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

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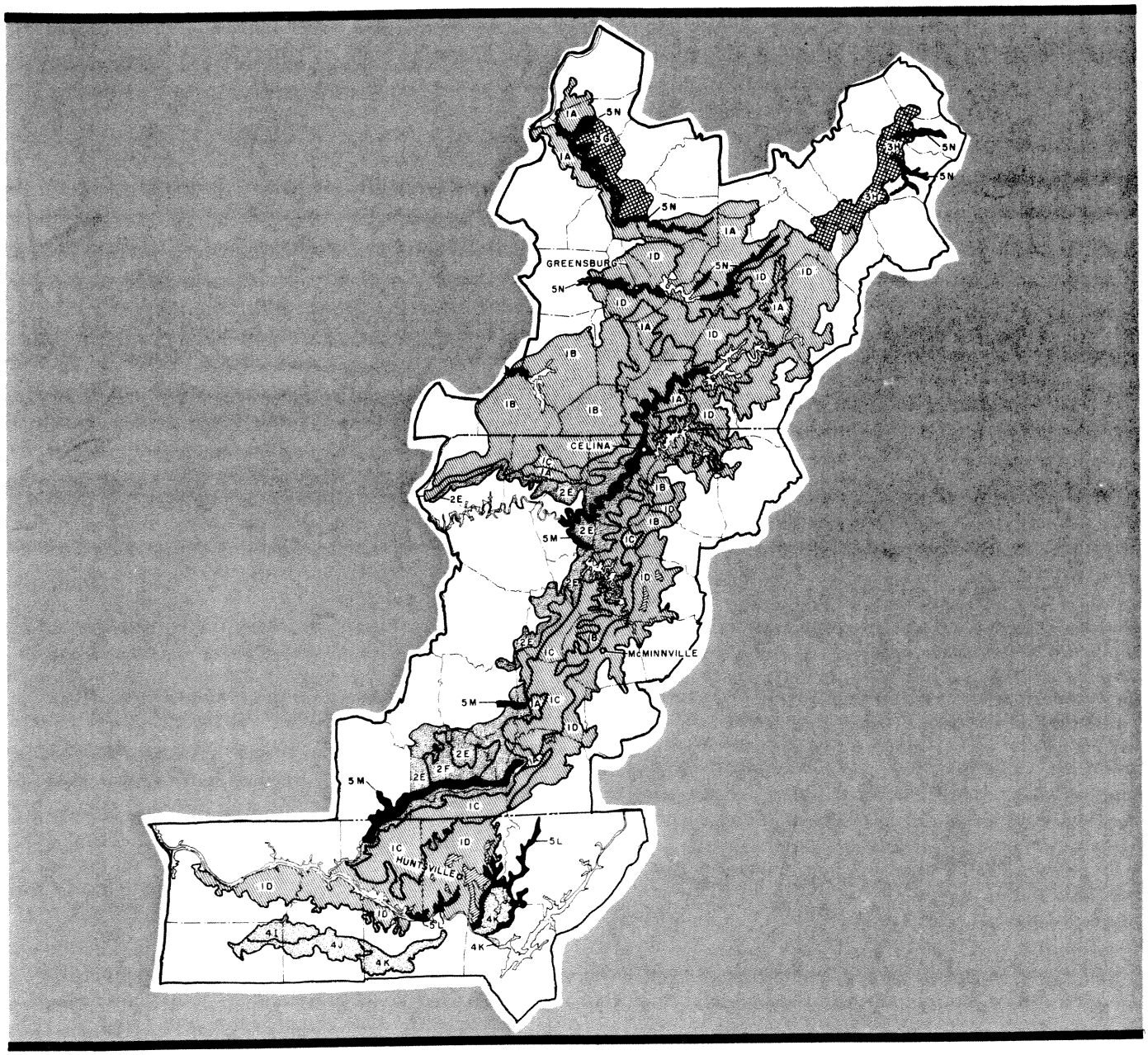

SUMMARY

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

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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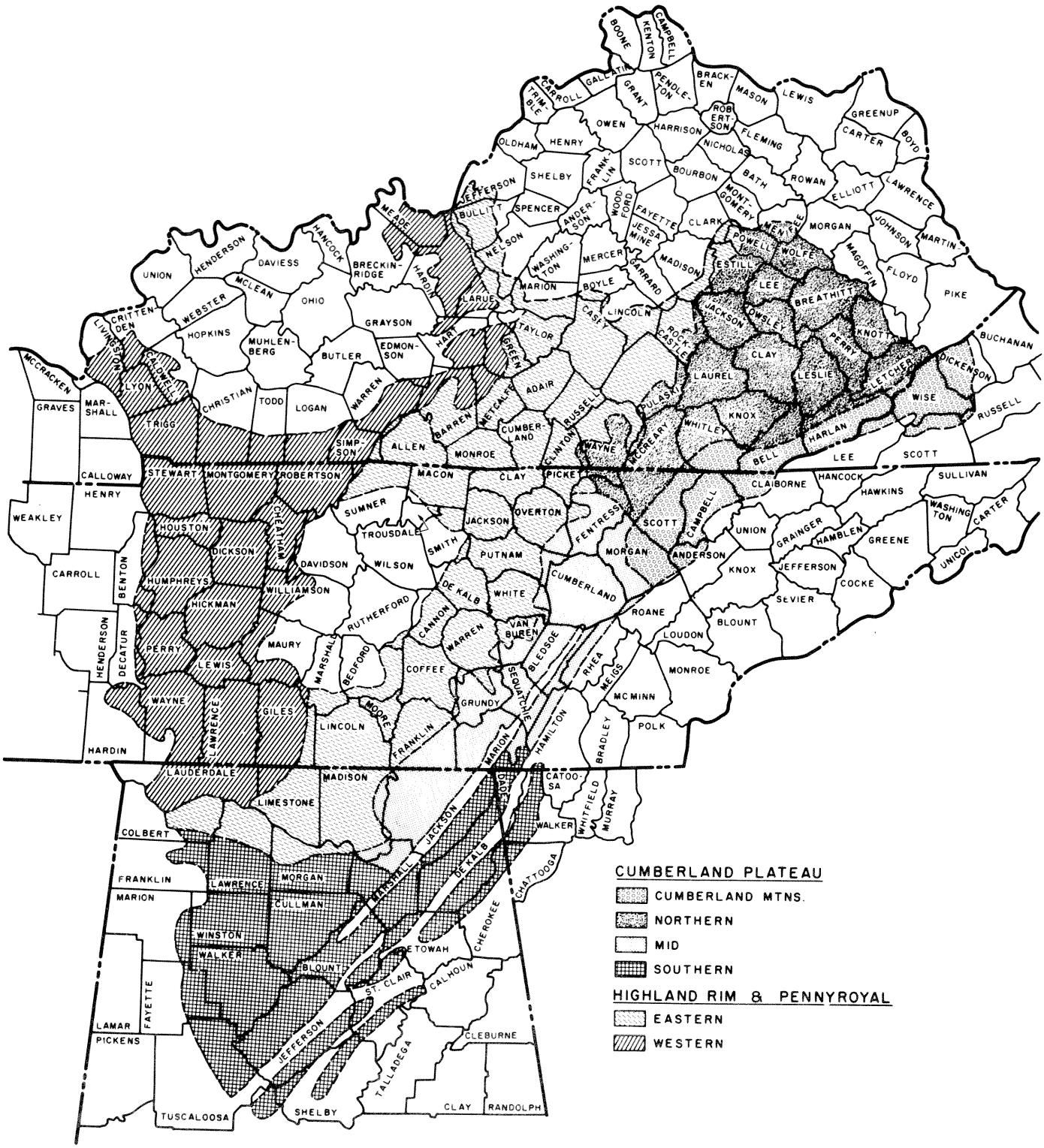

Figure 1.—*Physiographic provinces and regions of the Interior Uplands.*

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

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INTRODUCTION

This report classifies and evaluates forest sites on the Eastern Highland Rim and Pennyroyal (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 activities. 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, usually a major management objective. However, landtypes may also determine 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 unavailable and information, particularly productivity data, was extrapolated from adjacent regions. All sources of data are documented to assist the reader's evaluation.

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 and point out any shortcomings or needed revisions.

The rationale and methodology for developing 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). Site classification guides for the Southern Cumberland Plateau, the Western Highland Rim and Pennyroyal, and the Mid-Cumberland Plateau Regions have been published (Smalley 1979b, 1980, and 1982).

EASTERN HIGHLAND RIM AND PENNYROYAL REGION

The Eastern Highland Rim and Pennyroyal region covers about 11,440 sq. mi. in all or portions of 8 counties in Alabama, 25 in Tennessee, and 29 in Kentucky. The region extends south to north from about north latitude 34°30' to 38°10' and east to west from about west longitude 84°25' to 87°40'. It extends from Louisville, Kentucky to Russellville, Alabama, a distance of about 275 mi. (fig. 2).

In Alabama, the Eastern Highland Rim extends south of the Tennessee River and includes the Moulton Valley lying between Little Mountain and the north-facing escarpment of the Cumberland Plateau (Hajek and others 1975). North of the Tennessee River, the Eastern Rim extends eastward to Guntersville Dam and includes the Paint Rock River valley which clefts the highly dissected southern subregion of the Mid-Cumberland Plateau (Smalley 1982). The arbitrary division between the Eastern and Western Rims 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 Tennessee, the Eastern Rim includes the upland surrounding the Nashville Basin on the east (Fenneman 1938), the knobby transition from the Rim to the Basin, and interspersed portions of the Outer Basin in Lincoln, Marshall, and Moore Counties (Edwards and others 1974, Springer and Elder 1980).

