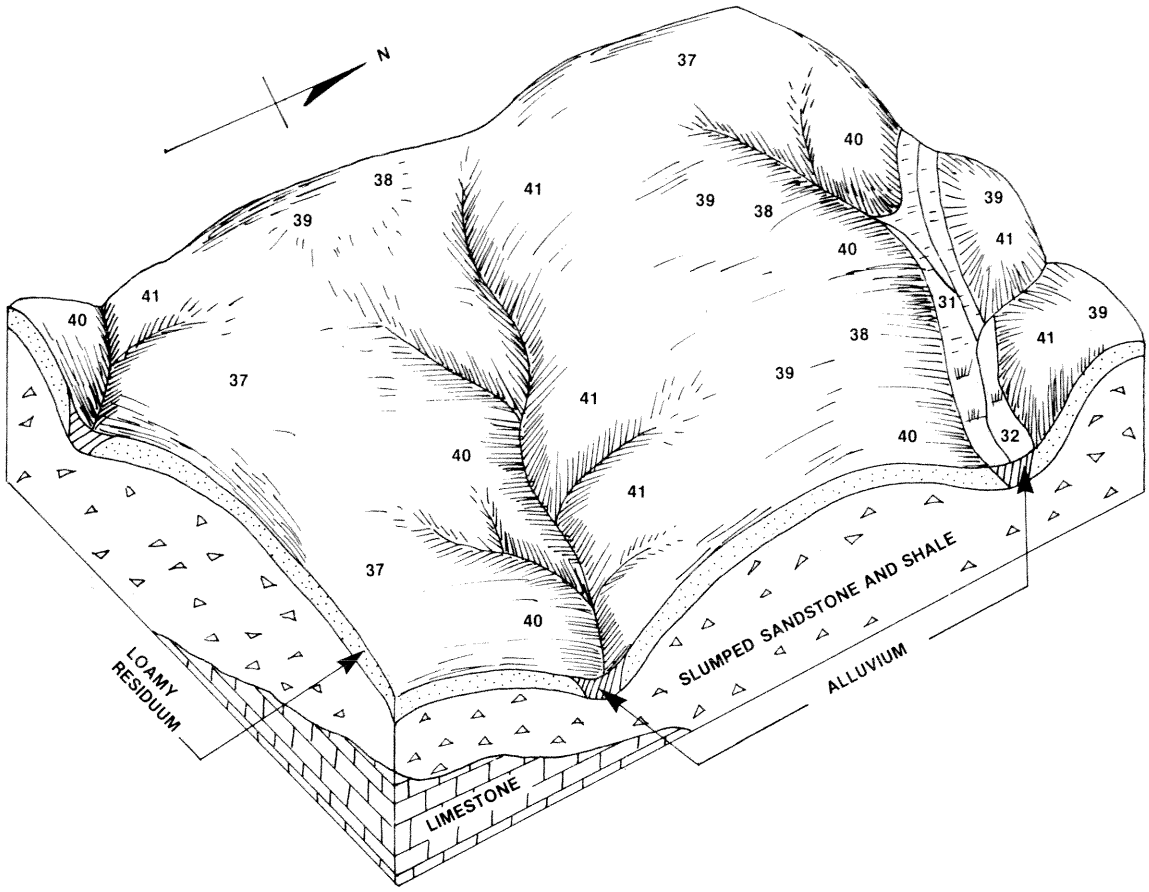

Figure 7.—*Landtypes characteristic of Landtype Association I in Subregion 3. Adapted from figure 4 in Arms and others (1979).*

LEGEND

31. Terraces and streambottoms with good drainage.
32. Terraces and streambottoms with poor drainage.
37. Broad undulating uplands.
38. Broad ridges—north aspect.
39. Broad ridges—south aspect.
40. North slopes.
41. South slopes.

grazing. These stands were located on soils representing, as nearly as possible, the modal concept of each soil series. SCS personnel then used index curves (Beck 1962; Broadfoot 1960, 1963; Broadfoot and Krinard 1959; Nelson and others 1961; Schnur 1937; U.S. Forest Service 1929; and Tennessee Valley Authority 1948[2]) to convert height and age data to site indices. Site index curves for all species except cottonwood are based on age 50 years; those for cottonwood on age 30 years.

Site indices, base age 25 years, are given for loblolly and shortleaf pines in plantations established on abandoned fields (Smalley and Bower 1971) when data for specific landtypes were available.

In a few cases when no values were available, site indices, base age 50 years, of important species were estimated. Where they occur in tables 5 to 53 these estimated values are enclosed in parentheses.

Average annual growth expressed in cubic feet per acre was calculated from available yield tables (McCarthy 1933, Nelson and others 1961, Schnur 1937, U.S. Forest Service 1929, and Winters and Osborne 1935). The yield tables represent either normal or fully-stocked conditions. Annual growth rates for all naturally occurring species or forest types were averaged over 50 years.

Average annual growth rates for loblolly and shortleaf pine plantations were derived from Smalley and Bailey's (1974a, 1974b) variable-density yield tables, and a planting density of 1,000 seedlings per acre was assumed. Average growth was based on 40 years, the oldest age reported in the yield tables.

Though our productivity data are the best available, all site curves and yield tables except those for plantation-grown loblolly and shortleaf pine were developed either for geographic areas larger than but including the Western Highland Rim and Pennyroyal or for areas other than the Western Highland Rim and Pennyroyal.

Yields were not expressed in a common merchantability standard, so care should be exercised in comparing average annual yields of species both within and between landtypes. Footnotes to tables 5 to 53 specify merchantability standards used.

[2]Site index curves for eastern redcedar based on data from 271 plots throughout the Tennessee River Valley.

Management Problems

Plant competition rates the invasion of unwanted plants after openings are made in the canopy. Plant competition is *slight* if unwanted plants do not prevent adequate natural regeneration, interfere with early growth, or restrict normal development of planted or seeded seedlings. Competition is *moderate* if unwanted plants delay establishment and hinder the growth of regenerated seedlings or if they retard the eventual development of a fully stocked stand. Competition is *severe* if unwanted plants prevent adequate restocking without extensive site preparation or special maintenance practices. Competition ratings in tables 5 to 53 represent regional averages, and competition on a given landtype may vary as a result of past land use.

Seedling Mortality is the loss of artificially established tree seedlings as influenced by soils and topographic conditions, assuming that planting is done properly and plant competition is insignificant. Rating is *slight* if expected mortality is 0 to 25 percent, *moderate* if expected mortality is 26 to 50 percent, and *severe* if mortality is more than 50 percent. If the rating is moderate or severe, special preparation of the seedbed and special planting techniques are often necessary to insure a fully stocked stand.

Equipment Limitations are restrictions on the use of conventional wheeled or tracked equipment. Soil and topographic characteristics such as slope, drainage, texture, and rockiness influence equipment limitations, sometimes necessitating the use of different kinds of equipment and methods of operation, or restricting the season when equipment is used. Generally, limitation is *slight* if slope is 20 percent or less and farm machinery can operate efficiently during all seasons. The rating is *moderate* if slope is 20 to 30 percent, limits the use of ordinary farm machinery, and requires track-type equipment; or if soil wetness prevents the use of logging vehicles for 2 to 6 months in a year. The rating is *severe* if slope exceeds 30 percent, making track-type equipment inadequate and requiring power vehicles and other special equipment; or if wetness prevents use of vehicles for 6 months or more in a year.

Erosion Hazard is the degree of potential soil erosion that can occur during and after forest management operations that expose soil along roads,

skid trails, fire lanes, and landing areas. The ratings assume that the forest is well managed and is protected from fire and grazing. Soil and topographic characteristics considered in rating hazard of erosion include slope, infiltration, permeability, water holding capacity, and resistance to detachment of soil particles by rainfall and runoff. *Slight* indicates that no special measures are needed, *moderate* indicates that some attention needs to be given to erosion control, and *severe* indicates that intensive erosion-control measures are needed.

Windthrow Hazard measures how soils affect root development and how firmly soils hold trees. The hazard is *slight* if rooting depth is more than 20 inches and trees withstand most winds, *moderate* if effective rooting depth is 10 to 20 inches and some trees are blown down during excessive soil wetness and strong winds, and *severe* if effective rooting depth is 10 inches or less and trees will not stand alone in strong winds.

Species Desirability

Three categories are used for rating **Species Desirability** of species that commonly occur on each landtype. *Most Desirable* species are those that have potential for fast growth, high value, or both. *Acceptable* species are those with moderate growth rate or value. *Least Desirable* species are those with slow growth, poor quality, or both. These ratings represent the average situation for the region. The presence or absence of local markets could result in a species being assigned to another category.

USING THE SYSTEM

This guide will allow professional foresters, forest landowners, landuse specialists, forest researchers, and other resource professionals to make onsite determinations of site productivity and will provide a site-dependent framework for forest management planning and forest research.

To make onsite determinations of productivity on a particular tract of land the user must first determine the subregion and landtype association in which the tract of land occurs by referring to table 3 and fig. 2. Landtypes common to each landtype association are shown in table 4. Landtype descriptions and landscape drawings (figs. 3 to 7) will enable the user to identify specific landtypes. Information about productivity, severity of management problems, and species desirability is shown on pages facing the landtype descriptions (tables 5 to 53).

This site classification system provides a sound biological basis for forest management planning because it recognizes inherent site differences and soil-related hazards. When the system is adopted landtypes become the basic unit of management. Continuous Forest Inventory or other forest inventory systems can easily be incorporated into this site classification system to obtain information on acreage, stocking, composition, and growth of forests by landtypes. Once productivity data are available for landtypes on a specific tract, they should be substituted for the regional values in the appropriate tables.

Users should be aware that productivity will vary within a landtype. This variation should be handled as a sampling problem dependent on the desired precision of the productivity information. To adequately sample some landtypes, users with existing inventory systems may be required to install new plots or points. Excessive variation in productivity within a landtype may indicate the need to divide that landtype into more homogeneous units.

A logical vehicle to transfer this site classification system into a valuable forest management tool is a landtype map (fig. 8), which can be used in all phases of management from day-to-day activities to long-range planning. The number and scale of maps will depend on size of ownership and how intensively one wishes to manage. Landtypes can be mapped at scales of 1:10,000 to 1:60,000. Areas as small as 2 acres can be recognized on the larger scale maps. Smoothness of the terrain will determine maximum size. So the U.S. Geological Survey 7½ minute quadrangle sheets (1:24,000) make excellent base maps on which to delineate landtypes. Black and white or color aerial photos, particularly stereo pairs, can also serve as base maps. A reasonable amount of ground checking should be part of

the mapping process. Owners or managers of large tracts should explore the advantages of computer-generated mapping of landtypes and other physical and biological features of the landscape (Beeman 1978).

For forest researchers, this site classification system provides a basis for stratifying study areas. The system also aids in identifying and isolating problems that need to be researched. For example, it became apparent in compiling site index and growth information that little mensuration data specific to the region are available. Finally, the system provides researchers with a vehicle for quick transfer of research results to the practitioner. Study results can be reported on the basis of their applicability to specific landtypes.

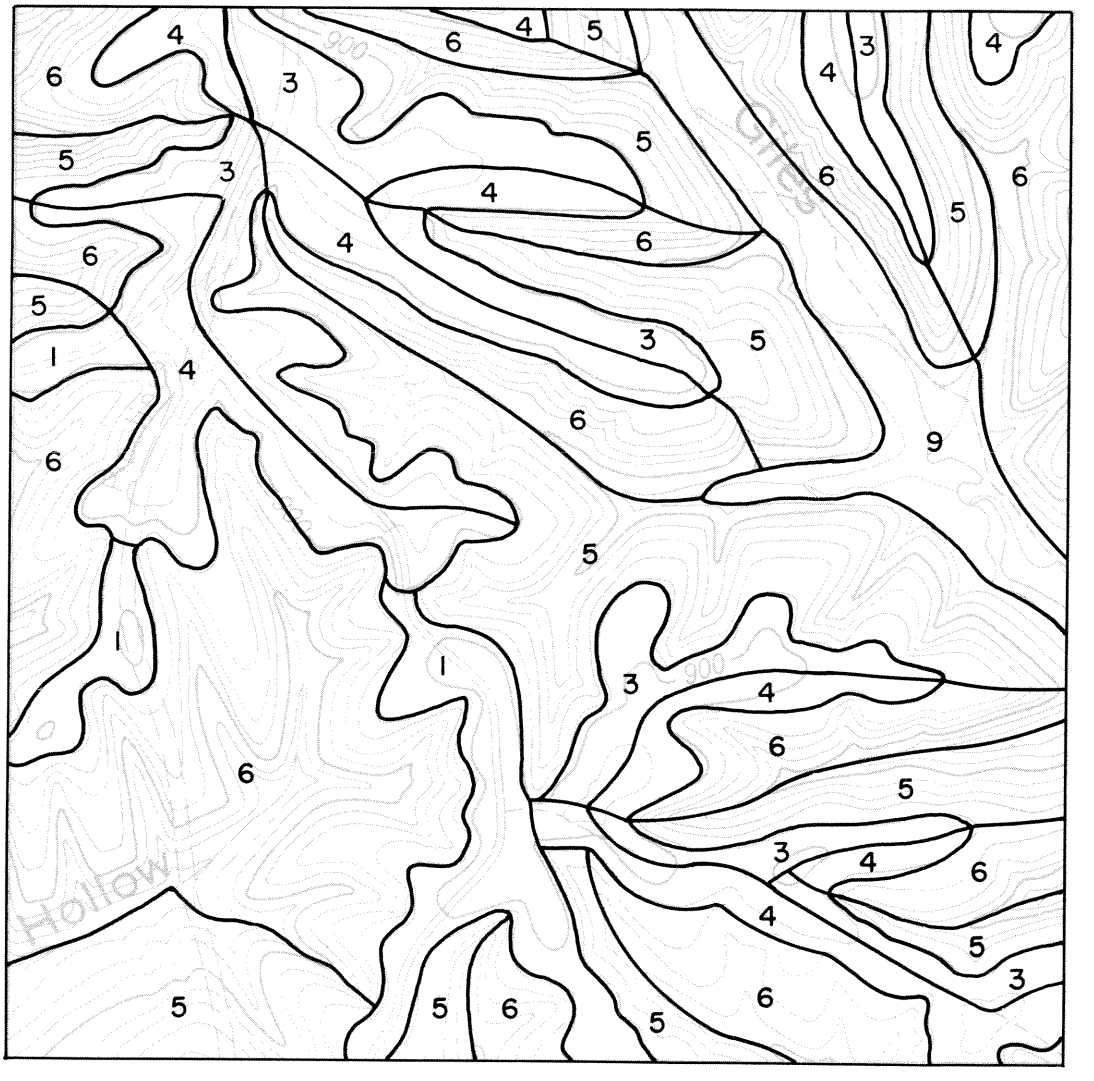

Figure 8.—*A sample landtype map for Landtype Association A (Strongly dissected Highland Rim plateau) in Subregion 1. Map covers a tract of about 700 acres located in the northwest quarter of the Riverside Quadrangle, Lewis County, Tennessee. Scale is 1:12,000.*

Description of Landtype 1: Narrow Ridges and Convex Upper Slopes

Geographic Setting—Deep, cherty soils on undulating to very steep, narrow winding ridgetops, knoblike hills, and adjoining convex upper slopes in Subregions 1 and 2. Slope ranges from 5 to 60 percent. Typically this landtype is no wider than 250 feet. Chert fragments are common on the surface. Twenty to eighty percent of the soil mass may be chert fragments mostly 1 to 4 inches, but some fragments may be 2 feet across.