[1]See Appendix for available soil surveys.

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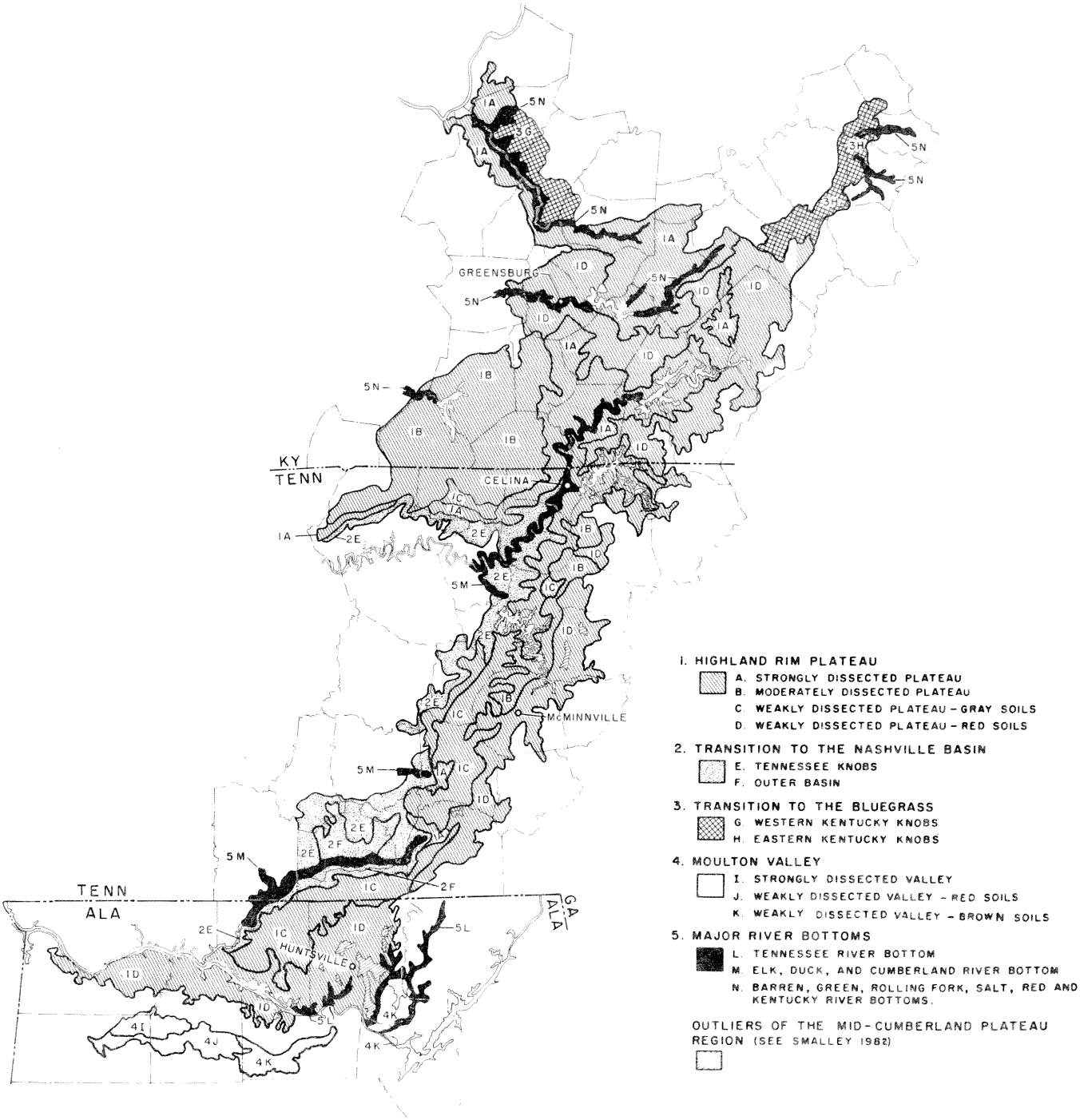

Figure 2.—*Subregions and landtype associations of the Eastern Highland Rim and Pennyroyal Region and location of weather stations.*

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, Tennessee. This boundary merges with the boundary between the Western Pennyroyal-Limestone Area and the Eastern Pennyroyal in Kentucky (Springer and Elder 1980, Soil Conserv. Serv. 1975, Smalley 1980).

In Kentucky, this section, known as the Eastern Pennyroyal (Bailey and Winsor 1964, Fenneman 1938, and Soil Conserv. Serv. 1975), is named for the Pennyroyal of America (*Hedeoma pulegioides* (L.) Pens.), a wild member of the mint family abundant in the area. The Pennyroyal extends northeastward from the Kentucky-Tennessee boundary to the Muldraugh's Hill escarpment overlooking the Bluegrass Region. North of the Green River, the Eastern Pennyroyal curves northwestward in a strip 2 to 5 mi. wide between the Western Pennyroyal-Limestone Area and the Rolling Fork River. A small area of the Eastern Pennyroyal lies east of the Rolling Fork River and south of Louisville.

The Eastern Pennyroyal also includes the Knobs, a narrow belt of conical hills surrounding the Bluegrass Region (Fenneman 1938, McFarlan 1943). These erosional remnants of the upland behind Muldraugh's Hill escarpment on the south and west and the Pottsville escarpment on the east occur in a belt of varying width. The broad areas lying west and east of the Bluegrass coincide with soil association G7 on the Kentucky General Soil Map. The narrow part south of the Bluegrass is included in soil association E2 (Soil Conserv. Serv. 1975).

Climate

The region's temperate climate is characterized by long, moderately hot summers, and short mild winters. According to Thornthwaite's (1948) classification, 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 evaluation above sea level for one station in Alabama, two 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 180 to 210 days with a decreasing trend south to north. Below freezing temperatures occur at night in December, January, and February. The ground freezes to a depth of 2 to 6 in. several times during the average winter season and commonly remains frozen for 2 to 12 days. Monthly air temperatures at Huntsville, Alabama, average 3° to 6°F warmer than those at Greensburg, Kentucky. However, local temperatures vary considerably from the average 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 9 mph. Severe winds are infrequent, usually associated with late spring and summer thundershowers.

Annual precipitation, averaging about 51 in., is well distributed all year. Rainfall decreases slightly south to north. Precipitation is greatest from December through March and least from August through October with short periods of very wet or very dry weather interspersed. Thunderstorms with high intensity rainfall and occasionally hail occur on about 55 days each year, mostly in late spring and summer. Snowfall seldom exceeds a few inches and melts in a few days, but accumulations of 10 in. or more have been recorded. Soils are wettest from December through April and driest from July to October. Tree growth is commonly retarded for a few days about 6 times each growing season.

Soil dryness during the growing season is measured by "frequency of drought days" data, days when precipitation and evapotranspiration data indicate that soil moisture content is below the wilting point (Knetsch and Smallshaw 1958). At McMinnville, drought days are most likely in August when the probability of 10 drought days per month is 15 percent. In June, and September, the probability is 12 and 13 percent respectively. These probabilities are low compared to other Eastern Highland Rim stations and may be due to the orographic influence of the Cumberland Plateau on the frequency and amount of summer rainfall in the McMinnville area. On the Eastern Rim in south central Tennessee and northern Alabama, the probability of drought days is higher. Soil dryness is most prevalent in August when the probability of 10 drought days per month is 43 percent or greater. During June, July, and September, the probability of 10 drought days ranges from 27 to 45 percent. These data were calculated for soils having 4 in. of available moisture storage. Less storage capacity increases the drought probability and *vice versa*.

Geology, Topography, and Soils

In general, the Eastern Highland Rim and Pennyroyal region is underlain by a series of Mississippian limestones of varying coarseness, purity, and solubil-

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

Station and County	Years of Record	Elevation Ft.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Huntsville Madison Ala.	18	624	5.13	5.16	5.79	4.79	3.86	3.97	4.88	3.46	3.29	2.57	3.88	5.38	52.16
McMinnville Warren Tenn.	96	940	5.47	5.28	5.39	4.42	4.11	4.50	4.66	3.65	3.93	2.49	3.86	5.20	52.96
Celina Clay Tenn.	28	550	5.08	4.96	5.25	4.24	3.65	4.77	4.98	3.13	3.41	2.47	4.24	4.73	50.91
Greensburg Green Ky.	90	590	4.29	3.95	5.27	4.09	4.71	4.70	4.94	4.07	3.30	2.39	3.70	4.12	49.53

[a]U.S. Department of Commerce (1976a, 1976b, 1976c)

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

Station and County	Years of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Warm Period Days[b]
Huntsville Madison Ala.	18	41	44	51	62	70	77	80	79	73	62	50	42	61	209
McMinnville Warren Tenn.	93	40	42	50	60	68	72	77	77	71	60	49	41	59	195
Celina Clay Tenn.	27	37	40	47	58	67	74	77	76	70	59	48	39	58	167
Greensburg Green Ky.	84	35	37	45	57	66	74	77	76	69	58	46	37	56	178

[a]U.S. Department of Commerce (1976a, 1976b, 1976c)
[b]Mean period from last 32° F to first 32° F (U.S. Department of Agriculture 1941)

ity. The boundary between the Rim and the Upper Coastal Plain in northwest Alabama is indistinct and irregular because unconsolidated Cretaceous sands and gravels cap broad uplands (Hajek and others 1975). A thin (3 ft. or less) silty deposit overlies much of the Rim. In the transition from the Rim to the Outer Nashville Basin in Tennessee and from the Eastern Pennyroyal and Cumberland Plateau to the Outer Bluegrass in Kentucky, phosphatic limestones, shales, siltstones, and sandstones of Devonian and Silurian age are exposed. Alluvial deposits of Quaternary age occur along the Cumberland, Duck, Elk, Green, Barren, Salt, Rolling Fork, Kentucky, and Red Rivers (McFarlan 1943; Edwards and others 1974; Swingle and others 1966; Miller and others 1966; Braun 1950, p. 89; and Lewis and Potter 1978).