Dominant Soils—Bodine and Fullerton.

Bedrock—Cherty limestone.

Depth to Bedrock—More than 5 feet.

Texture—Cherty silt loam, cherty loam, or cherty sandy loam.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Low.

Soil Fertility—Moderately low.

Vegetation—Scarlet oak, chestnut oak, post oak, white oak, hickories, southern red oak, loblolly pine, Virginia pine, and shortleaf pine; occasional black oak, blackgum, red maple, yellow-poplar, blackjack oak and eastern redcedar. Dogwood, sourwood, eastern hophornbeam, winged elm, sassafras, huckleberries, and wild plum are common in the understory.

Table 5.—*Forest management interpretations for Landtype 1: Narrow Ridges and Convex Upper Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65	(50)	95	117
Shortleaf pine	55	(40)	67	84
Virginia pine	55		41	
Eastern redcedar	40		...	
Chestnut oak	55		38	
Scarlet oak	55			

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate to severe	Moderate to severe	Moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	White oak	E. hophornbeam
Virginia pine	Chestnut oak	Post oak
	Black oak	Blackjack oak
	S. red oak	Winged elm
	Scarlet oak	Sassafras
	Yellow-poplar	Red maple
		Blackgum
		Dogwood
		Sourwood

Description of Landtype 2: Broad Undulating Coastal Plain Uplands

Geographic Setting—Moderately deep and deep soils on gently sloping to sloping broad ridges that typically occupy the smoother and higher parts of the landscape in Subregion 1. Slope does not exceed 12 percent, but the area with slope greater than 6 percent is small and aspect is not a dominant site factor. Soils developed in 2 to 4 feet of loess over gravelly, mostly unconsolidated Coastal Plain sediments. Volume of gravel in the C horizon ranges from 20 to 90 percent. Gravel is mostly chert, but some is quartz, and there are cemented layers in places. On steep side slopes below these broad ridges, the Coastal Plain sediments have been truncated and soils developed in the underlying cherty limestone. (See Landtypes 5 and 6.)

Dominant Soils—Brandon and Lax.

Bedrock—Cherty limestone.

Depth to Bedrock—More than 5 feet. Lax soils have a fragipan at depths of 18 to 35 inches.

Texture—Silt loam; gravelly in the lower horizons.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderately low.

Vegetation—White oak, northern red oak, black oak, southern red oak, hickories, scarlet oak, loblolly pine, shortleaf pine, Virginia pine, blackgum, and elms; occasional American beech, chestnut oak, post oak, red maple, sweetgum, and yellow-poplar. Persimmon, dogwood, sassafras, and sourwood are common in the understory.

Table 6.—*Forest management interpretations for Landtype 2: Broad Undulating Coastal Plain Uplands.* *Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	55	123	133
Shortleaf pine	70	(40)	125	84
Virginia pine	70		92	
N. red oak	70		57	
Yellow-poplar	90		90	
Sweetgum	85		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	American beech
Loblolly pine	Chestnut oak	Post oak
Virginia pine	Black oak	Sassafras
White oak	S. red oak	Red maple
N. red oak	Scarlet oak	Blackgum
Yellow-poplar	Elms	Dogwood
	Sweetgum	Sourwood
		Persimmon

Description of Landtype 3:
Broad Ridges—North Aspect

Geographic Setting—Deep, silty and cherty soils on gently sloping to rolling north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 1. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 15 percent. Soils developed in 2 to 3.5 feet of loess over clayey residuum from limestone some of which is cherty. Chert constitutes as much as 35 percent of the soil mass and is concentrated in the lower solum. Chert fragments occur on the surface in places.

Dominant Soils—Mountview, Dickson, and Bewleyville.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 6 feet. Dickson soils have a fragipan at depths of 24 to 36 inches.

Texture—Silt loam.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderately low.

Vegetation—White oak, southern red oak, black oak, northern red oak, hickories, blackgum, shortleaf pine, and loblolly pine; occasional scarlet oak, chestnut oak, post oak, yellow-poplar, red maple, black walnut, white ash, black cherry, and Virginia pine. Dogwood, sourwood, sassafras, persimmon, huckleberries, and winged elm are common in the understory.

Table 7.—*Forest management interpretations for Landtype 3: Broad Ridges—North Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	55	123	133
Shortleaf pine	65	(50)	113	119
Virginia pine	65		70	
Upland oaks	70		57	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Medium	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Virginia pine	Post oak
Loblolly pine	Hickories	Sassafras
Black walnut	Chestnut oak	Red maple
White oak	Black oak	Blackgum
N. red oak	S. red oak	Dogwood
Yellow-poplar	Scarlet oak	Sourwood
Black cherry		Persimmon
White ash		

Description of Landtype 4:
Broad Ridges—South Aspect

Geographic Setting—Deep, silty and cherty soils on gently sloping to rolling south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 1. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 15 percent. South-facing ridges tend to be somewhat steeper and have shallower soils with a higher chert content than north-facing ridges. Soils developed in 2 to 3.5 feet of loess over clayey residuum from limestone, some of which is cherty. Chert constitutes as much as 35 percent of the soil mass and is concentrated in the lower solum. Chert fragments occur on the surface in places.

Dominant Soils—Mountview, Dickson, and Bewleyville.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 6 feet. Dickson soils have a fragipan at depths of 24 to 36 inches.

Texture—Silt loam.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—Medium to low.

Soil Fertility—Moderately low.

Vegetation—Southern red oak, scarlet oak, post oak, white oak, chestnut oak, hickories, blackgum, shortleaf pine, loblolly pine, and Virginia pine; occasional black oak, red maple, yellow-poplar, and eastern redcedar. Sassafras, sourwood, dogwood, huckleberries, persimmon, and winged elm are common in the understory.

Table 8.—*Forest management interpretations for Landtype 4: Broad Ridges—South Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75	50	114	117
Shortleaf pine	60	(45)	102	102
Virginia pine	60		46	
Upland oaks	65		51	
Yellow-poplar	80		71	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	White oak	Post oak
Virginia pine	Chestnut oak	Winged elm
Yellow-poplar	Black oak	Sassafras
	S. red oak	Red maple
	Scarlet oak	Blackgum
		Dogwood
		Sourwood
		Persimmon

Description of Landtype 5: Cherty North Slopes

Geographic Setting—Moderately deep to deep, silty and clayey soils that are mostly cherty on gently sloping to very steep north-facing linear or nearly linear midslopes in Subregion 1. This landtype lies between the narrow winding ridgetops, broad undulating uplands, and broad ridgetops and convex upper slopes (Landtypes 1, 2, 3, 12, 13, and 14) and the lower concave footslopes, terraces, and bottoms of streams and creeks (Landtypes 9 and 10) or footslopes, terraces, and floodplains of major river bottoms (Landtypes 42 and 47). Slope ranges from 6 to 60 percent. Chert fragments and limestone outcrops are common on the surface. As much as 85 percent of the soil mass may be coarse fragments.

Dominant Soils—Bodine and Fullerton. Talbott soils are also common in an irregular band east of the Tennessee River in Wayne and Perry Counties, Tennessee (Soil Association D12).

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 60 inches to cherty limestone under Bodine and Fullerton soils and 20 to 40 inches to limestone under Talbott soils.

Texture—Cherty silt loam, cherty loam, and silt loam. Eroded areas have finer texture.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—High to medium. Irrigated by subsurface flow.

Soil Fertility—Moderate to moderately low.

Vegetation—White oak, black oak, southern red oak, yellow-poplar, northern red oak, hickories, blackgum, red maple; occasional scarlet oak, chestnut oak, post oak, elms, white ash, black walnut, black cherry, eastern redcedar, American beech, sugar maple, shortleaf pine, loblolly pine, and Virginia pine. Dogwood, sassafras, persimmon, eastern hophornbeam, American hornbeam, sourwood, eastern redbud, devil's club, euonymus, hydrangea, and huckleberries are common in the understory.

Table 9.—*Forest management interpretations for Landtype 5: Cherty North Slopes* *Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75	55	114	133
Shortleaf pine	65	45	113	102
Virginia pine	70		92	
E. redcedar	50		...	
Black oak, S. red oak	70		52	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Medium	Slight to moderate	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Post oak	American hornbeam
Virginia pine	Chestnut oak	E. hophornbeam
Black walnut	Black oak	American beech
White oak	S. red oak	Sassafras
N. red oak	Scarlet oak	E. redbud
Yellow-poplar	Elms	Maples
Black cherry		Blackgum
White ash		Dogwood
		Sourwood
		Persimmon

Description of Landtype 6:
Cherty South Slopes

Geographic Setting—Moderately deep to deep, silty and clayey soils that are mostly cherty on gently sloping to very steep south-facing linear or nearly linear midslopes in Subregion 1. This landtype lies between the narrow winding ridgetops, broad undulating uplands, and broad ridges and convex upper slopes (Landtypes 1, 2, 4, 12, 13, and 15) and the lower concave footslopes, terraces, and bottoms of streams and creeks (Landtypes 9 and 10) or footslopes, terraces, and floodplains of major river bottoms (Landtypes 42 and 47). Slope ranges from 6 to 60 percent. Chert fragments and limestone outcrops are common on the surface. As much as 85 percent of the soil mass may be coarse fragments. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes.

Dominant Soils—Bodine and Fullerton. Talbott soils are common in an irregular band east of the Tennessee River in Wayne and Perry Counties, Tennessee (Soil Association D12).

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 60 inches to cherty limestone under Bodine and Fullerton soils and 20 to 40 inches to limestone under Talbott soils.

Texture—Cherty silt loam, cherty loam, and silt loam. Eroded areas have finer texture.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Medium to low.

Soil Fertility—Moderately low.

Vegetation—White oak, scarlet oak, chestnut oak, post oak, hickories, black oak, southern red oak, eastern redcedar, loblolly pine, Virginia pine, and shortleaf pine; occasional red maple, elms, blackgum, and yellow-poplar. Sourwood, dogwood, huckleberries, euonymus, winged elm, sassafras, and wild plum are common in the understory.

Table 10.—*Forest management interpretations for Landtype 6: Cherty South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65	55	95	133
Shortleaf pine	55	(45)	90	102
Virginia pine	60		53	
E. redcedar	40		...	
Chestnut oak Scarlet oak	55		38	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	White oak	Post oak
Virginia pine	Chestnut oak	Winged elm
	Black oak	Red maple
	S. red oak	Blackgum
	Scarlet oak	Dogwood
	Elms	Sourwood
	Yellow-poplar	

Description of Landtype 7: Shaly North Slopes

Geographic Setting–Moderately deep to deep, silty soils that are shaly or cherty and situated on long strongly sloping to very steep north-facing linear to concave slopes above streams (Landtypes 9 and 10) that have cut deeply into the Highland Rim plateau in Subregion 1. These shaly north slopes occur below ridges and convex upper slopes (Landtypes 1 and 3) and cherty sideslopes (Landtype 5). Landtype 7 differs from Landtype 16 in Subregion 2 (Highland Rim-Nashville Basin transition) in that the streams have not cut down into phosphatic limestone. Slope ranges from 15 to 50 percent. Outcrops of shale and limestone are common but not extensive. Fifty percent or more of the soil mass may be shale, chert, or limestone fragments.

Dominant Soils–Sulphura and an undefined soil that is 3 to 4 feet to interbedded chert and shale.

Bedrock–Shale and thin lenses of limestone.

Depth to Bedrock–1 to 4 feet.

Texture–Shaly silt loam. In places cherty material has drifted downslope.

Soil Drainage–Well drained to excessively drained.

Relative Soil Water Supply – High to medium. Irrigated by subsurface flow.

Soil Fertility–Moderate to moderately low.

Vegetation–White oak, black oak, southern red oak, yellow-poplar, blackgum, red maple, northern red oak, and hickories; occasional scarlet oak, chestnut oak, elms, white ash, black walnut, black cherry, American beech, sugar maple, black locust, eastern redcedar, loblolly pine, shortleaf pine, and Virginia pine. Dogwood, sassafras, eastern hophornbeam, winged elm, American hornbeam, sourwood, huckleberries, eastern redbud, euonymus, and huckleberries are common in the understory.

Table 11.—*Forest management interpretations for Landtype 7: Shaly North Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65		95	
Shortleaf pine	55		90	
Virginia pine	55		41	
E. redcedar	35		...	
White oak	55		38	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Severe	Moderate	Severe	Moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Chestnut oak	American hornbeam
Virginia pine	Black oak	E. hophornbeam
Black walnut	S. red oak	American beech
White oak	Scarlet oak	Winged elm
N. red oak	Elms	Sassafras
Yellow-poplar		E. redbud
Black cherry		Black locust
White ash		Maples
		Blackgum
		Dogwood
		Sourwood

Description of Landtype 8: Shaly South Slopes

Geographic Setting–Moderately deep to deep, silty soils that are shaly or cherty and situated on long strongly sloping to very steep south-facing linear to concave slopes above streams (Landtypes 9 and 10) that have cut deeply into the Highland Rim plateau in Subregion 1. These shaly south slopes occur below the ridges and convex upper slopes (Landtypes 1 and 4) and cherty sideslopes (Landtype 6). Landtype 8 differs from Landtype 17 in Subregion 2 (Highland Rim-Nashville Basin transition) in that the streams have not cut down into phosphatic limestone. Slope ranges from 15 to 50 percent. Outcrops of shale and limestone are common but not extensive. Fifty percent or more of the soil mass may be shale, chert, or limestone fragments. South-facing slopes tend to be steeper and have shallower soils with higher rock content than north-facing slopes.

Dominant Soils–Sulphura and an undefined soil that is 3 to 4 feet to interbedded chert and shale.

Bedrock–Shale and thin lenses of limestone.

Depth to Bedrock–1 to 4 feet.

Texture–Shaly silt loam. In places cherty material has drifted downslope.

Soil Drainage–Well drained to excessively drained.

Relative Soil Water Supply–Low. Irrigated by subsurface flow but south slopes dry quickly.

Soil Fertility–Low.

Vegetation–White oak, scarlet oak, chestnut oak, hickories, southern red oak, black oak, eastern redcedar, loblolly pine, shortleaf pine, and Virginia pine; occasional elms, yellow-poplar, blackgum, American beech, white ash, sugar maple, black walnut, black cherry, and red maple. Dogwood, sassafras, sourwood, winged elm, huckleberries, eastern hophornbeam, American hornbeam, and euonymus are common in the understory.