Regional topography ranges from gentle to rugged and complex. Slope varies from nearly level to very steep. On the eastern two-thirds of the Pennyroyal, a dendritic drainage pattern indicates that dissection is about mature. Ridgetops are about 800 to 1,100 ft. above sea level, and local relief is 200 to 400 ft. Some remnants of the once broad undulating plateau remain. Ridges extend for 0.5 mi. or more and relief is 50 ft. or less.

In the western one-third of the Pennyroyal and counties north, east, and south of the Nashville Basin in Tennessee and Alabama, topography is more gentle. 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. Early settlers, finding portions of this area of gentle topography essentially prairie land, bestowed names like "Barren County" in Kentucky and "The Barrens" in Tennessee (Luther 1977, DeSelm 1978).

In the transition to the Outer Nashville Basin and in the vicinity of the Cumberland River, topography is complex, consisting of knobs and narrow meandering hills, erosional remnants of the Mississippian plateau. Steep gradients and minor waterfalls have developed where streams spill over the resistant Ft. Payne chert.

In Kentucky, the transition to the Outer Bluegrass is represented by the scarp slope of Muldraugh's Hill escarpment that eventually merges into the western escarpment of the Cumberland Plateau in Rockcastle County. Conical hills and winding narrow ridges with steep side slopes are separated by narrow to broad valley floors. Broader hills exist only on remaining remnants of the original, more resistant caprock. This area is underlain by lower Mississippian limestones and shales and Devonian black fissile shale. The area of higher ridges and mountains underlain by strata of mid to upper Mississippian age will be included, as traditionally considered, in the Northern Cumberland Plateau Region, although the base rocks are not Pennsylvanian. The fragmented nature of the western escarpment of the Cumberland Plateau is caused by the tilt of base rocks away from the Cincinnati Arch centered under the Bluegrass Region (Braun 1950, p. 89; Preston and others 1964, p. 116).

In the smoother parts of the Rim and Pennyroyal, upland soils have developed in deep clayey residuum from limestone, old alluvium, and thin silty deposits. Common soils are Fullerton (Baxter), Mountview, Dickson, Decatur, Trimble, Garmon, and Colbert. Soils are generally well drained with moderate fertility, but poorly drained soils are common in "The Barrens." This smooth area is mostly well suited to agriculture, but forests occupy 39 percent of the area, ranging from 20 percent in Limestone County, Ala. to more than 50 percent in Putnam County, Tenn. and in Wayne, Cumberland, and Casey Counties, Ky. (Hedlund and Earles 1971, 1973; Kingsley and Powell 1978).

In the highly dissected transition zones, soils are generally well drained and low to moderate in fertility. Most soils are acid, but some are calcareous. Typical upland soils are Bodine, Dellrose, Mimosa, Garmon, Caneyville and Frederick. In Kentucky, soils of the Knobs in front of Muldraugh's Hill escarpment are derived from Mississippian limestones, cherty limestones, siltstones, and shales, from Devonian black fissile shales, and from Silurian calcareous shales. Near Louisville, the Knobs, covered with a thick silty deposit that thins to a few inches on steep side slopes, have inferior soils, particularly those derived from Ohio (Chattanooga) shale. Colyer, Rockcastle, and Trappist soils are typical. The steeper slopes of the Knobs and the soft and relatively impervious bedrock result in rapid erosion. In the flat lowlands between the Knobs, the tight clayey, poorly drained soils are ill suited to agriculture (McFarlan 1943).

Fertile soils on floodplains and low terraces along major rivers have been covered by Tennessee Valley Authority and Corps of Engineers' lakes. However, extensive bottomlands remain along the Green River and the broad meanders of the Cumberland River from the head of Old Hickory Lake to Wolf Creek Dam that impounds Lake Cumberland. High terraces are seldom flooded and soils are deep and moderately fertile. Common soils are Armour, Lindell, Arrington, Lynnville, Nolin, Newark, and Elk. These floodplains are well suited to agriculture although seasonal wetness limits use of some areas. On the Tennessee River, the normal level of Wilson Lake is 508 ft. and Wheeler Lake is 556 ft. On the Cumberland River, the normal level of Old Hickory Lake is 445 ft.; Center Hill Reservoir is 648 ft.; Dale Hollow Reservoir is 680 ft.; and Lake Cumberland is 723 ft. The normal level of the Barren River Reservoir is 552 ft. and Green River Lake is 675 ft.

Gradient, aspect, slope length, and soil moisture are important in delineating landtypes described later. Slope steepness and topographic position affect the rate and amount of both surface runoff and subsurface movement of soil water. Soil erosion increases as gradient and length of slope increase. Although surface runoff and soil movement are rare under forested conditions, they do occur during road construction, logging, and other forest management operations. Soils on steep slopes are often shallower than soils on more nearly level terrain. On gentle terrain, surface runoff deposits more sediments below the longer and steeper slopes.

Generally, the steeper the gradient and the longer the slope, the greater 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, especially on those underlain by shale. An exception occurs on karst topography where soil water percolates deep into the porous limestone instead of moving downslope in the soil.

Aspect affects air and soil temperatures, with lower soil temperature on north-facing than on south-facing slopes. Because soils on north-facing slopes hold moisture longer during the growing season, rate of tree growth is faster and species composition is richer on north-facing than on south-facing slopes.

In Soil Taxonomy, temperature regime is one of several differentiae used to group soils within a subgroup having similar physical and chemical properties (Soil Survey Staff 1975). On the Eastern 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 is measured at 50 cm deep or at a lithic or paralithic contact, whichever is shallower.

Nearly all soils mapped in the Alabama portion of the Eastern Highland Rim are thermic while most soils mapped in Kentucky are mesic. In Tennessee, mean annual soil temperature on the Rim is less than 15°C, but both mesic and thermic soils are recognized.

Vegetation

Braum (1950) assigned the Eastern Highland Rim and Pennyroyal to the Mississippian Plateau section of the Western Mesophytic Forest Region which is a mosaic of oak-dominated communities reflecting widespread influence of man in the last 200 years. The extensive original bottomland forest acreage has been drastically reduced by flooding from lakes impounded behind Tennessee Valley Authority and Corps of Engineers' dams. Everywhere on the Rim remaining forested tracts are small, isolated, and so disturbed by logging, grazing, and fire that understanding past variations in composition and relations to topography and geology is difficult.

Forest vegetation of the Eastern Rim has not been studied as extensively as that in other regions of the Interior Uplands. On undulating parts of the Rim, white oak, southern red oak, and black oak are the most abundant species. Associates include sugar maple, American beech, yellow-poplar, hickories, and white ash. Dogwood is prevalent in the understory. Hannan and others (1978) reported that red maple and swamp white oak occurred throughout a 50-acre sinkhole in Rockcastle County, Ky. Sweetgum and white ash comprised 70 percent of the overstory density on wet sites and 74 percent of the understory on drier sites was sweetgum, American sycamore, blackgum, and red maple.

Prairie areas, or "barrens," are characterized by silty soils and karst topography, but prairie communities have been nearly destroyed by conversion to pasture and row crops. Most former prairie is now occupied by oak thickets in which post oak, blackjack oak, black oak, scarlet oak, and southern red oak are abundant (DeSelm 1978).

Ravine communities, dominating the strongly dissected parts of the Rim, are composed of mesophytic forest species, but they lack some of the species common to Cumberland Plateau gorges (Caplenor 1973, Wooden and Caplenor 1972). Dominant species are eastern hemlock, American beech, yellow-poplar, white oak, and sugar maple. Associates are yellow buckeye, white ash, white basswood, sourwood, and northern red oak.

Except for the effort by the SCS to determine mean site indices of selected tree species by soil series, no attempt has been made to determine relative or absolute productivity of Highland Rim forest sites other than on a regional basis (Hedlund and Earles 1971, 1973; Kingsley and Powell 1978).

SUBREGIONS AND LANDTYPE ASSOCIATIONS

I have divided the Eastern Highland Rim and Pennyroyal region into five subregions: (1) Highland Rim plateau, (2) transition to the Nashville Basin, (3) transition to the Bluegrass, (4) Moulton Valley, and (5) 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 Conservation Service 1975, Edwards and others 1974, and Springer and Elder 1980) (table 3). A description of these landtype associations follows:

Subregion 1: Highland Rim plateau

Landtype Association-A: Strongly Dissected Plateau.—This LTA corresponds to soil associations D11 (Bodine-Mountview-Dickson) and D13 (Sulphura-Christian-Mountview) in Tennessee, and soil association E2 (Garmon-Frederick) in Kentucky. In Tennessee LTA-A occurs as a narrow band north and east of the Nashville Basin. It represents part of the steep, rough transition from the smooth, undulating Highland Rim plateau to the Nashville Basin and to bottoms of the Elk and Cumberland Rivers and their major tributaries. In Kentucky LTA-A occurs near the Cumberland, Green, and Rolling Fork Rivers and their major tributaries. West of the Roll-

Table 3.—*Subregions and landtype associations of the Eastern 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. Transition to the Nashville Basin	E. Tennessee Knobs
	F. Outer Basin
3. Transition to the Bluegrass	G. Western Kentucky Knobs
	H. Eastern Kentucky Knobs
4. Moulton Valley	I. Strongly dissected valley
	J. Weakly dissected valley—red soils
	K. Weakly dissected valley—brown soils
5. Major river bottoms	L. Tennessee River bottom
	M. Elk, Duck, and Cumberland River bottoms
	N. Barren, Green, Rolling Fork, Salt, Red, and Kentucky River bottoms.

ing Fork River, LTA-A represents the Muldraugh's Hill escarpment. LTA-A also includes a narrow band of the Kentucky Knobs not extensive enough to be delineated at the 1:750,000 scale of the Kentucky General Soil Map (Soil Conservation Serv. 1975). The broader more extensive areas of Knobs are delineated as Landtype Associations G and H in Subregion 3. A LTA similar to LTA-A occurs extensively in the Western Highland Rim and Pennyroyal region (Smalley 1980).

Landtype association-A consists of narrow winding to moderately broad undulating ridges and deep narrow valleys with steep side slopes. Local relief may approach 400 ft. Valleys in upper reaches of intermittent streams are narrow and V-shaped but gradually become U-shaped with bottoms as wide as 250 to 1,000 ft. before merging with major river bottoms (Subregion 5).

Hilly and steep parts of LTA-A have well drained and somewhat excessively drained cherty and shaly, loamy and clayey soils derived from cherty limestone, shaly limestone, shale, calcareous shale, siltstone, and sandstone. Undulating parts have well drained and moderately well drained cherty, silty and clayey soils derived from thin silty deposits over clayey residuum from limestone, dolomite, or shaly limestone.

The loamy and clayey soils of the narrow belt of Knobs in Kentucky are gently sloping to steep, shallow to deep, and well drained to excessively drained. Upland soils formed in residuum and colluvium from tilted black, brown, and gray acid shales and interbedded thin layers of sandstone and siltstone.

One-half or more of LTA-A is forested. Only the smoother ridges and wider streambottoms have been cleared for agriculture and some of this acreage is reverting to woodland. Twenty-one landtypes are recognized: 1–12 and 31–39.

Landtype Association-B: Moderately Dissected Plateau.—This LTA corresponds to soil associations D21 (Baxter [Fullerton] -Mountview-Dickson) and D22 (Christian-Mountview) in Tennessee and soil associations E1 (Trimble-Baxter-Garmon) in Kentucky.

Also included in LTA-B is a small area of soil association D41 (Pembroke-Crider) in Macon County, Tenn. A similar association was not delineated on the Kentucky General Soil Map, but the soil survey of Allen County, Ky. will probably show a continuation of soil association D41. The presence of soil association D41 will be handled as an additional set of landtypes within LTA-B. A landtype association similar to LTA-B occurs extensively in the Western Highland Rim and Pennyroyal region (Smalley 1980).

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 ft. before merging with major river bottoms (Subregion 5).

Hilly and rolling parts of LTA-B have mostly well drained, cherty, and clayey soils derived from limestone residuum, and the smoother parts have well drained and moderately well drained silty soils that developed in 2 to 3 ft. of silty deposits over limestone residuum.

Inclusions corresponding to soil association D41 consist of mostly deep, well drained silty soils, some of which are cherty. They developed in thin, silty deposits, alluvium, and residuum from moderately high-grade limestone situated on an undulating to rolling karst plain. These broad wavy areas are pitted with sinkholes and shallow depressions which connect

in underground drainageways. Surface drainages are shallow and meandering; there are few permanent streams.

Broad ridges, mild slopes, and karst plains are in agriculture. Woodlands usually occur on the steeper and poorly drained parts of the landscape. Seventeen landtypes are recognized: 1–5 and 8–19.

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. In Tennessee the area is called the "Barrens." Landtype Association-C extends from the Tennessee River in north central Alabama to Smithville in DeKalb County, Tenn. Two separate areas occur in Putnam and Macon Counties, Tenn. A similar LTA also occurs in an irregular pattern on the Western Highland Rim and Pennyroyal region (Smalley 1980).

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 divide bottoms of permanent streams from broad ridges.

The silty and cherty soils are well drained to poorly drained and derived from 2 to 6 ft. of silty deposits overlying old alluvium or from clayey alluvium and 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. Eleven landtypes are recognized: 4, 5, 8, 9, 12, and 14–19.

Landtype Association-D: Weakly Dissected Plateau—Red Soils.—This LTA corresponds to soil association 5 (Decatur-Dewey) in Alabama (the next revision of the Alabama General Soil Map will have Bewleyville as a named member of soil association 5), soil association D51 (Waynesboro-Decatur-Bewleyville-Curtistown) in Tennessee, and soil association E3 (Frederick-Mountview-Caneyville) in Kentucky. Also included in LTA-D is a small area of soil association D42 (Baxter-Bewleyville-Pembroke) in Clay County, Tenn. A similar association is not delineated on the Kentucky General Soil Map. However, the D42 association merges with soil association 1 (Waynesboro-Crider-Bewleyville) delineated in the Monroe County, Ky. soil survey.

In northern Alabama, LTA-D occurs in a broad area on both sides of the Tennessee River. In Tennessee, a band of LTA-D occurs between the base of the Cumberland Plateau and the "Barrens" (LTA-C) and the moderately dissected Highland Rim plateau (LTA-B). It extends northward into Kentucky between the Cumberland Plateau and the strongly dissected area surrounding Lake Cumberland (LTA-A) and then curves westward where it joins the Western Pennyroyal and Western Coalfields physiographic provinces. An isolated portion of the LTA-D straddles the state line in Clay County, Tenn. and Monroe County, Ky.

In Alabama and most of Tennessee, LTA-D consists of broad, gently sloping ridges bounded by generally short, sloping to moderately steep side slopes. Uplands are pitted with sinkholes and depressions which connect in underground drainageways. Many shallow intermittent drainages and a few permanent streams comprise the weakly developed dendritic drainage pattern. Relief is commonly less than 100 ft. In northern Tennessee and Kentucky, LTA-D has a more defined drainage network, interfluvial areas are not as wide, and steeper side slopes lead into narrow V-valleys. Relief ranges from 50 to 150 ft. and in places approaches 200 ft.

Limestone knobs and hills dot the landscape near the Cumberland Plateau. These remnants of the Plateau project above the surface of the surrounding Rim and Pennyroyal. A few high knobs are capped with Pennsylvanian sandstone and are included in the Mid-Cumberland Plateau region (fig. 2) (Smalley 1982).

The mostly deep, reddish, well drained clayey and loamy soils are derived from alluvium or clayey residuum from moderately high-grade limestone. In places a thin silty deposit overlies the old parent materials. On the more dissected portions of LTA-D the red and brown, deep, cherty, clayey and silty soils are derived from limestone, shale, alluvium, and, in places, a thin silty deposit.

Nearly all of the smoother parts of LTA-D have been cleared for crops and pasture. The area is farmed intensively; soils are productive and respond to lime and fertilizer. Cotton, soybeans, corn, tobacco, and small grains are common crops. Beef cattle and dairy herds are prevalent. An extensive ornamental nursery industry is located in LTA-D. Steeper slopes and poorly drained areas are in woodland. Fifteen landtypes are recognized: 4, 5, 8–10, and 12–21.

Subregion 2: Transition to the Nashville Basin

Landtype Association-E: Tennessee Knobs.—This LTA corresponds to soil association E11 (Dellrose-Mimosa-Bodine) in Tennessee. Although not recognized in Alabama, this LTA was extended into Limestone County in a narrow band south of the Elk River. This LTA also occurs on the Western Highland Rim and Pennyroyal region (Smalley 1980).

Landtype association-E consists of a nearly continuous belt of high cherty ridges and knobs with steep side slopes, as much as 1,000 ft. long, and narrow valleys. Ridges are remnants of the Highland Rim plateau and are capped with Ft. Payne chert. Valleys, mairly V-shaped at the heads, become U-shaped downstream, not exceeding ¼ mi. and often ⅛ mi. or less in width. Elevation ranges from 900 to 1,200 ft. above sea level and relief is 180 to 300 ft. This strongly dissected area ranges in width from abcut 2 mi. in Sumner County in north central Tennessee to about 25 mi. 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, shaly limestone, phosphatic limestone, siltstone, and shale, and in colluvium. Chattanooga and Maury shales, lower shaly facies of Ft. Payne chert, and phosphatic limestone underlie or outcrop in places on long slopes along narrow winding drainages, particularly in the Cumberland River watershed. The thickness of shale layers and the prevalence of shaly limestone increases northward in Jackson and Clay counties, Tennessee.

Agriculture is limited by slope steepness, high chert content, and rockiness. Considerable cleared acreage is reverting to woodland. Twelve landtypes are recognized: 1–5, 10–12, and 22–25.

Landtype Association-F: Outer Basin.—This LTA corresponds to the portions of soil associations E21 (Mimosa-Armour-Rock outcrop) and E22 (Stiversville-Hampshire-Inman) in Lincoln, Marshall, and Moore Counties, Tennessee which are surrounded by LTA's E and M. This LTA is a modification of LTA-F in the Western Highland Rim and Pennyroyal region (Smalley 1980).