Table 12.—*Forest management interpretations for Landtype 8: Shaly South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	60		86	
Shortleaf pine	50		79	
Virginia pine	50		<41	
E. redcedar	30		...	
White oak	50		32	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Severe	Moderate to severe	Severe	Moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Black walnut	E. redcedar
Loblolly pine	Hickories	American hornbeam
Virginia pine	Chestnut oak	E. hophornbeam
White oak	Black oak	American beech
S. red oak	Scarlet oak	Winged elm
	Elms	Sassafras
	Yellow-poplar	Maples
	Black cherry	Blackgum
	White ash	Dogwood
		Sourwood

Description of Landtype 9: Footslopes, Terraces, Streambottoms, and Upland Depressions With Good Drainage

Geographic Setting—Deep and very deep, silty and loamy soils with good drainage on level to steep concave footslopes, terraces, and streambottoms, and in upland depressions in Subregion 1. Slope ranges from 0 to 45 percent. This landtype typically occurs below Landtypes 5 to 8 as long, narrow strips along intermittent drainages and as level bottomlands along permanent streams. It may also occur as small isolated depressions in Landtypes 3 and 4. When Landtypes 9 and 10 are adjacent, Landtype 9 occupies a higher position on the landscape.

Dominant Soils—Cherty Minvale, Humphreys, Ennis, Cannon, and Lobelville, and the noncherty Etowah, Emory, Choccolocco, Pruitton, and Staser.

Parent Material—Alluvium from cherty limestone, limestone, and loess.

Depth to Bedrock—5 to 15 feet.

Texture – Cherty silt loam, cherty loam, silt loam, loam, and rarely silty clay loam and fine sandy loam.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—High. Irrigated by subsurface drainage.

Soil Fertility—Moderately high.

Vegetation—White oak, yellow-poplar, southern red oak, northern red oak, blackgum, hickories, sweetgum, red maple, and American sycamore; occasional cottonwood, elms, American beech, hackberry, black oak, eastern redcedar, black walnut, black cherry, white ash, sugar maple, loblolly pine, shortleaf pine, and Virginia pine. Dogwood, cane, winged elm, persimmon, American hornbeam, eastern hophornbeam, eastern redbud, huckleberries, sassafras, sourwood, pawpaw, euonymus, hawthorns, and hydrangea are common in the understory.

Table 13.—*Forest management interpretations for Landtype 9: Footslopes, Terraces, Streambottoms, and Upland Depressions with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90	55	144	133
Shortleaf pine	75	(50)	136	120
Virginia pine	70		92	
Upland oaks	80		62	
Yellow-poplar	100		107	
Sweetgum	90		81	
Cottonwood	95		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Shortleaf pine	E. redcedar
Cottonwood	Virginia pine	American hornbeam
Black walnut	Hickories	E. hophornbeam
N. red oak	White oak	American beech
Yellow-poplar	Black oak	Winged elm
Sweetgum	S. red oak	Hackberry
American sycamore	Elms	Sassafras
Black cherry		E. redbud
White ash		Maples
		Blackgum
		Dogwood
		Sourwood
		Persimmon

Description of Landtype 10: Terraces, Streambottoms, and Upland Depressions with Poor Drainage

Geographic Setting—Deep and very deep, silty and loamy soils with poor drainage on level to nearly level terraces and streambottoms, and in upland depressions in Subregion 1. Slope ranges from 0 to 2 percent. This landtype typically occurs below Landtypes 5 to 8 as long, narrow strips along intermittent drainages and as level bottomlands along permanent streams and creeks. It may also occur as small isolated depressions in Landtypes 3 and 4. When Landtypes 9 and 10 are adjacent, Landtype 10 occupies a lower position on the landscape.

Dominant Soils—Cherty Lee and noncherty Chenneby.

Parent Material—Alluvium from cherty limestone, limestone, and loess.

Depth to Bedrock—More than 5 feet.

Texture—Cherty silt loam, cherty loam, and silt loam.

Soil Drainage—Somewhat poorly drained to poorly drained.

Relative Soil Water Supply—Very high to high. Irrigated by subsurface flow. Seasonal water table.

Soil Fertility—Moderately high.

Vegetation—Sweetgum, elms, blackgum, red maple, American sycamore, and white oak; occasional willow oak, water oak, silver maple, cottonwood, green ash, yellow-poplar, loblolly pine, black willow, American beech, and hickories. Alder, witch-hazel, cane, hydrangea, dogwood, and huckleberries are common in the understory.

Table 14.—*Forest management interpretations for Landtype 10: Terraces, Streambottoms, and Upland Depressions with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	95		156	
Bottomland oaks	95		...	
Yellow-poplar	100		107	
Sweetgum	95		93	
White oak	90		>62	
American sycamore	100		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Moderate to severe	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	Black willow
Cottonwood	White oak	American beech
Willow oak	Elms	Maples
Water oak	Yellow-poplar	Blackgum
Sweetgum	American sycamore	Dogwood
Green ash		

Description of Landtype 11: Limestone Rockland and Shallow Soils

Geographic Setting—Small to extensive areas of limestone outcrops interspersed with patches of shallow to moderately deep, clayey soils on gently sloping to moderately steep ridgetops and slopes, along incised streams, and in sinkholes in Subregions 1, 2, and 3. This intricate pattern of soils and rockland occurs in association with many landtypes. Eastern redcedar often dominates this landtype. Slope ranges from 1 to 40 percent. Soil mass may contain up to 35 percent limestone slabs. More than 50 percent of the surface may be exposed limestone rock. Where the exposed rock is extensive, it is often terraced, but the slope of each terrace is nearly horizontal.

Dominant Soils—Barfield, Gladeville, Fairmount, and Corydon, and Limestone Rockland. Barfield and Gladeville soils have a thermic temperature regime and are common to Alabama and Tennessee; Fairmount and Corydon soils have a mesic temperature regime and are common to Kentucky. Pockets of moderately deep Talbott (thermic), Fredonia (mesic), and Caneyville (mesic) soils may occur in this landtype.

Bedrock—Limestone.

Depth to Bedrock—Mostly less than 20 inches but ranges up to 40 inches where Talbott, Fredonia, and Caneyville soils occur.

Texture—Silt loam, silty clay loam, and silty clay.

Soil Drainage—Well drained to excessively drained.

Relative Soil Water Supply—Low. Seepage is common in wet weather but the soil dries quickly.

Soil Fertility—Moderate.

Vegetation—Eastern redcedar, hickories, hackberry, rock elm, chinkapin oak, and post oak; occasional bur oak, honeylocust, Virginia pine, blackjack oak, blue ash, and white ash. Forbs, grasses, sumac, eastern redbud, winged elm, osage-orange, buckthorn, hawthorns, and prickly pear are common in the understory.

Table 15.—*Forest management interpretations for Landtype 11: Limestone Rockland and Shallow Soils.* *Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
E. redcedar	40		...	
Virginia pine	55		41	
Upland oaks	(55)		43	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Severe	Moderate to severe	Moderate to severe	Moderate to severe

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Virginia pine	Hickories	Blackjack oak
E. redcedar	Bur oak	Winged elm
	Post oak	Hackberry
	Chinkapin oak	Osage-orange
	Rock elm	E. redbud
	White ash	Honeylocust
	Blue ash	

Description of Landtype 12: Broad Silty Uplands

Geographic Setting—Deep, silty soils on gently sloping to strongly sloping broad uplands in Subregions 1, 2, and 3. Slope ranges from 1 to 15 percent but is commonly 6 percent or less, and aspect is not a dominant site factor. This landtype occurs mostly in Landtype Association C where it may exceed 0.25 mile in width. Extensive areas with greater slope should be classified as Landtypes 3 or 4. In Landtype Association E, this landtype generally is 250 to 500 feet wide and occupies the scattered higher portions of the knobby landscape in association with the predominant steep, narrow ridges (Landtype 1). In Landtype Association G, this landtype is of limited extent and occupies the higher and broader portions of the karst plain in association with Landtypes 23, 24, and 25.

Dominant Soils—Mountview and Dickson.

Bedrock—Cherty limestone.

Depth to Bedrock—More than 6 feet. Dickson soils have fragipans at depths ranging from 24 to 36 inches.

Texture—Silt loam.

Soil Drainage—Well drained and moderately well drained.

Relative Soil Water Supply—Low to medium.

Soil Fertility—Moderately low.

Vegetation—Southern red oak, post oak, scarlet oak, blackjack oak, hickories, white oak, and blackgum; occasional chestnut oak, black oak, eastern redcedar, black cherry, elms, shortleaf pine, Virginia pine, loblolly pine, yellow-poplar, sweetgum, and red maple. Dogwood, huckleberries, sourwood, sassafras, and winged elm are common in the understory.

Table 16.—*Forest management interpretations for Landtype 12: Broad Silty Uplands. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	(50)	123	117
Shortleaf pine	65	(40)	113	84
Virginia pine	60		53	
Upland oaks	70		52	
Yellow-poplar	(75)		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	White oak	Blackjack oak
Virginia pine	Post oak	Elms
Black oak	Chestnut oak	Sassafras
S. red oak	Yellow-poplar	Red maple
Scarlet oak	Sweetgum	Blackgum
	Black cherry	Dogwood
		Sourwood

Description of Landtype 13:
Broad Undulating Uplands

Geographic Setting–Deep, silty and clayey soils on nearly level to gently sloping uplands in Subregion 1. Slope generally does not exceed 6 percent, and aspect is not a dominant site factor. This landtype may be 0.5 mile or more wide. Typically it occupies the highest part of the landscape and grades into Landtypes 5 and 6. Sinkholes and depressions are common.

Dominant Soils–Bewleyville, Curtistown, Decatur, Dewey, and Waynesboro.

Bedrock–Limestone.

Depth to Bedrock–More than 5 feet.

Texture–Silt loam, loam, silty clay loam; some chert in the lower horizons.

Soil Drainage–Well drained.

Relative Soil Water Supply–High to medium.

Soil Fertility–Moderately low.

Vegetation–Southern red oak, scarlet oak, white oak, black oak, yellow-poplar, hickories, elms, red maple, and eastern redcedar; occasional American beech, black walnut, loblolly pine, shortleaf pine, Virginia pine, white ash, black cherry, and hackberry. Dogwood, persimmon, sassafras, red mulberry, and sourwood are common in the understory.

Table 17.—*Forest management interpretations for Landtype 13: Broad Undulating Uplands. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	(50)	123	117
Shortleaf pine	75		136	
Virginia pine	75		120	
E. redcedar	45		...	
S. red oak	70		52–62	
White oak	75			
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Black oak	American beech
Virginia pine	S. red oak	Hackberry
Black walnut	Scarlet oak	Red mulberry
White oak	Elms	Sassafras
Yellow-poplar		Red maple
Black cherry		Dogwood
White ash		Sourwood
		Persimmon

Description of Landtype 14:
Broad Ridges—North Aspect

Geographic Setting—Deep, mostly clayey soils on gently sloping to hilly north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 1. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 25 percent. In Fullerton soils chert constitutes as much as 35 percent of the soil mass. When the land is cleared, erosion is a problem on the steeper parts.

Dominant Soils—Decatur, Dewey, and Fullerton.

Bedrock—Limestone.

Depth to Bedrock—More than 5 feet.

Texture—Silt loam, loam, cherty silt loam, and cherty loam; if eroded, silty clay loam, silty clay, or cherty silty clay loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderate to moderately high.

Vegetation—Southern red oak, scarlet oak, white oak, black oak, red maple, hickories, yellow-poplar, and eastern redcedar; occasional American beech, elms, white ash, black walnut, black cherry, loblolly pine, shortleaf pine, and Virginia pine. Dogwood, persimmon, sassafras, sourwood, and red mulberry are common in the understory.

Table 18.—*Forest management interpretations for Landtype 14: Broad Ridges—North Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75	(55)	114	133
Shortleaf pine	70		125	
Virginia pine	70		92	
E. redcedar	50		...	
White oak	70		52	
S. red oak	70			
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Black oak	American beech
Virginia pine	Scarlet oak	Red mulberry
Black walnut	Elms	Sassafras
White oak		Red maple
S. red oak		Dogwood
Yellow-poplar		Sourwood
Black cherry		Persimmon
White ash		

Description of Landtype 15:
Broad Ridges—South Aspect

Geographic Setting—Deep, mostly clayey soils on gently sloping to hilly south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 1. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 25 percent. South-facing ridges tend to be somewhat steeper and have shallower soils than north-facing ridges. In Fullerton soils chert constitutes as much as 35 percent of the soil mass. When the land is cleared, erosion is a problem on the steeper parts.

Dominant Soils—Decatur, Dewey, and Fullerton.

Bedrock—Limestone.

Depth to Bedrock—More than 5 feet.

Texture—Silt loam, loam, cherty silty loam, and cherty loam; if eroded, silty clay loam, silty clay, or cherty silty clay loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderate to moderately high.

Vegetation—Southern red oak, scarlet oak, hickories, white oak, black oak, and eastern redcedar; occasional yellow-poplar, chestnut oak, post oak, red maple, elms, loblolly pine, shortleaf pine, and Virginia pine. Dogwood, persimmon, sassafras, sourwood, and huckleberries are common in the understory.

Table 19.—*Forest management interpretations for Landtype 15: Broad Ridges—South Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	70	(50)	104	117
Shortleaf pine	65		113	
Virginia pine	65		70	
E. redcedar	40		...	
White oak	65		48	
S. red oak	65			

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Post oak	Sassafras
Virginia pine	Chestnut oak	Red maple
White oak	Black oak	Dogwood
S. red oak	Scarlet oak	Sourwood
	Elms	Persimmon
	Yellow-poplar	

Description of Landtype 16: North Slopes

Geographic Setting–Moderately deep to deep, silty and clayey, soils that are mostly shaly or cherty and situated on north-facing linear to concave midslopes and lower slopes in Subregion 2. This landtype lies between the high broad uplands or narrow winding ridges and knoblike hills and adjoining convex upper slopes (Landtypes 1 and 12) and lower slopes, terraces and streambottoms (Landtypes 18 and 19). Slope ranges from 2 to 50 percent but is mainly 20 to 40 percent. Sulphura soils contain 10 to 25 percent shale and chert fragments in the topsoil and 35 to 55 percent in the subsoil. Dellrose soils contain 10 to 35 percent chert fragments.

Dominant Soils–Sulphura, Dellrose, and Mimosa. Sulphura soils formed in a thin mantle of cherty material of high silt content over residuum from shale. Dellrose soils formed in cherty medium-textured creep more than 5 feet thick. Mimosa soils formed mostly in clayey residuum from limestone that was moderate to high in phosphates. Sulphura soils lie as narrow strips below Bodine and Fullerton soils and above Dellrose soils, which lie above Mimosa soils.

Bedrock–Shale and phosphatic limestone.

Depth to Bedrock–20 to 40 inches to shale; 60 to 80 or more inches to phosphatic limestone.

Texture–Cherty silt loam, cherty loam, or silt loam.

Soil Drainage–Somewhat excessively drained and well drained.

Relative Soil Water Supply–Medium to high. Irrigated by subsurface flow. Seeps occur in places.

Soil Fertility–Moderate to moderately high.

Vegetation–White oak, black oak, northern red oak, yellow-poplar, hickories, blackgum, elms, red maple, and American beech; occasional chestnut oak, scarlet oak, southern red oak, black walnut, white ash, black cherry, cucumbertree, hackberry, black locust, sassafras, eastern redcedar, and loblolly pine. Dogwood, eastern redbud, American hornbeam, eastern hophornbeam, devil's club, pawpaw, huckleberries, and euonymus are common in the understory.

Table 20.—*Forest management interpretations for Landtype 16: North Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75		114	
N. red oak	75		52–57	
White oak	(70)			
Yellow-poplar	100		107	
Hickories	(75)		...	
Black walnut	(75)		...	
White ash	(75)		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Slight to moderate	Slight to moderate	Moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	E. redcedar
Black walnut	Chestnut oak	American hornbeam
White oak	Black oak	E. hophornbeam
N. red oak	S. red oak	American beech
Yellow-poplar	Scarlet oak	Hackberry
Black cherry	Elms	Sassafras
White ash	Cucumbertree	E. redbud
		Black locust
		Maples
		Blackgum
		Dogwood
		Sourwood

Description of Landtype 17: South Slopes

Geographic Setting–Moderately deep to deep, silty and clayey soils that are mostly shaly or cherty and situated on south-facing linear to concave midslopes and lower slopes in Subregion 2. This landtype lies between the high broad uplands or narrow winding ridges and knoblike hills and adjoining convex upper slopes (Landtypes 1 and 12) and lower slopes, terraces, and streambottoms (Landtypes 18 and 19). Slope ranges from 2 to 50 percent but is mainly 20 to 40 percent. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes. Sulphura soils contain 10 to 25 percent shale and chert fragments in the topsoil and 35 to 55 percent in the subsoil. Dellrose soils contain 10 to 35 percent chert fragments.

Dominant Soils–Sulphura, Dellrose, and Mimosa. Sulphura soils formed in a thin mantle of cherty material of high silt content over residuum from shale. Dellrose soils formed in cherty medium-textured creep more than 5 feet thick. Mimosa soils formed mostly in residuum from limestone that was moderate to high in phosphates. Sulphura soils lie as narrow strips below Bodine and Fullerton soils and above Dellrose soils, which lie above Mimosa soils.

Bedrock–Shale and phosphatic limestone.

Depth to Bedrock–20 to 40 inches to shale; 60 to 80 or more inches to phosphatic limestone.

Texture–Cherty silt loam, cherty loam, or silt loam.

Soil Drainage–Somewhat excessively drained and well drained.

Relative Soil Water Supply–Medium. Irrigated by subsurface flow.

Soil Fertility–Moderate.

Vegetation–White oak, scarlet oak, southern red oak, black oak, chestnut oak, and hickories; occasional red maple, blackgum, elms, black locust, chinkapin oak, yellow-poplar, American beech, black walnut, black cherry, sugar maple, white ash, eastern redcedar, and loblolly pine. Dogwood, sassafras, sourwood, eastern redbud, and hawthorns are common in the understory.

Table 21.—*Forest management interpretations for Landtype 17: South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65		95	
Upland oaks	60		43	
E. redcedar	45		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate	Slight to moderate	Slight to moderate	Moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	E. redcedar	American beech
White oak	Black walnut	Sassafras
Black oak	Hickories	E. redbud
S. red oak	Chestnut oak	Black locust
	Chinkapin oak	Maples
	Scarlet oak	Blackgum
	Elms	Dogwood
	Yellow-poplar	Sourwood
	Black cherry	
	White ash	

Description of Landtype 18: Footslopes, Terraces, and Streambottoms with Good Drainage

Geographic Setting—Deep, mostly silty soils with good drainage on level to strongly sloping footslopes, terraces, and streambottoms in Subregion 2. Slope ranges from 0 to 12 percent. This landtype typically occurs below Landtypes 16, 17, 21 and 22 as long, narrow strips along intermittent drainages and as level bottomlands along permanent streams. When Landtypes 18 and 19 are adjacent, Landtype 18 occupies a higher position on the landscape.

Dominant Soils—Armour, Britton, Arrington, Egam, and Lynnville.

Parent Material—Mostly alluvium washed from soils developed in residuum from phosphatic limestone. Armour soils developed in 2 to 4 feet of loess over alluvium.

Depth to Bedrock—4 to 15 feet to phosphatic limestone.

Texture—Silt loam and silty clay loam.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—High. Footslopes irrigated by subsurface flow. Terraces and bottoms subject to occasional flooding.

Soil Fertility—High to moderately high.

Vegetation—White oak, northern red oak, red maple, blackgum, southern red oak, hickories, sweetgum, and American sycamore; occasional American beech, elms, hackberry, yellow-poplar, sugar maple, cottonwood, boxelder, river birch, black cherry, black walnut, white ash, eastern redcedar, shortleaf pine, and loblolly pine. Dogwood, cane, osage-orange, and euonymus are common in the understory.

Table 22.—*Forest management interpretations for Landtype 18: Footslopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90		144	
Shortleaf pine	80		148	
White oak	80		62	
S. red oak	80			
Yellow-poplar	100		107	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Elms	River birch
Cottonwood	American sycamore	American beech
Black walnut		Hackberry
White oak		Osage-orange
N. red oak		Maples
S. red oak		Blackgum
Yellow-poplar		Dogwood
Sweetgum		
Black cherry		
White ash		

Description of Landtype 19:
Terraces and Streambottoms with Poor Drainage

Geographic Setting—Deep, mostly clayey soils with poor drainage on level to gently sloping terraces and streambottoms in Subregion 2. Slope ranges from 0 to 5 percent. This landtype typically occurs below landtypes 16, 17, 21, and 22 as long, narrow strips along intermittent drainages and on level bottomlands along permanent streams. When Landtypes 18 and 19 are adjacent, Landtype 19 occupies a lower position on the landscape.

Dominant Soils—Godwin, Lanton, and Mhoon.

Parent Material—Alluvium washed from soils developed in residuum from phosphatic limestone and a variable amount of loess.

Depth to Bedrock—More than 5 feet to phosphatic limestone.

Texture—Silt loam and silty clay loam.

Soil Drainage—Somewhat poorly drained to poorly drained.

Relative Soil Water Supply—High to very high. Soils have a seasonally fluctuating water table and are subject to occasional flooding.

Soil Fertility—High.

Vegetation—Willow oak, water oak, sweetgum, red maple, blackgum, green ash, and American sycamore; occasional boxelder, elms, white ash, yellow-poplar, cottonwood, hickories, and loblolly pine. Dogwood and cane are common in the understory.

Table 23.—*Forest management interpretations for Landtype 19: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90		144	
Water oak	90		...	
Sweetgum	95		93	
Cottonwood	105		...	
Green ash	90		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Moderate to severe	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	Red maple
Cottonwood	Elms	Boxelder
Willow oak	Yellow-poplar	Blackgum
Water oak	American sycamore	Dogwood
Sweetgum	White ash	
Green ash		

Description of Landtype 20: Low Broad Ridges

Geographic Setting—Deep, silty and clayey soils on nearly level to sloping broad, smooth tops of low-lying hills below the surrounding higher ridges and slopes (Landtypes 1, 5–8, and 12) in Subregion 2. Slope ranges from 0 to 10 percent but is usually 6 percent or less, and aspect is not a dominant site factor. Soils developed in 2 feet or less of loess over old alluvium or in old valley fill and residuum from phosphatic limestone.

Dominant Soils—Maury and Harpeth. Soils classified as Maury soils in the Nashville Basin are slightly warmer than the range defined for the series. But, because they are so similar in morphology, composition, and behavior to soils of the Maury series they are considered taxadjuncts to that series.

Bedrock—Phosphatic limestone.

Depth to Bedrock—5 to 15 feet.

Texture—Silt loam and silty clay loam. Some chert fragments occur in the lower horizons of Maury soils.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderately high to high.

Vegetation—White oak, northern red oak, black oak, hickories, sugar maple, scarlet oak, southern red oak, elms, white ash, and eastern redcedar; occasional hackberry, American beech, chinkapin oak, honeylocust, Kentucky coffeetree, yellow-poplar, black cherry, black walnut, shortleaf pine, and loblolly pine. Winged elm, persimmon, eastern redbud, and sassafras are common in the understory.

Table 24.—*Forest management interpretations for Landtype 20: Low Broad Ridges. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90		144	
Shortleaf pine	80		148	
E. redcedar	50		...	
N. red oak	80		62	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Chinkapin oak	American beech
Black walnut	Black oak	Winged elm
White oak	S. red oak	Hackberry
N. red oak	Scarlet oak	Sassafras
Yellow-poplar	Elms	E. redbud
Black cherry	Sugar maple	Kentucky coffeetree
White ash		Honeylocust
		Persimmon

Description of Landtype 21: North Slopes and Narrow Ridges

Geographic Setting–Deep, clayey soils on north-facing linear and concave midslopes and lower slopes in Subregion 2. Slope ranges from 2 to 35 percent. This landtype usually occurs below landtype 20. When Landtype 21 occurs in association with low narrow ridges, all land up to the ridge crest is included. Landtypes 18 and 19 occur below this landtype. Soils developed in old valley fill and clayey residuum from phosphatic limestone. The top 2 feet of Braxton soils may contain as much as 30 percent chert fragments, and the surface layer of Mimosa soils may contain as much as 15 percent chert fragments.

Dominant Soils–Braxton and Mimosa. Limestone outcrops are associated with Mimosa soils.

Bedrock–Phosphatic limestone.

Depth to Bedrock–40 to more than 80 inches.

Texture–silt loam, silty clay loam, and cherty silt loam.

Soil Drainage–Well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderate to moderately high.

Vegetation–White oak, northern red oak, black oak, hickories, sugar maple, scarlet oak, southern red oak, elms, white ash, and eastern redcedar; occasional hackberry, American beech, chinkapin oak, honeylocust, Kentucky coffeetree, yellow-poplar, black cherry, black walnut, and loblolly pine. Winged elm, persimmon, eastern redbud, and sassafras are common in the understory.

Table 25.—*Forest management interpretations for Landtype 21: North Slopes and Narrow Ridges. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80		123	
E. redcedar	50		...	
Upland oaks	70		52	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	E. redcedar
Black walnut	Chinkapin oak	American beech
White oak	Black oak	Winged elm
N. red oak	S. red oak	Hackberry
Yellow-poplar	Scarlet oak	Sassafras
Black cherry	Elms	E. redbud
White ash	Sugar maple	Kentucky coffeetree
		Honeylocust
		Persimmon

Description of Landtype 22:
South Slopes and Narrow Ridges

Geographic Setting–Deep, clayey soils on south-facing linear and concave midslopes and lower slopes in Subregion 2. Slope ranges from 2 to 35 percent. This landtype usually occurs below Landtype 20. When Landtype 22 occurs in association with low, narrow ridges, all land up to the ridge crest is included. Landtypes 18 and 19 occur below this landtype. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes. Soils developed in old valley fill and clayey residuum from phosphatic limestone. As much as 30 percent of the top 2 feet of Braxton soils, and as much as 15 percent of the surface layer of Mimosa soils may be chert fragments.

Dominant Soils–Braxton and Mimosa. Limestone outcrops are associated with Mimosa soils.

Bedrock–Phosphatic limestone.

Depth to Bedrock–40 to more than 80 inches.

Texture–Silt loam, silty clay loam, and cherty silt loam.

Soil drainage–Well drained.

Relative Soil Water Supply–Medium to low.

Soil Fertility–Moderate to moderately high.

Vegetation–White oak, post oak, hickories, chinkapin oak, scarlet oak, and eastern redcedar; occasional honeylocust, chestnut oak, sugar maple, hackberry, American beech, Kentucky coffeetree, and loblolly pine. Winged elm, persimmon, eastern redbud, and sassafras are common in the understory.

Table 26.—*Forest management interpretations for Landtype 22: South Slopes and Narrow Ridges. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	70		104	
E. redcedar	45		...	
Upland oaks	60		43	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	E. redcedar	American beech
White oak	Hickories	Winged elm
Chestnut oak	Post oak	Sassafras
Scarlet oak	Chinkapin oak	E. redbud
		Kentucky coffeetree
		Honeylocust
		Sugar maple
		Persimmon

Description of Landtype 23: Broad Undulating Uplands

Geographic Setting—Deep, mostly silty soils on nearly level to sloping broad uplands pitted with sinkholes and depressions in Subregion 3. Slope ranges from 1 to 10 percent but is commonly 6 percent or less, and aspect is not a dominant site factor. Soils developed in 1.5 to 4 feet of loess over residuum from limestone or in old alluvium. Volume of chert is negligible in the upper solum and ranges up to 15 percent in the lower solum below the discontinuity.

Dominant Soils—Pembroke, Crider, Nicholson, and Cumberland.

Bedrock—Limestone.

Depth to Bedrock—4 to 13 feet. Nicholson soils have fragipans at depths ranging from 16 to 30 inches.

Texture—Silt loam. Silty clay loam and clay loam in severely eroded areas.

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderately high to high.

Vegetation—Black oak, white oak, southern red oak, scarlet oak, hickories, red maple, northern red oak, and elms; occasional yellow-poplar, American beech, bur oak, hackberry, black walnut, black cherry, white ash, sugar maple, eastern redcedar, shortleaf pine, Virginia pine, and loblolly pine. Eastern hophornbeam, persimmon, dogwood, and sassafras are common in the understory.

Table 27.—*Forest management interpretations for Landtype 23: Broad Undulating Uplands. Footnotes Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80		123	
Shortleaf pine	80		148	
Virginia pine	80		158	
N. red oak	85		52->62	
White oak	70			
Yellow-poplar	95		98	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Scarlet oak	American beech
Black walnut	Elms	Hackberry
White oak	Sugar maple	Sassafras
N. red oak		Red maple
Black oak		Dogwood
S. red oak		Persimmon
Yellow-poplar		
Black cherry		
White ash		

Description of Landtype 24:
Broad Ridges–North Aspect

Geographic Setting–Deep, silty and clayey soils on sloping to moderately steep north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 3. Sinkholes and depressions are common. Landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 20 percent. Soils developed in residuum from cherty limestone, old alluvium, or in 1.5 to 4 feet of loess over residuum from limestone. Volume of chert is 15 percent or less and concentrated in the lower solum, except Baxter soils, which may contain as much as 35 percent.

Dominant Soils–Pembroke, Baxter, Crider, Bewleyville, and Cumberland.

Bedrock–Limestone and cherty limestone.

Depth to Bedrock–5 to 10 feet.

Texture–Silt loam and cherty silt loam; if eroded, silty clay loam or cherty silty clay loam.

Soil Drainage–Well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderately high.

Vegetation–White oak, black oak, northern red oak, hickories, yellow-poplar, red maple, and elms; occasional southern red oak, scarlet oak, bur oak, American beech, black walnut, sugar maple, white ash, black cherry, eastern redcedar, shortleaf pine, Virginia pine, and loblolly pine. Sassafras, dogwood, persimmon, and eastern hophornbeam are common in the understory.