Landtype association-F consists of low broad hills and knobs projecting above bottomlands adjacent to Cane Creek, Mulberry Creek, and other tributaries of the Elk River. However, the ridgetops are lower than the surrounding Highland Rim plateau. Soils are derived from phosphatic limestone, shaly limestone, sandy phosphatic limestone, thin strata of shale, and alluvium from soils formed from these rocks. Soils are deep and moderately deep, mostly well drained, and predominantly clayey and silty but occasionally loamy. Topography is hilly and rolling; a few slopes are 40 percent in steepness but most are less than 25 percent. Relief ranges from 50 to 200 ft. and highest elevations are about 800 ft. above sea level. Slope length rarely exceeds 350 ft.

Most of LTA-F is in crops or pasture. Only the steeper slopes and shallow rocky pastures are in woodland. Eight landtypes are recognized: 10 and 24–30.

Subregion 3: Transition to the Bluegrass

Landtype Association-G: Western Kentucky Knobs.—This LTA corresponds to soil association G7 (Colyer-Rockcastle-Trappist) in Bullitt, Nelson, and Marion Counties, Kentucky.

Landtype association-G consists of a belt of conical hills and ridges that are erosional remnants of the Eastern Pennyroyal plateau. Basement rocks range from mid and lower Mississippian to upper Silurian resulting from the downward tilt to the west and south away from the Cincinnati Arch. These hills are separated from the Eastern Pennyroyal upland west of the Muldraugh's Hill escarpment by the valley of the Rolling Fork River (Landtype association-N). Conical forms are common and broader hills occur only where remnants of the more resistant caprock remain. Topography is rough because side-cutting has been rapid in the soft shales and sandstones. Valleys are narrow, V-shaped, and steep at the heads, becoming broader, U-shaped, and less steep as they enter the Bluegrass Region. Major river bottoms are broad and relatively flat (Landtype association-N). Relief averages about 400 ft., but crests of some knobs are 700 ft. above the valleys.

The loamy and clayey soils of LTA-G are gently sloping to steep, shallow to deep, and well drained to excessivley drained. Upland soils formed in residuum and colluvium from the tilted black, brown, and gray acid shales and interbedded thin layers of sandstone and siltstone. Near Louisville the knobs are covered with a thick silty deposit which thins to a few inches on steep side slopes.

Agriculture is limited by slope steepness and soil depth. Considerable acreage once cleared for agriculture is reverting to woodland. Eleven landtypes are recognized: 10, 11, 31–39.

Landtype Association-H: Eastern Kentucky Knobs.—This LTA corresponds to soil association G7 (Colyer-Rockcastle-Trappist) in Rockcastle, Lincoln, Garrard, Madison, Jackson, Estill, Clark, Montgomery, and Powell Counties, Kentucky.

Landtype association-H consists of a belt of conical hills and winding, narrow ridges that are erosional remnants of the Eastern Pennyroyal plateau. Basement rocks range from mid and lower Mississippian to upper Silurian owing to the downward tilt to the east and south away from the Cincinnati Arch. Higher knobs and mountains to the east, although capped with upper Mississippian rocks, have traditionally been considered part of the Cumberland Plateau because the boundary between the poorly defined western escarpment of the Cumberland Plateau and this strongly dissected Mississippian landscape is unclear.

This strongly dissected belt varies from 3 to 7 mi.

in width. Conical forms are common and broader hills and ridges occur only where remnants of the more resistant caprock remain. Topography is rough because side-cutting has been rapid in the soft shales and sandstones. Valleys are narrow, V-shaped, and steep at the heads but become broader, U-shaped, and less steep as they enter the Bluegrass Region. Major river bottoms are broad and relatively flat (Landtype association-N). Relief averages about 250 ft. and ranges from 100 to 500 ft.

The loamy and clayey soils of LTA-H are gently sloping to steep, shallow to deep, and well drained to excessively drained. Upland soils formed in residuum and colluvium from black, brown, and gray acid shales and interbedded thin layers of siltstone and sandstone.

Agriculture is limited by slope steepness and soil depth. Considerable acreage that was formerly cleared for agriculture is reverting to woodland. Eleven landtypes are recognized: 10, 11, and 31–39.

Subregion 4: Moulton Valley

Landtype Association-I: Strongly Dissected Valley.—This LTA corresponds to soil association 11 (Minvale-Fullerton) in the Moulton Valley in Alabama and is similar to LTA-A. Other parts of soil association 11 were included in LTA-A in the Western Highland Rim and Pennyroyal region (Smalley 1980).

Landtype association-I consists of narrow, winding to moderately broad, undulating ridges and deep narrow valleys with steep side slopes. Valleys in upper reaches of intermittent and permanent streams are U-shaped with bottoms as wide as 250 to 500 ft. Valleys of major streams narrow as they flow northward through Little Mountain.

Hilly and steep parts of LTA-I have well drained and somewhat excessively drained cherty, loamy and clayey soils derived from cherty limestone and dolomite. Undulating parts have well drained and moderately well drained cherty, silty and clayey soils derived from thin silty deposits over clayey residuum from limestone or dolomite.

The boundary between LTA-I and the Upper Coastal Plain physiographic province in Franklin and Colbert Counties, Ala. is indistinct. Soils from unconsolidated Coastal Plain sediments and cherty limestone and dolomite are intimately mixed on the landscape, mostly on broad ridges.

Nearly one-half of LTA-I is forested. Only the smooth ridges and wide streambottom have been cleared for agriculture and some of these are reverting to woodland. Nine landtypes are recognized: 1–5, 8–10, and 40.

Landtype Association-J: Weakly Dissected Valley—Red Soils.—This LTA is a restricted version of LTA-D and corresponds to soil association 5 (Decatur-Dewey) in Alabama. Landtype association-J occupies a band across south central Lawrence County and westward into northeastern Franklin County.

This LTA consists of broad, gently sloping ridges bounded by generally short, sloping to moderately steep side slopes. Uplands are pitted with sinkholes and depressions. The weakly developed dendritic drainage network consists of many shallow intermittent streams and a few permanent ones. Relief is usually less than 100 ft.

The reddish, well drained, clayey and loamy soils are derived from old alluvium or clayey residuum from moderately high-grade limestone. In places a thin silty deposit overlies the old parent materials.

Nearly all of LTA-J has been cleared for agriculture. The area is farmed intensively for cotton, corn, tobacco, and small grains. The productive soils respond to lime and fertilizer. Woodlands are restricted mostly to the steeper slopes and poorly drained areas. Twelve landtypes are recognized: 4–5, 8–10, and 13–19.

Landtype Association-K: Weakly Dissected Valley—Brown Soils.—This LTA corresponds to soil association 3 (Colbert-Conasauga-Firestone) in Alabama. It is limited to the eastern one-third of the Moulton Valley in Morgan County, and in southeastern Madison County and north-central Marshall County.

Landtype association-K consists of nearly level to gently sloping broad valleys between the higher Cumberland Plateau and Little Mountain. Many shallow intermittent drainages and a few permanent streams comprise the weakly developed dendritic drainage pattern. Depressions and broad flat uplands are common. Steep, rocky knobs, remants of the surrounding Plateau, project above the broad level valleys in places.

The mostly moderately well drained and clayey soils are derived from clayey residuum or old clayey alluvium from level-bedded, fractured shales, and argillaceous and shaly limestones.

The LTA is characterized by nearly level pasture land intermingled with wooded areas. Four landtypes are recognized: 20 and 41–43.

Subregion 5: Major River Bottoms

Landtype Association-L: Tennessee River Bottom.—This LTA corresponds to soil association 9 (Lobelville-Lee) along the Tennessee River and several major tributaries (Flint River, Paint Rock River, Huntsville Spring Creek, and Indian Creek) in Lime-

stone, Madison, Marshall, and Jackson Counties, Ala. According to several county soil surveys, these two soils occur infrequently. Lobelville and Lee soils are more common along creeks and streams that drain areas underlain by cherty limestone. Soils common to these bottom lands are heavier textured, somewhat more fertile, and contain less chert than Lobelville and Lee soils. A soil association such as Wolftever-Egam-Beason-Lindside would more aptly describe these bottomlands. Landtype association-L is the same as LTA-J in the Western Highland Rim and Pennyroyal region (Smalley 1980).

Landtype association-L consists of well drained to poorly drained clayey and silty soils that formed in mixed alluvium on nearly level to rolling terraces and floodplains. Most of the floodplains along the Tennessee River and for short distances up the major tributaries are covered by lakes impounded by Tennessee Valley Authority dams.

About 80 percent of LTA-L has been cleared for cultivation and pasture. Major agricultural crops are cotton, corn, soybeans, and hay. Only the steeper and wetter areas are in woodland. Two landtypes are recognized: 44 and 45.

Landtype Association-M: Elk, Duck, and Cumberland River Bottoms.—This LTA corresponds to soil association A43 (Arrington-Lindell-Egam-Armour) along the Elk and Duck Rivers in Tennessee. The association was extended south along the Elk River to Wheeler Lake in northern Alabama. Landtype association-M also corresponds to soil associations 10 (Armour-Pickwick-Lynnville) and 11 (Armour-Lynnville-Arrington) delineated on the general soil map of the Nashville Basin. Although not delineated on the Kentucky general soil map, soil association 11 is extended up the Cumberland River from Celina, Tenn. to Wolf Creek Dam in Russell County. Above the dam, bottomlands and terraces are inundated by Lake Cumberland. Landtype association-M is a continuation of LTA-L in the Western Highland Rim and Pennyroyal region (Smalley 1980).