Table 28.—*Forest management interpretations for Landtype 24: Broad Ridges—North Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	(55)	123	133
Shortleaf pine	70		125	
Virginia pine	75		120	
E. redcedar	40		...	
N. red oak	90		52->62	
White oak	70			
Yellow-poplar	95		98	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Black oak	American beech
Black walnut	S. red oak	Sassafras
White oak	Scarlet oak	Red maple
N. red oak	Elms	Dogwood
Yellow-poplar	Sugar maple	Persimmon
Black cherry		
White ash		

Description of Landtype 25:
Broad Ridges–South Aspect

Geographic Setting–Deep, silty and clayey soils on sloping to moderately steep south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 3. Sinkholes and depressions are common. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 20 percent. South-facing portions of ridges tend to be somewhat steeper and have shallower soils with a higher chert content than north-facing portions. Soils developed in residuum from cherty limestone, old alluvium, or in 1.5 to 4 feet of loess over residuum from limestone. Volume of chert is 15 percent or less and concentrated in the lower solum, except Baxter soils, which may contain as much as 35 percent.

Dominant Soils–Pembroke, Baxter, Crider, Bewleyville, and Cumberland.

Bedrock–Limestone and cherty limestone

Depth to Bedrock–5 to 10 feet.

Texture–Silt loam and cherty silt loam; if eroded, silty clay loam or cherty silty clay loam.

Soil Drainage–Well drained.

Relative Soil Water Supply–Medium to low.

Soil Fertility–Moderate to moderately high.

Vegetation–Black oak, white oak, scarlet oak, southern red oak, hickories, and eastern redcedar; occasional chestnut oak, bur oak, yellow-poplar, red maple, hackberry, elms, white ash, sugar maple, black walnut, black cherry, shortleaf pine, Virginia pine, and loblolly pine. Eastern hophornbeam, persimmon, dogwood, and sassafras are common in the understory.

Table 29.—*Forest management interpretations for Landtype 25: Broad Ridges—South Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	70	(50)	104	117
Shortleaf pine	(60)		102	
Virginia pine	65		70	
E. redcedar	35		...	
N. red oak	75		43–57	
White oak	60			
Yellow-poplar	(80)		71	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Chestnut oak	Hackberry
Black walnut	Scarlet oak	Sassafras
White oak	Elms	Maples
Black oak		Dogwood
S. red oak		Persimmon
Yellow-poplar		
Black cherry		
White ash		

Description of Landtype 26: Narrow Limestone Ridges and Knoblike Hills

Geographic Setting–Shallow to moderately deep, clayey soils on gently sloping to steep crests of knoblike hills, long narrow ridgetops, and adjoining convex to linear short slopes in Subregion 3. Short slopes extending down to stream terraces (Landtypes 31 and 32) are included. Slope ranges from 6 to 50 percent. This landtype is common to soil association D3 on the general soil map of Kentucky. Limestone outcrops may be extensive enough to recognize Landtype 11 (Limestone Rockland and Shallow Soils).

Dominant Soils–Hagerstown, Fredonia, and Caneyville.

Bedrock–Limestone.

Depth to Bedrock–20 inches to 5 feet.

Texture–Silt loam. Silty clay loam and silty clay in severely eroded areas.

Soil Draingage–Well drained.

Relative Soil Water Supply–Medium to low.

Soil Fertility–Moderate.

Vegetation–Southern red oak, post oak, hickories, hackberry, and eastern redcedar; occasional honeylocust, chinkapin oak, scarlet oak, sugar maple, black oak, white oak, and northern red oak. Eastern redbud, winged elm, sumac, and sassafras are common in the understory.

Table 30.—*Forest management interpretations for Landtype 26: Narrow Limestone Ridges and Knoblike Hills. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
E. redcedar	45		...	
Black oak	80		52–62	
N. red oak	70			
Scarlet oak	70			

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Moderate	Moderate to severe	Moderate to severe	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
White oak	E. redcedar	Winged elm
N. red oak	Hickories	Sassafras
Black oak	Post oak	E. redbud
S. red oak	Chinkapin oak	Honeylocust
	Scarlet oak	
	Hackberry	
	Sugar maple	

Description of Landtype 27: Upland Flats, Depressions, and Sinkholes with Good Drainage

Geographic Setting—Deep, silty soils with good drainage on level to gently sloping upland flats and depressions, and in sinkholes in Subregions 1 and 3. Landtype 28 occurs in association with broad silty uplands, broad undulating uplands, and broad ridges (Landtypes 12, 13, 23, 24, and 25). Slope is less than 6 percent. Flats and depressions may approach 20 acres in size; level bottoms of sinkholes are usually smaller.

Dominant Soils—Sango, Epley, Lindside, and Nolin. Thermic Sango soils are associated with Landtype 12 and 13 in Subregion 1. The other three soils are mesic and associated with Landtypes 23, 24, and 25 in Subregion 3.

Parent Material—Alluvium from limestone and loess, and loess over residuum from cherty limestone.

Depth to Bedrock—More than 4 feet. Sango soils have a fragipan at depths to 25 to 34 inches.

Texture—Silt loam; occasional silty clay loam and loam.

Soil Drainage—Moderately well drained to well drained.

Relative Soil Water Supply—High.

Soil Fertility—Moderate to moderately high.

Vegetation—White oak, southern red oak, black oak, hickories, red maple, northern red oak, scarlet oak, sweetgum, yellow-poplar, and elms; occasional black cherry, black walnut, white ash, sugar maple, American sycamore, American beech, bur oak, and eastern redcedar. Dogwood, sourwood, huckleberries, sassafras, and winged elm are common in the understory.

Table 31.—*Forest management interpretations for Landtype 27: Upland Flats, Depressions, and Sinkholes with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	85		52->62	
White oak	85			
Scarlet oak	70			
Yellow-poplar	90		90	
Sweetgum	85		70	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Black walnut	Hickories	E. redcedar
N. red oak	Bur oak	American beech
S. red oak	Black oak	Winged elm
White oak	Scarlet oak	Sassafras
Yellow-poplar	Elms	Maples
Sweetgum	American sycamore	Dogwood
Black cherry		Sourwood
White ash		

Description of Landtype 28: Upland Flats, Depressions, and Sinkholes with Poor Drainage

Geographic Setting–Deep, silty soils with poor drainage on nearly level upland flats and depressions, and in sinkholes in Subregions 1 and 3. Landtype 28 occurs within broad silty uplands, broad undulating uplands, and broad ridges (Landtypes 12, 13, 23, 24, and 25). Slope is less than 3 percent. Flats and depressions may approach 20 acres in size; level bottoms of sinkholes are usually smaller.

Dominant Soils–Taft, Guthrie, Robertsville, Lawrence, and Newark. Thermic Taft and Guthrie soils are found in association with Landtypes 12 and 13 in Subregion 1, while mesic Robertsville, Lawrence, and Newark soils are associated with Landtypes 23, 24, and 25 in Subregion 3.

Parent Material–Alluvium from limestone and loess, and loess over residuum from cherty limestone.

Depth to Bedrock–More than 5 feet. All soils but Newark have fragipans at depths of 20 to 40 inches.

Texture–Silt loam; occasional silty clay loam and loam.

Soil Drainage–Somewhat poorly drained to poorly drained.

Relative Soil Water Supply–High to very high. Often flooded for short periods during winter and spring.

Soil Fertility–Moderate to moderately high.

Vegetation–Willow oak, blackgum, sweetgum, red maple, yellow-poplar, and elms; occasional hickories, American sycamore, Shumard oak, southern red oak, white oak, boxelder, green ash, cottonwood, and hackberry. Dogwood, azalea, alder, huckleberries, euonymus, and cane are common in the understory.

Table 32.—*Forest management interpretations for Landtype 28: Upland Flats, Depressions, and Sinkholes with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Upland oaks	75		57	
Bottomland oaks	90		...	
Yellow-poplar	95		98	
Sweetgum	85		70	
Cottonwood	95		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Hackberry
Shumard oak	White oak	Red maple
Willow oak	S. red oak	Boxelder
Yellow-poplar	Elms	Blackgum
Sweetgum	Green ash	Dogwood
American sycamore		

Description of Landtype 29: North Slopes

Geographic Setting—Deep, clayey soils on short, steep north-facing slopes between broad undulating uplands and ridges (Landtypes 23 and 24) and terraces and bottoms of permanent streams (Landtypes 31 and 32) or sinkholes and depressions (Landtypes 27 and 28) in Subregion 3. Also included in this landtype are north-facing portions of funnel-shaped sinkholes that have little or no level bottoms. Slope ranges from 10 to 60 percent. Limestone outcrops in places. Soils developed in clayey residuum from cherty limestone and old alluvium. Volume of chert ranges up to 45 percent.

Dominant Soils—Baxter and Cumberland.

Bedrock—Limestone or cherty limestone.

Depth to Bedrock—More than 5 feet.

Texture—Cherty silt loam and silt loam. Silty clay loam and silty clay in severely eroded areas.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderately high.

Vegetation—White oak, black oak, northern red oak, hickories, yellow-poplar, red maple, and elms; occasional southern red oak, scarlet oak, American beech, bur oak, black walnut, black cherry, white ash, sugar maple, eastern redcedar, shortleaf pine, Virginia pine, and loblolly pine. Dogwood, persimmon, sassafras, and eastern hophornbeam are common in the understory.

Table 33.—*Forest management interpretations for Landtype 29: North Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	80	(65)	123	162
Shortleaf pine	75		136	
Virginia pine	70		92	
E. redcedar	40		...	
N. red oak	90		52->62	
White oak	70			
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Moderate to severe	Moderate to severe	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Black oak	American beech
Black walnut	S. red oak	Sassafras
White oak	Elms	Red maple
N. red oak	Sugar maple	Dogwood
Yellow-poplar		Persimmon
Black cherry		
White ash		

Description of Landtype 30: South Slopes

Geographic Setting—Deep, clayey soils on short, steep south-facing slopes between broad undulating uplands and ridges (Landtypes 23 and 25) and terraces and bottoms of permanent streams (Landtypes 31 and 32) or sinkholes and depressions (Landtypes 27 and 28) in Subregion 3. Also included in this landtype are south-facing portions of funnel-shaped sinkholes that have little or no level bottoms. Slope ranges from 10 to 60 percent. South-facing slopes tend to be somewhat steeper and have shallower soils with a higher chert content than north-facing slopes. Limestone outcrops in places. Soils developed in clayey residuum from cherty limestone and old alluvium. Volume of chert ranges up to 45 percent.

Dominant Soils—Baxter and Cumberland.

Bedrock—Limestone or cherty limestone.

Depth to Bedrock—More than 5 feet.

Texture—Cherty silt loam and silt loam. Silty clay loam and silty clay in severely eroded areas.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderate.

Vegetation—Black oak, white oak, scarlet oak, northern red oak, southern red oak, hickories, and eastern redcedar; occasional chestnut oak, post oak, bur oak, yellow-poplar, red maple, elms, American beech, white ash, black walnut, black cherry, sugar maple, shortleaf pine, Virginia pine, and loblolly pine. Dogwood, persimmon, eastern hophornbeam, and sassafras are common in the understory.

Table 34.—*Forest management interpretations for Landtype 30: South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	70		104	
Shortleaf pine	65		113	
Virginia pine	65		70	
E. redcedar	35		...	
N. red oak	80		62	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Slight to moderate	Moderate to severe	Moderate to severe	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Post oak	American beech
Black walnut	Chestnut oak	Sassafras
White oak	Black oak	Maples
N. red oak	Scarlet oak	Dogwood
S. red oak	Elms	Persimmon
Yellow-poplar		
Black cherry		
White ash		

Description of Landtype 31: Terraces and Streambottoms with Good Drainage

Geographic Setting–Deep, silty and loamy soils with good drainage on level to strongly sloping terraces and streambottoms in Subregion 3. Slope ranges from 0 to 12 percent. This landtype occurs below Landtypes 29 and 30 along intermittent and permanent drainages. When Landtypes 31 and 32 are adjacent, Landtype 31 occupies a higher position on the landscape.

Dominant Soils–Elk, Statler, Otwell, and Ashton on terraces, and Nolin, Staser, Huntington, Lindside, and Hamblen on streambottoms.

Parent Material–Mixed alluvium of varying age washed from soils formed in loess and residuum weathered mostly from limestone, and in places, from sandstone, shale, and siltstone.

Depth to Bedrock–4 to 10 feet. Otwell soils have a fragipan at a depth of about 26 inches.

Texture–Silt loam and loam; occasional silty clay loam.

Soil Drainage–Well drained to moderately well drained.

Relative Soil Water Supply–High.

Soil Fertility–Moderate to moderately high.

Vegetation–White oak, sweetgum, yellow-poplar, red maple, northern red oak, hickories, southern red oak, American sycamore, and blackgum; occasional black oak, Shumard oak, cottonwood, elms, American beech, hackberry, black cherry, black walnut, white ash, sugar maple, eastern redcedar, and shortleaf pine. Dogwood, cane, persimmon, euonymus, pawpaw, eastern redbud, and sassafras are common in the understory.

Table 35.—*Forest management interpretations for Landtype 31: Terraces and Streambottoms with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY				
Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Shortleaf pine	75		136	
N. red oak	85		57->62	
White oak	75			
Yellow-poplar	95		98	
Shumard oak	95		...	
Sweetgum	80		60	

MANAGEMENT PROBLEMS				
Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Cottonwood	Shortleaf pine	E. redcedar
Black walnut	Hickories	American beech
White oak	Black oak	Sassafras
N. red oak	S. red oak	E. redbud
Shumard oak	Elms	Maples
Yellow-poplar	Hackberry	Blackgum
Sweetgum		Dogwood
American sycamore		Persimmon
Black cherry		
White ash		

Description of Landtype 32: Terraces and Streambottoms with Poor Drainage

Geographic Setting—Deep, mostly silty soils with poor drainage on level to gently sloping terraces and streambottoms in Subregion 3. Slope ranges from 0 to 3 percent. This landtype occurs below Landtypes 29 and 30 along permanent and intermittent drainages. When Landtypes 31 and 32 are adjacent, Landtype 32 occupies a lower position on the landscape.

Dominant Soils—Lawrence on terraces and Newark, Melvin, and Dunning on streambottoms.

Parent Material—Mixed alluvium of varying age washed from soils formed in loess and residuum weathered mostly from limestone, and in places, from sandstone, shale, and siltstone.

Depth to Bedrock—More than 5 feet. Lawrence soils have a fragipan at a depth of about 25 inches.

Texture—Silt loam, silty clay loam, and loam.

Soil Drainage—Somewhat poorly drained to very poorly drained.

Relative Soil Water Supply—High to very high.

Soil Fertility—Moderate to moderately high.

Vegetation—Willow oak, sweetgum, pin oak, red maple, blackgum, green ash, and American sycamore; occasional American beech, silver maple, elms, yellow-poplar, cottonwood, hickories, and black willow. Dogwood, cane, huckleberries, and alder are common in the understory.