These bottoms vary from broad extensive areas 1,000 to 2,500 ft. wide to narrow discontinuous strips 100 to 400 ft. wide. Floodplains are nearly level or very gently sloping with 5 to 30 ft. of relief. Terraces and footslopes are steeper and relief may be as much as 150 ft. Limestone or shale escarpments occur intermittently along these rivers.

Landtype association-M consists of well drained to poorly drained mostly silty and clayey soils formed in mixed old alluvium, clayey residuum from limestone and shale, and in places silty deposits. On floodplains coarse-textured and better drained soils usually occur 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. Generally, soils are moderate to high in phosphorus.

Seasonal high water tables and occasional flooding limit the use and affect the management of this LTA. Most of these river bottoms have been cleared for agriculture, but woodlands, some extensive, are scattered all along these bottoms. Corn, soybeans, tobacco, and legumes and tall grasses for hay and pasture are major crops. Cattle and hogs are major livestock enterprises. Two landtypes are recognized: 46 and 47.

Landtype Association-N: Barren, Green, Rolling Fork, Salt, and Kentucky River Bottoms.—This LTA corresponds to soil associations A5 (Belknap-Karnack-McGary) and A7 (Nolin-Newark-Otwell) along the Rolling Fork and Salt Rivers in north central Kentucky and soil association 3 (Huntington-Newark-Morehead) along the Kentucky River and its major tributaries, as delineated on the soil association map of Estill and Lee Counties. Landtype association-N also includes the Barren and Green River bottoms although they were not delineated on the Kentucky general soil map. The Green River bottom was delineated as soil association 5 (Staser-Taft-Landisburg) in the Adair County soil survey. Landisburg soils are now mapped as Tarklin, and Taft soils are now mapped as Lawrence in Kentucky. For the Barren and Green Rivers, LTA-N is a continuation of LTA-M in the Western Highland Rim and Pennyroyal region (Smalley 1980).

These bottoms vary from broad extensive areas 1,000 to 2,000 ft. wide to narrow discontinuous strips 250 to 500 ft. wide. Floodplains are nearly level or very gently sloping with 5 to 25 ft. of relief. Terraces and footslopes are steeper, and relief may exceed 100 ft. Limestone or shale escarpments occur intermittently along these rivers.

Landtype association-N consists of well drained to poorly drained, mostly silty and clayey soils formed in mixed old alluvium, clayey residuum from limestone and shale, and in places silty deposits. However, soils common to LTA-N contain low amounts of phosphorus compared to soils in LTA-M that are moderate to high in phosphorus. On floodplains coarse textured and better drained soils usually occur on the highest areas adjacent to the rivers and, as distance from the rivers increases, soils become progressively more clayey and less well drained.

Seasonal high water tables and occasional flooding limit the use and affect the management of this LTA. Most LTA-N river bottoms have been cleared for agriculture, but woodlands, some extensive, are scattered all along these bottoms. Corn, soybeans, tobacco, and legumes and tall grasses for hay and pasture are major crops. Cattle and hogs are major livestock enterprises. Two landtypes are recognized: 48 and 49.

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

Landtype number and name by subregion	Landtype association[1]
1. Highland Rim Plateau	
1. Narrow ridges and convex upper slopes	A,B
2. Broad ridges—north aspect	A,B
3. Broad ridges—south aspect	A,B
4. Cherty north slopes	A,B,C,D
5. Cherty south slopes	A,B,C,D
6. Shaly north slopes	A
7. Shaly south slopes	A
8. Footslopes, terraces, and streambottoms with good drainage	A,B,C,D
9. Terraces and streambottoms with poor drainage	A,B,C,D
10. Limestone rockland and shallow soils	A,B,D
11. Shale rockland and shallow soils	A,B
12. Broad silty uplands	A,B,C,D
13. Broad undulating redlands	B,D
14. Hilly redlands—north aspect	B,C,D
15. Hilly redlands—south aspect	B,C,D
16. Redland slopes—north aspect	B,C,D
17. Redland slopes—south aspect	B,C,D
18. Upland flats, depressions, and sinkholes with good drainage	B,C,D
19. Upland flats, depressions, and sinkholes with poor drainage	B,C,D
20. Narrow limestone ridges and knoblike hills	D
21. Footslopes, terraces, and streambottoms with good drainage in coves	D
31. Crests of knobs and narrow ridges	A
32. Broad ridges—north aspect	A
33. Broad ridges—south aspect	A
34. Upper north slopes	A
35. Upper south slopes	A
36. Lower north slopes	A
37. Lower south slopes and crests of low knobs and narrow ridges	A
38. Upland depressions, sinkholes, footslopes, terraces, and streambottoms with good drainage	A
39. Upland flats, sinkholes, terraces, and streambottoms with poor drainage	A
2. Transition to the Nashville Basin	
1. Narrow ridges and convex upper slopes	E
2. Broad ridges—north aspect	E
3. Broad ridges—south aspect	E
4. Cherty north slopes	E
5. Cherty south slopes	E
10. Limestone rockland and shallow soils	E,F
11. Shale rockland and shallow soils	E
12. Broad silty uplands	E
22. North slopes	E
23. South slopes	E
24. Footslopes, terraces, and streambottoms with good drainage	E,F
25. Terraces and streambottoms with poor drainage	E,F
26. Broad undulating ridges	F
27. Broad ridges—north aspect	F
28. Broad ridges—south aspect	F
29. North slopes	F
30. South slopes	F
3. Transition to the Bluegrass	
10. Limestone rockland and shallow soils	G,H
11. Shale rockland and shallow soils	G,H
31. Crests of knobs and narrow ridges	G,H
32. Broad ridges—north aspect	G,H
33. Broad ridges—south aspect	G,H
34. Upper north slopes	G,H
35. Upper south slopes	G,H
36. Lower north slopes	G,H

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

Landtype number and name by subregion	Landtype association[1]
37. Lower south slopes and crests of low knobs and narrow ridges	G,H
38. Upland depressions, sinkholes, footslopes, terraces, and streambottoms with good drainage	G,H
39. Upland flats, sinkholes, terraces, and streambottoms with poor drainage	G,H
4. Moulton Valley	
1. Narrow ridges and convex upper slopes	I
2. Broad ridges—north aspect	I
3. Broad ridges—south aspect	I
4. Cherty north slopes	I,J
5. Cherty south slopes	I,J
8. Footslopes, terraces, and streambottoms with good drainage	I,J
9. Terraces and streambottoms with poor drainage	I,J
10. Limestone rockland and shallow soils	I,J
13. Broad undulating redlands	J
14. Hilly redlands—north aspect	J
15. Hilly redlands—south aspect	J
16. Redland slopes—north aspect	J
17. Redland slopes—south aspect	J
18. Upland flats, depressions, and sinkholes with good drainage	J
19. Upland flats, depressions, and sinkholes with poor drainage	J
20. Narrow limestone ridges and knoblike hills	K
40. Undulating Coastal Plain uplands	I
41. Broad undulating valleys	K
42. Broad valley flats, depressions, terraces, and streambottoms with good drainage	K
43. Broad valley flats, depressions, terraces, and streambottoms with poor drainage	K
5. Major River Bottoms	
44. Terraces and floodplains with good drainage	L
45. Terraces and floodplains with poor drainage	L
46. Terraces and floodplains with good drainage	M
47. Terraces and floodplains with poor drainage	M
48. Terraces and floodplains with good drainage	N
49. Terraces and floodplains with poor drainage	N

[1]See table 3.

LANDTYPES

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

The Eastern Highland Rim and Pennyroyal region has 49 landtypes distributed among five subregions and fourteen landtype associations (table 4). Some are common to as many as nine associations while others are characteristic of only one landtype association. Figures 3 to 6 depict how these landtypes occur on the landscape in each of the landtype associations.

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. Slope was classified in accordance with SCS standards (Soil Survey Staff 1951).

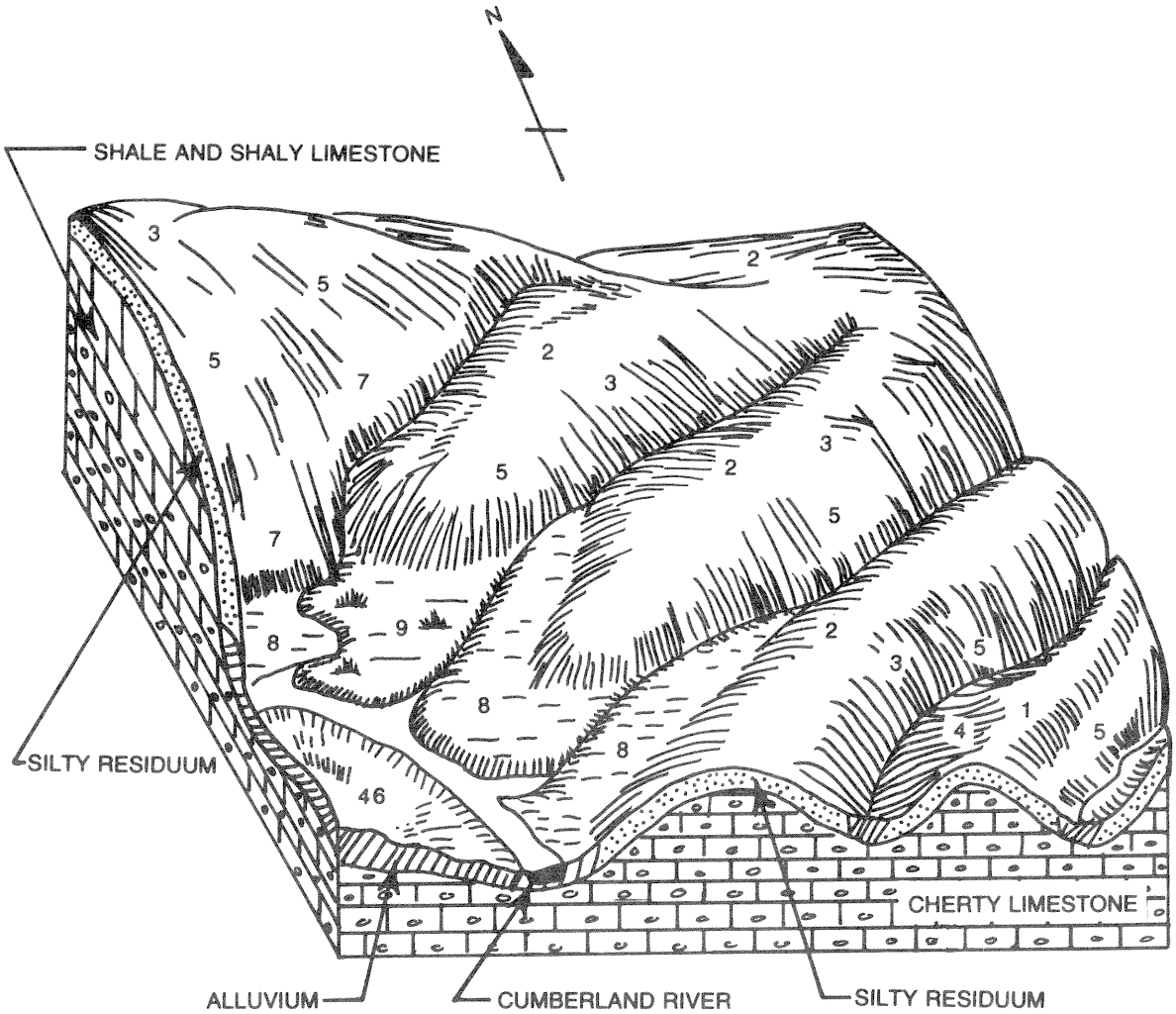

Figure 3.—*Landtypes characteristic of Landtype Associations A and B in Subregion 1, Landtype Association I in Subregion 4, and Landtype Association M in Subregion 5.*

LEGEND

1. Narrow ridges and convex upper slopes.
2. Broad ridges—north aspect.
3. Broad ridges—south aspect.
4. Cherty north slopes.
5. Cherty south slopes.
7. Shaly south slopes.
8. Footslopes, terraces, and streambottoms with good drainage.
9. Terraces and streambottoms with poor drainage.
46. Terraces and floodplains with good drainage.

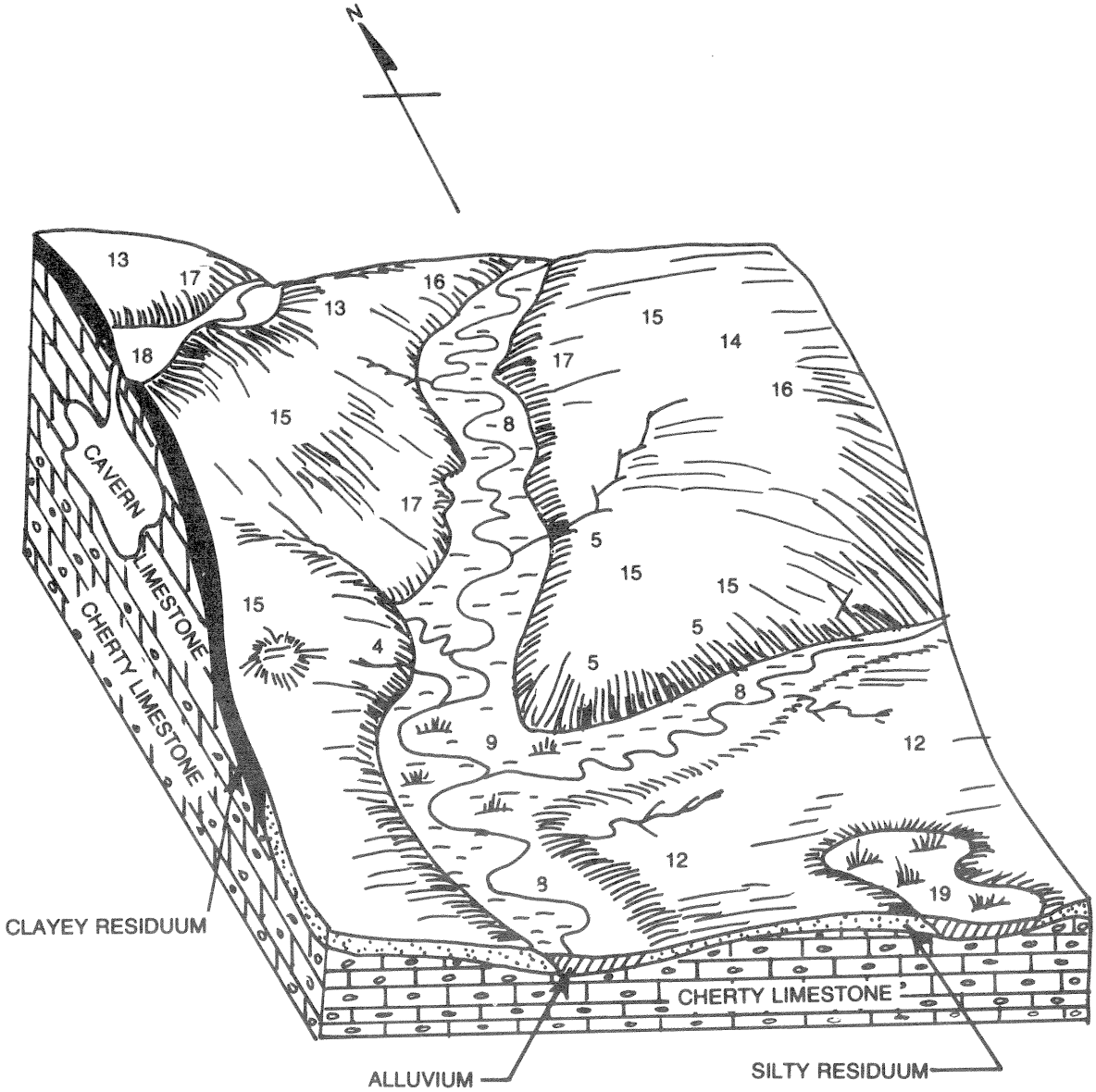

Figure 4.—*Landtypes characteristic of Landtype Association C (bottom) and D (top) in Subregion 1, and Landtype Association J (top) in Subregion 4.*

LEGEND

4. Cherty north slopes.
5. Cherty south slopes.
8. Footslopes, terraces, and streambottoms with good drainage.
9. Terraces and streambottoms with poor drainage.
12. Broad silty uplands.
13. Broad undulating redlands.
14. Hilly redlands—north aspect.
15. Hilly redlands—south aspect.
16. Redland slopes—north aspect.
17. Redland slopes—south aspect.
18. Upland flats, depressions, and sinkholes with good drainage.
19. Upland flats, depressions, and sinkholes with poor drainage.