Table 36.—*Forest management interpretations for Landtype 32: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Pin oak	95		...	
Yellow-poplar	90		90	
Sweetgum	90		81	
Cottonwood	95		...	
Bottomland oaks	(90)		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight to severe	Moderate to severe	Slight	Slight to moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Black willow
Pin oak	Elms	American beech
Willow oak	Yellow-poplar	Maples
Sweetgum	American sycamore	Blackgum
Green ash		Dogwood

Description of Landtype 33: Broad Ridges–North Aspect

Geographic Setting–Deep, silty soils on sloping to moderately steep north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 3. Surface drainage network is more developed than in Landtype 24. Many small streams drain the area, but sinks and depressions are common. Landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 20 percent. Soils developed in a thin cap of loess over residuum from limestone, interbedded limestone, calcareous shale, and siltstone, or old alluvium. Near the heads of streams there is no level bottom, and this landtype extends down to the stream channel. Further downstream Landtype 35 (north slopes) normally occurs between this landtype and terraces and streambottoms (Landtypes 31 and 32). Volume of chert is 15 percent or less and concentrated in the lower solum below the discontinuity.

Dominant Soils–Crider and Nicholson.

Bedrock–Limestone interbedded with calcareous shale and siltstone in places.

Depth to Bedrock–4 to 13 feet. Nicholson soils have fragipans at depths of 16 to 30 inches.

Texture–Silt loam.

Soil Drainage–Well drained to moderately well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderately high.

Vegetation–White oak, northern red oak, black oak, southern red oak, hickories, red maple, and yellow-poplar; occasional scarlet oak, bur oak, American beech, elms, hackberry, white ash, black cherry, black walnut, sugar maple, eastern redcedar, shortleaf pine, and Virginia pine. Sassafras, dogwood, persimmon, huckleberries, winged elm, sourwood, and eastern hophornbeam are common in the understory.

Table 37.—*Forest management interpretations for Landtype 33: Broad Ridges—North Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	80		62	
Yellow-poplar	95		98	
Shortleaf pine	80		148	
Virginia pine	80		158	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Black walnut	Shortleaf pine	E. redcedar
White oak	Virginia pine	E. hophornbeam
N. red oak	Hickories	American beech
Yellow-poplar	Bur oak	Winged elm
Black cherry	Black oak	Sassafras
White ash	S. red oak	Maples
	Scarlet oak	Dogwood
	Elms	Sourwood
	Hackberry	Persimmon

Description of Landtype 34:
Broad Ridges–South Aspect

Geographic Setting–Deep, silty soils on sloping to moderately steep south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 3. Surface drainage network is more developed than in Landtype 26. Many small streams drain the area, but sinks and depressions are common. Landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 20 percent. Soils developed in a thin cap of loess over residuum from limestone, interbedded limestone, calcareous shale, and siltstone, or old alluvium. South-facing portions of ridges tend to be somewhat steeper and have shallower soils with a higher chert content than north-facing portions. Near the heads of streams there is no level bottom, and this landtype extends down to the stream channel. Further downstream Landtype 36 (South slopes) normally occurs between this landtype and terraces and streambottoms (Landtypes 31 and 32). Volume of chert is 15 percent or less and concentrated in the lower solum below the discontinuity.

Dominant Soils–Crider and Nicholson.

Bedrock–Limestone interbedded with calcareous shale and siltstone in places.

Depth to Bedrock–4 to 13 feet. Nicholson soils have fragipans at depths of 16 to 30 inches.

Texture–Silt loam.

Soil Drainage–Well drained to moderately well drained.

Relative Soil Water Supply–Medium to low.

Soil Fertility–Moderate to moderately high.

Vegetation–Scarlet oak, white oak, chestnut oak, post oak, hickories, blackgum, and eastern redcedar; occasional black oak, northern red oak, bur oak, southern red oak, red maple, yellow-poplar, elms, white ash, sugar maple, black cherry, black walnut, shortleaf pine, and Virginia pine. Dogwood, eastern hophornbeam, persimmon, sourwood, sassafras, and huckleberries are common in the understory.

Table 38.—*Forest management interpretations for Landtype 34: Broad Ridges—South Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	75		57	
Yellow-poplar	85		80	
Shortleaf pine	75		136	
Virginia pine	75		120	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	Bur oak	E. hophornbeam
Black walnut	Post oak	Sassafras
White oak	Chestnut oak	Red maple
N. red oak	Black oak	Blackgum
S. red oak	Scarlet oak	Dogwood
Yellow-poplar	Elms	Sourwood
Black cherry		Persimmon
White ash		

Description of Landtype 35: North Slopes

Geographic Setting–Deep, mostly silty and loamy soils on sloping to steep north-facing linear and concave midslopes and lower slopes in Subregion 3. Slope ranges from 6 to 30 percent. This landtype usually occurs below Landtypes 23 and 33. When this landtype occurs in association with low narrow ridges (250 feet wide or less), all land up to the crest is included. Landtypes 31 and 32 (Terraces and streambottoms) occur below this landtype. Limestone outcrops occur on steeper parts of this landtype and may be extensive enough to recognize Landtype 11 (Limestone rockland and shallow soils). Chert fragments range from 0 to 15 percent below the lithologic discontinuity in Crider soils. Small amounts of chert are common in the upper solum and increase with depth in Vertress soils. Geodes and pebbles and cobblestones of sandstone or quartzite occur in Waynesboro soils.

Dominant Soils–Crider, Vertress, and Waynesboro.

Bedrock–Limestone interbedded with shale and siltstone.

Depth to Bedrock–5 to 8 feet or more.

Texture–Silt loam, silty clay loam, loam, and fine sandy loam.

Soil Drainage–Well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderate.

Vegetation–White oak, black oak, northern red oak, southern red oak, hickories, yellow-poplar, red maple, and blackgum; occasional scarlet oak, chinkapin oak, bur oak, black walnut, white ash, black cherry, sugar maple, elms, American beech, eastern redcedar, shortleaf pine, and Virginia pine. Dogwood, sassafras, eastern hophornbeam, persimmon, and eastern redbud are common in the understory.

Table 39.—*Forest management interpretations for Landtype 35: North Slopes. Footnotes appear on page 118.*

PRODUCTIVITY				
Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	90		90	
Black oak	80		≥62	
N. red oak	85			
White oak	80			
Chinkapin oak	80			
Shortleaf pine	75		136	
Virginia pine	75		120	

MANAGEMENT PROBLEMS				
Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight to moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	Bur oak	E. hophornbeam
Black walnut	Chinkapin oak	American beech
White oak	S. red oak	Sassafras
N. red oak	Scarlet oak	E. redbud
Black oak	Elms	Maples
Yellow-poplar		Blackgum
Black cherry		Dogwood
White ash		Persimmon

Description of Landtype 36: South Slopes

Geographic Setting—Deep, mostly silty and loamy soils on sloping to steep south-facing linear and concave midslopes and lower slopes in Subregion 3. Slope ranges from 6 to 30 percent. This landtype usually occurs below Landtypes 23 and 34. When this landtype occurs in association with low narrow ridges (250 feet wide or less), all land up to the crest is included. Landtypes 31 and 32 (Terraces and streambottoms) occur below this landtype. Limestone outcrops occur on steeper parts of this landtype and may be extensive enough to recognize Landtype 11 (Limestone rockland and shallow soils). South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes. Chert fragments range from 0 to 15 percent below the lithologic discontinuity in Crider soils. Small amounts of chert are common in the upper solum and increase with depth in Vertress soils. Geodes and pebbles and cobblestones of sandstone and quartzite occur in Waynesboro soils.

Dominant Soils—Crider, Vertress, and Waynesboro.

Bedrock—Limestone interbedded with shale and siltstone.

Depth to Bedrock—5 to 8 feet or more.

Texture—Silt loam, silty clay loam, loam, and fine sandy loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Low.

Soil Fertility—Moderately low.

Vegetation—White oak, scarlet oak, chestnut oak, post oak, hickories, southern red oak, and eastern redcedar; occasional bur oak, chinkapin oak, black oak, yellow-poplar, red maple, sugar maple, American beech, Virginia pine, and shortleaf pine. Dogwood, persimmon, sourwood, sassafras, euonymus, winged elm, and eastern redbud are common in the understory.

Table 40.—*Forest management interpretations for Landtype 36: South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	75		63	
Black oak	70			
N. red oak	70			
White oak	70		52	
Chinkapin oak	70			
Shortleaf pine	65		113	
Virginia pine	65		70	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	Bur oak	American beech
White oak	Post oak	Winged elm
Chinkapin oak	Chestnut oak	Sassafras
N. red oak	Scarlet oak	E. redbud
Black oak	Yellow-poplar	Maples
S. red oak		Dogwood
		Sourwood
		Persimmon

Description of Landtype 37: Broad Undulating Uplands

Geographic Setting–Deep, loamy soils on nearly level to sloping broad uplands in Subregion 3. Slope ranges from 0 to 10 percent but is commonly 6 percent or less, and aspect is not a dominant site factor. Soils formed in 18 to 30 inches of loess over unconsolidated material of sandstone and shale origin. Volume of coarse fragments is 5 percent in the lower solum.

Dominant Soils–Sonora and Gatton.

Bedrock–Limestone.

Depth to Bedrock–More than 5 feet. Gatton soils have a fragipan at depths of 20 to 30 inches.

Texture–Silt loam.

Soil Drainage–Moderately well drained to well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderate.

Vegetation–White oak, southern red oak, black oak, northern red oak, hickories, red maple, and elms; occasional scarlet oak, bur oak, chinkapin oak, yellow-poplar, black walnut, American beech, blackgum, sugar maple, eastern redcedar, and shortleaf pine. Dogwood, persimmon, sassafras, and sourwood are common in the understory.

Table 41.—*Forest management interpretations for Landtype 37: Broad Undulating Uplands. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	85		80	
Upland oaks	70		52	
Shortleaf pine	70		125	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to moderate	Slight	Slight	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Black walnut	Bur oak	American beech
White oak	Chinkapin oak	Sassafras
N. red oak	Scarlet oak	Maples
Black oak	Elms	Blackgum
S. red oak		Dogwood
Yellow-poplar		Sourwood
		Persimmon

Description of Landtype 38:
Broad Ridges–North Aspect

Geographic Setting–Deep, loamy soils on gently sloping to strongly sloping north-facing portions of broad ridges and adjoining convex upper slopes in Subregion 3. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 12 percent. Soils formed in 18 to 30 inches of loess over unconsolidated material of sandstone and shale origin. Volume of coarse fragments is 5 percent or less in the lower solum.

Dominant Soils–Sonora and Gatton.

Bedrock–Limestone.

Depth to Bedrock–More than 5 feet. Gatton soils have a fragipan at depths of 20 to 30 inches.

Texture–Silt loam.

Soil Drainage–Moderately well drained to well drained.

Relative Soil Water Supply–Medium to high.

Soil Fertility–Moderate to moderately high.

Vegetation–White oak, black oak, northern red oak, southern red oak, hickories, red maple, yellow-poplar, elms, and red maple; occasional scarlet oak, American beech, sugar maple, black walnut, black cherry, white ash, bur oak, and shortleaf pine. Dogwood, sassafras, persimmon, sourwood, and eastern hophornbeam are common in the understory.

Table 42.—*Forest management interpretations for Landtype 38: Broad Ridges—North Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	90		90	
Upland oaks	75		57	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Black walnut	Shortleaf pine	American beech
White oak	Hickories	Sassafras
N. red oak	Bur oak	Maples
Black oak	Scarlet oak	Dogwood
S. red oak	Elms	Sourwood
Yellow-poplar		Persimmon
Black cherry		
White ash		

Description of Landtype 39:
Broad Ridges–South Aspect

Geographic Setting–Deep, loamy soils on gently sloping to strongly sloping south-facing portions of broad ridges and adjoining convex upper slopes in Subregion 3. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point gradient usually increases noticeably. Slope ranges from 6 to 12 percent. Soils formed in 18 to 30 inches of loess over unconsolidated material of sandstone and shale origin. South-facing portions of ridges tend to be somewhat steeper and have shallower soils with a higher coarse fragment content than north-facing portions. Volume of coarse fragments is 10 percent or less in the lower solum.

Dominant Soils–Sonora and Gatton.

Bedrock–Limestone.

Depth to Bedrock–More than 5 feet. Gatton soils have a fragipan at depths of 20 to 30 inches.

Texture–Silt loam.

Soil Drainage–Moderately well drained to well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderate.

Vegetation–Scarlet oak, white oak, chestnut oak, post oak, hickories, blackgum, and eastern redcedar; occasional bur oak, black oak, southern red oak, northern red oak, elms, yellow-poplar, sugar maple, American beech, black walnut, black cherry, and shortleaf pine. Dogwood, persimmon, sassafras, sourwood, huckleberries, and winged elm are common in the understory.

Table 43.—*Forest management interpretations for Landtype 39: Broad Ridges—South Aspect. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	80		71	
Upland oaks	65		48	
Shortleaf pine	65		113	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Black walnut	Bur oak	American beech
White oak	Post oak	Winged elm
N. red oak	Chestnut oak	Sassafras
Black oak	Scarlet oak	Sugar maple
S. red oak	Elms	Blackgum
Yellow-poplar		Dogwood
Black cherry		Sourwood
		Persimmon

Description of Landtype 40: North Slopes

Geographic Setting–Deep, loamy and clayey soils on gently sloping to steep north-facing linear and concave midslopes and lower slopes in Subregion 3. Slope ranges from 6 to 30 percent but is usually less than 20 percent. This landtype usually occurs below Landtypes 37 and 38. When this landtype occurs in association with low narrow ridges (250 feet wide or less), all land up to the crest is included. Landtypes 31 and 32 (terraces and streambottoms) occur below this landtype. Geodes, quartzitic pebbles, and sandstone fragments occur throughout the soil mass, but typically increase with depth. As much as 20 percent of the lower solum may be coarse fragments.

Dominant Soils–Riney and Waynesboro.

Bedrock–Soft sandstone and shale.

Depth to Bedrock–4 to 10 feet or more.

Texture–Loam and fine sandy loam.

Soil Drainage–Well drained.

Relative Soil Water Supply–Medium.

Soil Fertility–Moderate to moderately low.

Vegetation–White oak, black oak, southern red oak, northern red oak, yellow-poplar, hickories, red maple, and blackgum; occasional bur oak, scarlet oak, elms, black walnut, black cherry, white ash, sugar maple, American beech, eastern redcedar, and shortleaf pine. Sassafras, dogwood, persimmon, and eastern hophornbeam are common in the understory.

Table 44.—*Forest management interpretations for Landtype 40: North Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	80		57–62	
White oak	75			
Yellow-poplar	90		90	
Shortleaf pine	80		148	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Black walnut	Shortleaf pine	E. redcedar
White oak	Hickories	E. hophornbeam
N. red oak	Bur oak	American beech
Black oak	Scarlet oak	Sassafras
S. red oak	Elms	Maples
Yellow-poplar		Blackgum
Black cherry		Dogwood
White ash		Persimmon

Description of Landtype 41: South Slopes

Geographic Setting—Deep, loamy and clayey soils on gently sloping to steep south-facing linear and concave midslopes and lower slopes in Subregion 3. Slope ranges from 6 to 30 percent but is usually less than 20 percent. This landtype usually occurs below Landtypes 37 and 39. When this landtype occurs in association with low narrow ridges (250 feet wide or less), all land up to the ridge crest is included. Landtypes 31 and 32 (terraces and streambottoms) occur below this landtype. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes. Geodes, quartzitic pebbles, and sandstone fragments occur throughout the soil mass, but typically increase with depth. As much as 20 percent of the lower solum may be coarse fragments.

Dominant Soils—Riney and Waynesboro.

Bedrock—Soft sandstone and shale.

Depth to Bedrock—4 to 10 feet or more.

Texture—Loam and fine sandy loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Low to medium.

Soil Fertility—Moderately low.

Vegetation—White oak, scarlet oak, chestnut oak, post oak, hickories, southern red oak, and eastern redcedar; occasional chinkapin oak, bur oak, American beech, black oak, yellow-poplar, sugar maple, red maple, Virginia pine, and shortleaf pine. Dogwood, persimmon, sassafras, winged elm, and eastern redbud are common in the understory.

Table 45.—*Forest management interpretations for Landtype 41: South Slopes. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	70		48–52	
White oak	(65)			
Yellow-poplar	70		54	
Shortleaf pine	70		125	
Virginia pine	75		120	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	Bur oak	American beech
White oak	Post oak	Winged elm
Black oak	Chestnut oak	Sassafras
S. red oak	Chinkapin oak	E. redbud
Yellow-poplar	Scarlet oak	Maples
		Dogwood
		Sourwood

Description of Landtype 42: Terraces and Floodplains with Good Drainage

Geographic Setting–Deep, mostly silty and loamy alluvial soils with good drainage on level to rolling terraces and floodplains along the Tennessee River in Subregion 4. Slope ranges from 0 to 12 percent. On floodplains this landtype occurs in stringers paralleling the river in association with Landtype 43, which has poor soil drainage.

Dominant Soils–Wolftever, Sequatchie, Captina, and Statler on terraces, and Egam, Huntington, Bruno, Lindside, Hamblen, and Staser on floodplains.

Parent Material–Mixed alluvium of variable age washed from soils formed in residuum weathered mostly from limestone, sandstone, and shale, and, in places, loess.

Depth to Bedrock–5 to 15 feet.

Texture–Mostly silt loam, silty clay loam, and loam except Bruno, which is sandy loam and loamy sand.

Soil Drainage–Well drained to moderately well drained. Bruno soils are excessively drained.

Relative Soil Water Supply–High. Low areas flood occasionally.

Soil Fertility–Moderately high to high.

Vegetation–White oak, southern red oak, sweetgum, yellow-poplar, blackgum, elms, red maple, and hickories; occasional willow oak, water oak, river birch, American sycamore, American beech, silver maple, black willow, pin oak, hackberry, boxelder, black oak, Shumard oak, cherrybark oak, cottonwood, northern red oak, black cherry, white ash, black walnut, white basswood, loblolly pine, honeylocust, persimmon, sassafras, and water tupelo. Dogwood, cane, hawthorn, sumac, American hornbeam, eastern hophornbeam, American holly, huckleberries, grape, pawpaw, euonymus, bladdernut, and red mulberry are common in the understory.

Table 46.—*Forest management interpretations for Landtype 42: Terraces and Floodplains with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	100		107	
Sweetgum	95		93	
Upland oaks	80		62	
Loblolly pine	90		144	
Bottomland oaks	95		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight to moderate	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	Black willow
Cottonwood	Black oak	River birch
Black walnut	S. red oak	American hornbeam
White oak	Pin oak	E. hophornbeam
N. red oak	Elms	American beech
Shumard oak	White basswood	Hackberry
Cherrybark oak		Red mulberry
Willow oak		Sassafras
Water oak		Honeylocust
Yellow-poplar		Maples
Sweetgum		Water tupelo
American sycamore		Blackgum
Black cherry		Dogwood
White ash		Persimmon

Description of Landtype 43: Terraces and Floodplains with Poor Drainage

Geographic Setting–Deep, silty and clayey alluvial soils with poor drainage on level to gently sloping terraces and floodplains along the Tennessee River in Subregion 4. Slope ranges from 0 to 3 percent. On the floodplains this landtype occurs as stringers paralleling the river in association with Landtype 42, which has good soil drainage. Landtype 43 is often wooded, but Landtype 42 is mostly in agriculture.

Dominant Soils–Beason and Robertsville on terraces, and Melvin, Dunning, and Newark on floodplains.

Parent Material–Mixed alluvium of variable age washed from soils formed in residuum weathered mostly from limestone, sandstone, and shale, and, in places, loess.

Depth to Bedrock–5 to 15 feet.

Texture–Silt loam and silty clay loam; occasionally loam.

Soil Drainage–Somewhat poorly drained and poorly drained.

Relative Soil Water Supply–Very high. Soils have a seasonal high water table and are subject to occasional flooding.

Soil Fertility–Moderately high.

Vegetation–Willow oak, water oak, sweetgum, green ash, elms, blackgum, and water tupelo; occasional silver maple, black willow, boxelder, yellow-poplar, American sycamore, loblolly pine, hickories, cottonwood, hackberry, and cypress. Dogwood, cane, grasses, and sedges are common in the understory.

Table 47.—*Forest management interpretations for Landtype 43: Terraces and Floodplains with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	90		98	
Sweetgum	90		81	
Bottomland oaks	(95)		...	
Loblolly pine	80		123	
Green ash	90		...	
Cottonwood	100		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Moderate to severe	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Loblolly pine	Black willow
Willow oak	Baldcypress	Maples
Water oak	Hickories	Blackgum
Yellow-poplar	Elms	Dogwood
Sweetgum	Hackberry	
Green ash	American sycamore	
	Water tupelo	

Description of Landtype 44: Footslopes, Terraces, and Floodplains with Good Drainage

Geographic Setting—Deep, loamy alluvial soils with good drainage on level to steep footslopes, terraces, and floodplains along the Buffalo River in Subregion 4. Slope ranges from 0 to 45 percent but seldom exceeds 25 percent.

Dominant Soils—Minvale, Etowah, and Humphreys on footslopes and terraces, and Ennis, Lobelville, and Cannon on floodplains. All of these soils except Etowah have high chert contents throughout.

Parent Material—Mixed alluvium of variable age washed from soils formed in residuum weathered from cherty limestone and loess.

Depth to Bedrock—5 to 15 feet.

Texture—Cherty silt loam, cherty loam, silt loam, loam, and gravelly silt loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Moderately high to high. Occasionally flooded in winter and early spring.

Soil Fertility—Moderate.

Vegetation—White oak, southern red oak, sweetgum, yellow-poplar, blackgum, elms, red maple, and hickories; occasional willow oak, water oak, river birch, American sycamore, American beech, silver maple, black willow, pin oak, hackberry, boxelder, Shumard oak, cottonwood, black oak, northern red oak, black cherry, white ash, black walnut, loblolly pine, shortleaf pine, honeylocust, persimmon, and sassafras. Dogwood, cane, hawthorn, sumac, American hornbeam, eastern hophornbeam, American holly, huckleberries, grape, pawpaw, euonymus, bladdernut, and red mulberry are common in the understory.

Table 48.—*Forest management interpretations for Landtype 44: Footslopes, Terraces, and Floodplains with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90	(55)	144	133
Shortleaf pine	70		125	
Upland oaks	75		57	
Yellow-poplar	95		98	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Shortleaf pine	Black willow
Cottonwood	Hickories	River birch
Black walnut	Black oak	American hornbeam
White oak	S. red oak	E. hophornbeam
N. red oak	Pin oak	American beech
Shumard oak	Elms	Hackberry
Willow oak	White basswood	Red mulberry
Water oak		Sassafras
Yellow-poplar		Honeylocust
Sweetgum		American holly
American sycamore		Maples
Black cherry		Blackgum
White ash		Dogwood
		Persimmon

Description of Landtype 45: Terraces and Floodplains with Poor Drainage

Geographic Setting–Deep, loamy alluvial soils with poor drainage on nearly level terraces and floodplains along the Buffalo River in Subregion 4. Slope is less than 2 percent.

Dominant Soils–Lee.

Parent Material–Young mixed alluvium washed from soils formed in residuum weathered from cherty limestone and loess.

Depth to Bedrock–5 to 12 feet.

Texture–Cherty silt loam and cherty loam.

Soil Drainage–Poorly drained.

Relative Soil Water Supply–Very high. Low areas flood frequently in winter and spring.

Soil Fertility–Moderate.

Vegetation–Willow oak, water oak, sweetgum, green ash, elms, and blackgum; occasional silver maple, black willow, boxelder, yellow-poplar, American sycamore, hickories, cottonwood, hackberry, and loblolly pine. Dogwood, cane, grasses, and sedges are common in the understory.

Table 49.—*Forest management interpretations for Landtype 45: Terraces and Floodplains with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY				
Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	90		144	
Bottomland oaks	90		...	
Yellow-poplar	90		90	
Sweetgum	90		81	
Cottonwood	(100)		...	

MANAGEMENT PROBLEMS				
Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Severe	Severe	Slight	Slight

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Cottonwood	Loblolly pine	Black willow
Willow oak	Hickories	Maples
Water oak	Elms	Blackgum
Yellow-poplar	Hackberry	Dogwood
Sweetgum	American sycamore	
Green ash		

Description of Landtype 46: Terraces and Floodplains with Good Drainage

Geographic Setting–Deep, silty and clayey alluvial soils with good drainage on level to strongly sloping terraces and floodplains along the Cumberland, Harpeth, Duck, and Elk Rivers in Subregion 4. Slope ranges from 0 to 15 percent. On floodplains this landtype occurs in association with Landtype 47, which has poor drainage.

Dominant Soils–Pickwick, Armour, Nesbitt, Wolftever, and Capshaw on terraces, and Arrington, Staser, Lynnville, Egam, and Lindell on floodplains.

Parent Material–On terraces, soils formed in 2 to 4 feet of silty alluvium or loess underlain by old alluvium or residuum of phosphatic limestone. Parent material on floodplains consists of recent alluvium washed from soils formed in residuum weathered mostly from phosphatic limestone, cherty limestone, and loess, and possibly from shale and sandstone.

Depth to Bedrock–4 to more than 10 feet.

Texture–Silt loam and silty clay loam; occasionally loam and fine sandy loam. Armour, Capshaw, and Lindell soils contain some chert and gravel.

Soil Drainage–Well drained to moderately well drained.

Relative Soil Water Supply–High. Low areas flood occasionally.

Soil Fertility–High to very high.

Vegetation–White oak, southern red oak, sweetgum, yellow-poplar, blackgum, elms, red maple, and hickories; occasional willow oak, water oak, river birch, American sycamore, American beech, silver maple, black willow, pin oak, hackberry, boxelder, Shumard oak, cherrybark oak, cottonwood, black oak, northern red oak, black cherry, white ash, yellow buckeye, black walnut, white basswood, bur oak, honeylocust, persimmon, and sassafras. Dogwood, cane, hawthorn, sumac, American hornbeam, eastern hophornbeam, American holly, huckleberries, grape, pawpaw, euonymus, bladdernut, and red mulberry are common in the understory.

Table 50.—*Forest management interpretations for Landtype 46: Terraces and Floodplains with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	95		98	
Upland oaks	75		57	
Sweetgum	85		70	
Bottomland oaks	85		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Black willow
Black walnut	Bur oak	River birch
White oak	Black oak	American hornbeam
N. red oak	S. red oak	E. hophornbeam
Shumard oak	Pin oak	American beech
Cherrybark oak	Elms	Hackberry
Willow oak	Yellow buckeye	Red mulberry
Water oak	White basswood	Sassafras
Yellow-poplar		Honeylocust
Sweetgum		American holly
American sycamore		Maples
Black cherry		Blackgum
White ash		Dogwood
		Persimmon

Description of Landtype 47: Terraces and Floodplains with Poor Drainage

Geographic Setting–Deep, mostly clayey alluvial soils with poor drainage on level to gently sloping terraces and floodplains along the Cumberland, Harpeth, Duck, and Elk Rivers in Subregion 4. Slope ranges from 0 to 5 percent. On floodplains this landtype occurs in association with Landtype 46, which has good drainage.

Dominant Soils–Beason and Forestdale on terraces and Mhoon and Lanton on floodplains.

Parent Material–On terraces, soils formed in mixed fine-textured alluvium washed from watersheds underlain by sedimentary rocks. Parent material on floodplains consists of recent alluvium washed from soils formed in residuum weathered from phosphatic limestone, cherty limestone, and loess.

Depth to Bedrock–More than 5 feet.

Texture–Silt loam and silty clay loam.

Soil Drainage–Somewhat poorly drained and poorly drained.

Relative Soil Water Supply–High to very high. A fluctuating water table is near the surface part of the time, and the landtype is subject to occasional flooding.

Soil Fertility–High to very high.

Vegetation–Willow oak, water oak, sweetgum, green ash, elms, and blackgum; occasional silver maple, black willow, boxelder, yellow-poplar, American sycamore, pin oak, elms, hickories, cottonwood, and hackberry. Dogwood, cane, grasses, and sedges are common in the understory.

Table 51.—*Forest management interpretations for Landtype 47: Terraces and Floodplains with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	90		90	
Bottomland oaks	90		...	
Sweetgum	90		81	
Green ash	85		...	
Cottonwood	95		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Moderate to severe	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Black willow
Pin oak	Elms	Maples
Willow oak	Hackberry	Blackgum
Water oak	American sycamore	Dogwood
Yellow-poplar		
Sweetgum		
Green ash		

Description of Landtype 48: Footslopes, Terraces, and Floodplains with Good Drainage

Geographic Setting–Deep, silty and loamy alluvial soils with good drainage on level to strongly sloping footslopes, terraces and floodplains along the Green and Barren Rivers in Subregion 4. Slope ranges from 0 to 20 percent but seldom exceeds 12 percent. On the floodplains, this landtype occurs in stringers paralleling the rivers in association with Landtype 49, which has poor soil drainage.

Dominant Soils–Ashton, Elk, and Otwell on the footslopes and terraces, and Huntington, Nolin, and Lindside on the floodplains. Otwell soils have a fragipan at a depth of about 24 inches.

Parent Material–Soils on terraces developed in old mixed alluvium and those on floodplains developed in more recent mixed alluvium washed from areas dominated by sedimentary rocks.

Depth to Bedrock–5 to 20 feet.

Texture–Silt loam and loam; occasional silty clay loam.

Soil Drainage–Well drained to moderately well drained.

Relative Soil Water Supply–High.

Soil Fertility–Moderately high to high.

Vegetation–White oak, southern red oak, sweetgum, yellow-poplar, blackgum, elms, red maple, and hickories; occasional willow oak, river birch, American sycamore, American beech, silver maple, black willow, pin oak, hackberry, boxelder, Shumard oak, cottonwood, black oak, northern red oak, black cherry, white ash, black walnut, bur oak, honeylocust, persimmon, and sassafras. Dogwood, cane, hawthorn, sumac, American hornbeam, eastern hophornbeam, huckleberries, grape, pawpaw, euonymus, bladdernut, and red mulberry are common in the understory.

Table 52.—*Forest management interpretations for Landtype 48: Footslopes, Terraces, and Floodplains with Good Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
N. red oak	85		>62	
White oak	85			
Yellow-poplar	95		98	
Sweetgum	90		81	
Pin oak	100		...	
Shumard oak	95		...	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Slight	Slight to moderate	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Black willow
Black walnut	Bur oak	River birch
White oak	Black oak	American hornbeam
N. red oak	S. red oak	E. hophornbeam
Shumard oak	Elms	American beech
Pin oak		Hackberry
Willow oak		Red mulberry
Yellow-poplar		Sassafras
Sweetgum		Honeylocust
American sycamore		Maples
Black cherry		Blackgum
White ash		Dogwood
		Persimmon

Description of Landtype 49: Terraces and Floodplains with Poor Drainage

Geographic Setting–Deep, silty and clayey alluvial soils with poor drainage on level to gently sloping terraces and floodplains along the Green and Barren Rivers in Subregion 4. Slope ranges from 0 to 3 percent. On floodplains this landtype occurs in stringers paralleling the river in association with Landtype 48, which has good soil drainage.

Dominant Soils–Lawrence and Robertsville on the terraces and Newark, Melvin, Karnack, and Dunning on the floodplains. Lawrence and Robertsville have fragipans at depths of 16 to 34 inches.

Parent Material–Soils on terraces developed in old mixed alluvium or residuum from limestone and loess. Soils on floodplains developed in more recent mixed alluvium washed from areas dominated by sedimentary rocks. Karnack and Dunning soils developed in clayey alluvium deposited by slack water.

Depth to Bedrock–5 to 16 feet or more.

Texture–Silt loam, silty clay loam; occasionally loam or fine sandy loam.

Soil Drainage–Somewhat poorly drained to very poorly drained.

Relative Soil Water Supply–High. Floodplains have seasonal high water tables and are subject to occasional flooding.

Soil Fertility–Moderately high to high.

Vegetation–Willow oak, sweetgum, green ash, elms, and blackgum; occasional silver maple, black willow, boxelder, yellow-poplar, American sycamore, pin oak, hickories, cottonwood, and hackberry. Dogwood, cane, grasses, and sedges are common in the understory.

Table 53.—*Forest management interpretations for Landtype 49: Terraces and Floodplains with Poor Drainage. Footnotes appear on page 118.*

PRODUCTIVITY

Species	Site index		Average annual growth Cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Yellow-poplar	90		90	
Bottomland oaks	95		...	
Pin oak	100		...	
Cottonwood	95		...	
Sweetgum	90		81	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Moderate to severe	Moderate to severe	Slight	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Hickories	Black willow
Pin oak	Elms	Maples
Willow oak	Hackberry	Blackgum
Yellow-poplar	American sycamore	Dogwood
Sweetgum		
Green ash		

FOOTNOTES FOR TABLES 5-53

[1]Site indices for each naturally occurring species, except those enclosed in parentheses, are the means of values from soil survey interpretations issued by the SCS for the dominant soils in each landtype (Beck 1962; Broadfoot 1960, 1963; Broadfoot and Krinard 1959; Nelson and others 1961; Schnur 1937; and U.S. Forest Service 1929). Estimated site indices are enclosed in parentheses. Base age is 50 years for all naturally grown species except cottonwood, for which it is 30 years.

[2]Adapted from Smalley and Bower's (1971) site curves, base age 25 years.

[3] Annual growth of natural stands calculated from published yields at 50 years: Yellow-poplar – (McCarthy 1933, Table 17), inside-bark volume to a 3.0-inch i.b. top, trees >4.5″ d.b.h.; Sweetgum – (Winters and Osborne 1935, Table 13), inside-bark volume to a 4.0-inch i.b. top, trees >4.5″ d.b.h.; Upland oaks – (Schnur 1937, Table 2, Column 12), outside-bark volume to a 4.0-inch o.b. top, trees >4.5″ d.b.h.; Virginia pine – (Nelson and others 1961, Table 4), outside-bark volume to a 4.0-inch o.b. top, trees >3.5″ d.b.h., 100 percent density; Loblolly and shortleaf pines – (U.S. Forest Service 1929, Tables 44 and 108), total volume outside bark, trees >3.5″ d.b.h.

[4] Annual growth of loblolly and shortleaf pine plantations calculated from yields at 40 years assuming 1,000 seedlings planted per acre (Smalley and Bailey 1974a, 1974b), outside-bark volume to a 4.0-inch o.b. top, trees >4.5″ d.b.h.

LITERATURE CITED

Arms, F. S., M. J. Mitchell, F. C. Watts, and B. L. Wilson.
1979. Soil survey of Hardin and Larue Counties, Kentucky. U.S. Dep. Agric., Soil Conserv. Serv., 158 p. + maps.

Bailey, H. H., and J. H. Winsor.
1964. Kentucky soils. Univ. Kentucky Agric. Exp. Stn. Misc. 308, 174 p.

Beck, D. E.
1962. Yellow-poplar site index curves. U.S. Dep. Agric. For. Serv. Res. Note 180, 2p. Southeast. For. Exp. Stn. Asheville, N.C.

Beeman, L. E.
1978. Computer-assisted resource management. *In* Integrated Inventories of Renewable Natural Resources; Proceedings of the Workshop, p. 375–381. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. RM-55. Rocky Mtn. For. and Range Exp. Stn. Fort Collins, Colo.

Broadfoot, W. M.
1960. Field guide for evaluating cottonwood sites. U.S. Dep. Agric. For. Serv. Occas. Pap. 178, 6p. South. For. Exp. Stn. New Orleans, La.

Broadfoot, W. M.
1963. Guide for evaluating water oak sites. U.S. Dep. Agric. For. Serv. Res. Pap. S0-1, 8 p. South For. Exp. Stn. New Orleans, La.

Broadfoot, W. M., and R. M. Krinard.
1959. Guide for evaluating sweetgum sites. U.S. Dep. Agric. For. Serv. Occas. Pap. 176, 6p. South For. Exp. Stn. New Orleans, La.

Edwards, M. J., J. A. Elder, and M. E. Springer.
1974. The soils of the Nashville Basin. Univ. of Tennessee Agric. Exp. Stn. Bull. 499, 125 p.

Elder, J. A., and M. E. Springer.
1978. General soil map, Tennessee. U.S. Dep. Agric., Soil Conserv. Serv. in cooperation with Tenn. Agric. Exp. Stn.

Fenneman, N. M.
1938. Physiography of eastern United States. 714 p. McGraw-Hill Book Co., New York.

Fernald, M. L.
1950. Gray's manual of botany. Ed. 8. 1632 p. Am. Book Co., New York.

Francis, J. K., and N. S. Loftus.
1977. Chemical and physical properties of Cumberland Plateau and Highland Rim forest soils. U.S. Dep. Agric. For. Serv. Res. Pap. SO-138, 44 p. South. For. Exp. Stn. New Orleans, La.

Hajek, B. F., F. L. Gilbert, and C. A. Steers.
1975. Soil associations of Alabama. Agron. and Soils Departmental Series No. 24, 30 p. + map. Agric. Exp. Stn., Auburn Univ. and U.S. Dep. Agric. Soil Conserv. Serv.

Hedlund, A., and J. W. Earles.
1971. Forest statistics for Tennessee counties. U.S. Dep. Agric. For. Serv. Resour. Bull. SO-32, 58 p. South. For. Exp. Stn. New Orleans, La.

Hedlund, A., and J. W. Earles.
1973. Forest statistics for Alabama counties. U.S. Dep. Agric. For. Serv. Resour. Bull. SO-39, 65 p. South For. Exp. Stn. New Orleans, La.

Kingsley, N. P., and D. S. Powell.
1978. The forest resources of Kentucky. U.S. Dep. Agric. For. Serv. Resour. Bull. NE-54, 97 p. Northeast. For. Exp. Stn. Broomall, Pa.

Knetsch, J. L., and J. Smallshaw.
1958. The occurrence of drought in the Tennessee Valley. Bull. T 58-2 AE, 58 p. Tenn. Val. Auth.

Little, E. L., Jr.
1979. Checklist of United States trees (native and naturalized). U.S. Dep. Agric. Handb. 541, 375 p.

McCarthy, E. F.
1933. Yellow poplar characteristics, growth, and management. U.S. Dep. Agric. Tech. Bull. No. 356, 58 p.

Nelson, T. C., J. L. Clutter, and L. E. Chaiken.
1961. Yield of Virginia pine. U.S. Dep. Agric. For. Serv. Stn. Pap. 124, 11 p. Southeast. For. Exp. Stn. Asheville, N.C.

Schnur, G. L.
1937. Yield, stand, and volume tables for even-aged upland oak forests. U.S. Dep. Agric. Tech. Bull. 560, 87 p. (Reprinted 1961).

Smalley, G. W.
1978. Classification and evaluation of forest sites in the Interior Uplands. *In* P. E. Pope (ed.), Proc. Second Cent. Hdwd. For. Conf., Addendum p. Smalley 1-20. Purdue Univ., Ind. November 14-16, 1978.

Smalley, G. W.
1979a. Classification and evaluation of forest sites for timber production: Introduction of a new system for classifying forest sites based on the physical features of the landscape. *In* Forest Soils and Site Quality Workshop, p. 28-47. Auburn Univ., Alabama, May 8-9, 1979.

Smalley, G. W.
1979b. Classification and evaluation of forest sites on the southern Cumberland Plateau. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. SO-23, 59 p. South. For. Exp. Stn. New Orleans, La.

Smalley, G. W., and R. L. Bailey.
1974a. Yield tables and stand structure for loblolly pine plantations in Tennessee, Alabama, and Georgia highlands. U.S. Dep. Agric. For. Serv. Res. Pap. SO-96, 81 p. South. For. Exp. Stn. New Orleans, La.

Smalley, G. W., and R. L. Bailey.
1974b. Yield tables and stand structure for shortleaf pine plantations in Tennessee, Alabama, and Georgia highlands. U.S. Dep. Agric. For. Serv. Res. Pap. SO-97, 57 p. South. For. Exp. Stn. New Orleans, La.

Smalley, G. W., and D. R. Bower.
1971. Site index curves for loblolly and shortleaf pine plantations on abandoned fields in Tennessee, Alabama, and Georgia highlands. U.S. Dep. Agric. For. Serv. Res. Note SO-126, 6 p. South. For. Exp. Stn. New Orleans, La.

Soil Conservation Service.
1975. General soil map, Kentucky. In cooperation with Ky. Agric. Exp. Stn. and Div. Conserv., Dep. Nat. Resour. and Environ. Protect.

Soil Survey Staff.
1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 p.

Soil Survey Staff.
1975. Soil taxonomy: A basic system of soil classification for making and interpretating soil surveys. U.S. Dep. Agric. Soil Conserv. Serv. Agric. Handb. 436, 754 p.

Thornthwaite, C. W.
1931. The climate of North America according to a new classification. Geogr. Rev. 21: 633-655.

U.S. Department of Agriculture.
1941. Climate and man. Yearbook of agriculture. 1248 p. U.S. Gov. Print. Off. House Document No. 27, 77th Congress, 1st Session.

U.S. Department of Commerce.
1974a. Climatological data, Kentucky annual summary. 69:13, 13 p.

U.S. Department of Commerce.
1974b. Climatological data, Tennessee annual summary. 79:13, 11 p.

U.S. Forest Service.
1929. Volume, yield, and stand tables for second-growth southern pines. U.S. Dep. Agric. For. Serv. Misc. Pub. No 50, 202 p. (Slightly revised 1976).

Wertz, W. A., and J. F. Arnold.
1975. Land stratification for land-use planning. *In* B. Bernier and C. H. Winget (ed.), Forest Soils and Forest Land Management, p. 617-629. Les Presses de L'Université Laval, Quebec.

Winters, R. K., and J. G. Osborne.
1935. Growth and yields of second-growth red gum in fully stocked stands on alluvial lands in the South. U.S. Dep. Agric. For. Serv. Occas. Pap. 54, 12 p. South. For. Exp. Stn. New Orleans, La.

APPENDIX

County Soil Surveys Available for the Western Highland Rim and Pennyroyal[1]

*Arms, F. S., M. J. Mitchell, F. C. Watts, and B. L. Wilson.
1979. Soil survey of Hardin and Larue Counties, Kentucky. U.S. Dep. Agric. Soil Conserv. Serv. 158 p. + maps.

*Dye, J. W., A. J. Barton, and R. D. Froedge.
1975. Soil survey of Logan County, Kentucky U.S. Dep. Agric. Soil Conserv. Serv. 78 p. + maps.

Harmon, A. B., Jr., E. Lusk, J. Overton, J. H. Elder, Jr., and L. D. Williams.
1959. Soil survey of Maury County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. Series 1952, No. 7. 94 p. + maps.

*Humphrey, M. E., R. A. Hayes, and P. M. Love.
1966. Soil survey of Caldwell County, Kentucky. U.S. Dep. Agric. Soil Conserv. Serv. 104 p. + maps.

*Lampley, E. T., J. B. Cothran, L. E. Davis, R. B. Hinton, O. L. North, and P. T. Steele.
1975. Soil survey of Montgomery County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. 63 p. + maps.

*Latham, E. E.
1969. Soil survey of Barren County, Kentucky. U.S. Dep. Agric. Soil Conserv. Serv. 85 p. + maps.

*Latham, E. E., and A. J. Barton.
1967. Soil survey of Metcalfe County, Kentucky. U.S. Dep. Agric. Soil Conserv. Serv. 82 p. + maps.

*Moneymaker, R. H., J. F. Brasfield, J. B. Cothran, B. B. Hinton, E. T. Lampley and J. P. Sutton, Jr.
1968. Soil survey of Robertson County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. 61 p. + maps.

Overton, J. R., I. B. Epley, J. A. Blanton, D. D. Walker, and R. Wildermuth.
1959. Soil survey of Lawrence County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. Series 1952, No. 6. 61 p. + maps.

*Proffitt, W. H., T. R. Love, E. T. Lampley, O. W. Rice, and B. B. Hinton.
1963. Soil survey of Hardin County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. Series 1960, No. 2. 134 p. + maps.

*Sherard, H.
1977. Soil survey of Lauderdale County, Alabama. U.S. Dep. Agric. Soil Conserv. Serv. 47 p. + maps.

*Soil Conservation Service.
(In Press). Soil survey of Davidson County, Tennessee.

*True, J. C., J. F. Campbell, E. P. Davis, and D. L. Montgomery.
1968. Soil survey of Giles County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. 69 p. + maps.

*True, J. C., J. F. Campbell, E. P. Davis, O. G. Sprouse, Jr., J. F. Brasfield, and I. D. Howell.
1964. Soil survey of Williamson County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. Series 1961, No. 5. 147 p. + maps.

Wildermuth, R., and L. E. Odom.
1958. Soil survey of Houston County, Tennessee. U.S. Dep. Agric. Soil Conserv. Serv. Series 1949, No. 2., 49 p. + maps.

[1] Asterisk denotes survey that contains a section on woodland suitability.

SMALLEY, GLENDON W.
1980. Classification and evaluation of forest sites on the Western Highland Rim and Pennyroyal. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. S0-30, 120 p. South. For. Exp. Stn., New Orleans, La.

Presents a comprehensive forest site classification system for the Western Highland Rim and Western Pennyroyal-Limestone area in northwest Alabama, west-central Tennessee, and western Kentucky. The system is based on physiography, geology, soils, topography, and vegetation.

Additional keywords: Site index, mean annual increment, soil properties, pines, hardwoods.

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