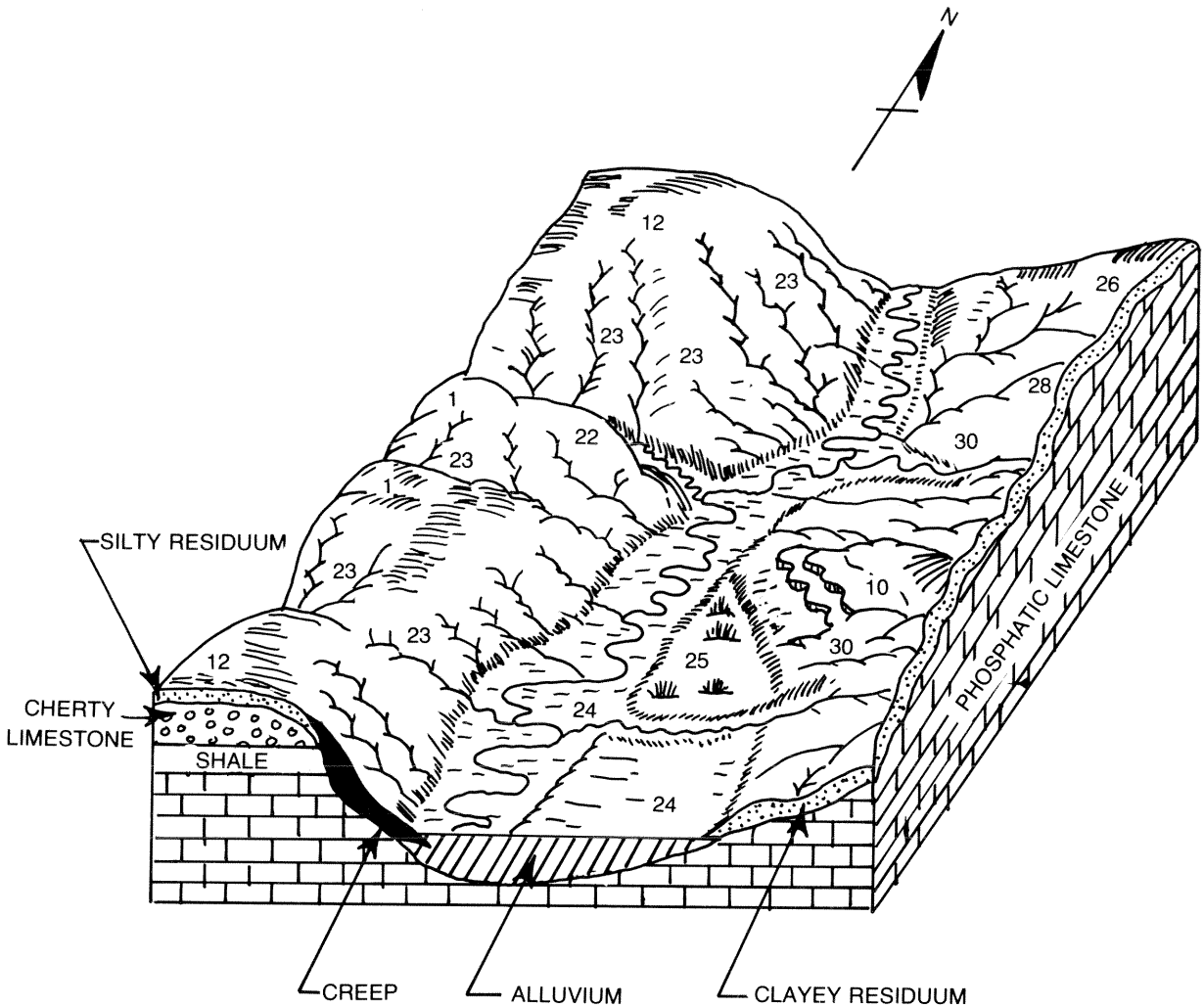

Figure 5.—*Landtypes characteristic of Landtype Association E (right) and F (left) in Subregion 2. Adapted from figures 4 and 5 in Edwards and others (1974).*

LEGEND

1. Narrow ridges and convex upper slopes.
10. Limestone rockland and shallow soils.
12. Broad silty uplands.
22. North slopes.
23. South slopes.
24. Footslopes, terraces, and streambottoms with good drainage.
25. Terraces and streambottoms with poor drainage.
26. Broad undulating ridges.
28. Broad ridges—south aspect.
30. South slopes.

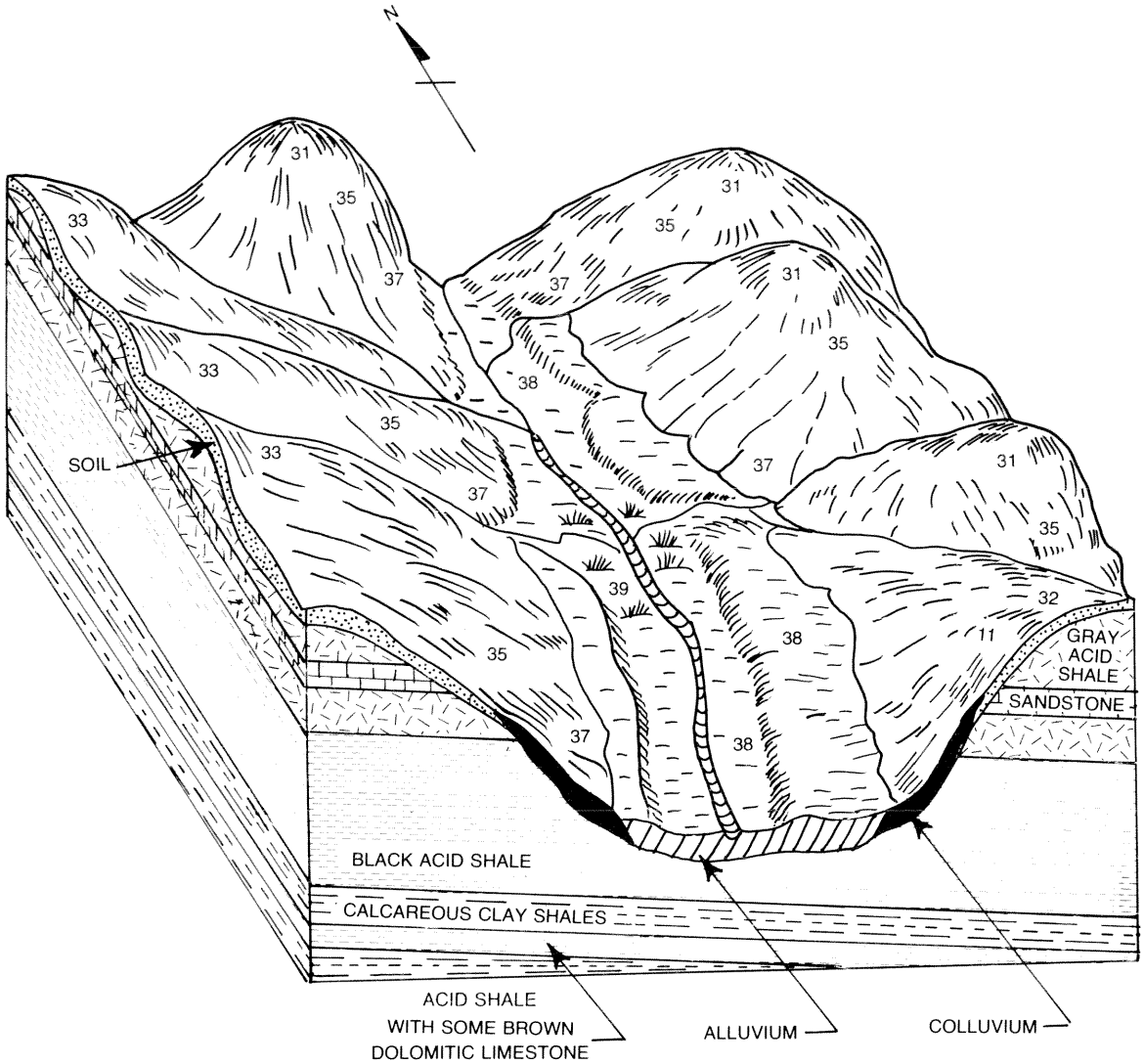

Figure 6.—*Landtypes characteristic of Landtype Associations G and H in Subregion 3.*

LEGEND

11. Shale rockland and shallow soils.
31. Crests of knobs and narrow ridges.
32. Broad ridges—north aspect.
33. Broad ridges—south aspect.
35. Upper south slopes.
37. Lower south slopes.
38. Upland depressions, sinkholes, footslopes, terraces, and streambottoms with good drainage.
39. Upland flats, sinkholes, terraces, and streambottoms with poor drainage.

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.

The kind of **Bedrock** or **Soil Parent Material** and the **Depth to Bedrock** are listed next. **Soil Texture** is described in 12 conventional classes, based on percentages of sand, silt, and clay-size particles (Soil Survey Staff 1951).

The conventional seven **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 texture and thickness), but allowances are made for influences of soil drainage, topographic position, and aspect.

Soil Fertility is described as: *very low, low, moderdately low, moderate, moderately high, high* or *very high*. Some soils (Bodine, 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 Eastern Highland Rim and Pennyroyal soils varies widely (Edwards and others 1974, Francis and Lofton, 1977).

Common and occasional woody species in the overstory are listed under **Vegetation** in approximate order of abundance. Important understory species are listed also, including some distinctive herbaceous groups. Reproduction of overstory species is usually present in the understory, but species are not lisited. Loblolly pine, native only in northern Alabama and southern Tennessee, has been planted north of its range on converted sites and abandoned fields. Species nomenclature follows Little (1979) and Fernald (1950).

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 operations.

Productivity

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

For all naturally occurring species, site indices are the averages of values from SCS soil survey interpretations for dominant soils in each landtype. SCS personnel obtained height and age measurements in well-stocked, even-aged, essentially unmanaged stands not damaged excessively by fire, insects, disease, or grazing. These stands were located on soils representing, as nearly as possible, the modal concept of each soil series. SCS personnel then used published site index curves (Beck 1962; Broadfoot 1960, 1963; Broadfoot and Krinard 1959; Curtis and Post 1962; Defler 1937; Nelson and others 1961; Schnur 1937; Tennessee Valley Authority 1948[2]; and U.S. Forest Service 1929) to convert height and age data to site indices. Curves for all species are based on age 50 years. When site indices were available for one species, estimates for other species were made using Doolittle's (1958) site index comparisons. When necessary, I adjusted SCS site index values for aspect and slope position according to experience and soil-site research (Carmean 1975).

Site indices, base age 25 years from seed, 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 of important species were estimated. These estimated values are enclosed in parentheses in tables 5 to 53.

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

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

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, assuming a planting density of 1,000 seedlings per acre. 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 Eastern Highland Rim and Pennyroyal or for areas other than the Eastern 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.

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 occurring during and after forest management operations which expose soil along roads, skid trails, fire lanes, and landing areas. The ratings assume good management and protection 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 to 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 have potential for fast growth, high value, or both. *Acceptable* species have moderate growth rate or value. *Least Desirable* species have 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 on-site determinations of site productivity and will provide a site-dependent framework for forest management planning and forest research.

To make on-site determinations of productivity on a particular tract of land, the user must first determine the subregion and landtype association in which the particular 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 6) 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 estimates. 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. 7), which can be used in all phases of management. The number and scale of maps will depend on tract size and management intentions. Landtypes can be mapped at scales of 1:10,000 to 1:60,000 allowing areas as small as 2 acres to be recognized on the larger scale maps. Smoothness of the terrain will determine maximum size. 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, but ground checking should be part of the mapping process. Owners or managers of large tracts should explore the advantages of computer-generated mapping or 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 needing research. 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 facilitates immediate transfer of research results to the practitioner. Study results can be reported on the basis of their applicability to specific landtypes.

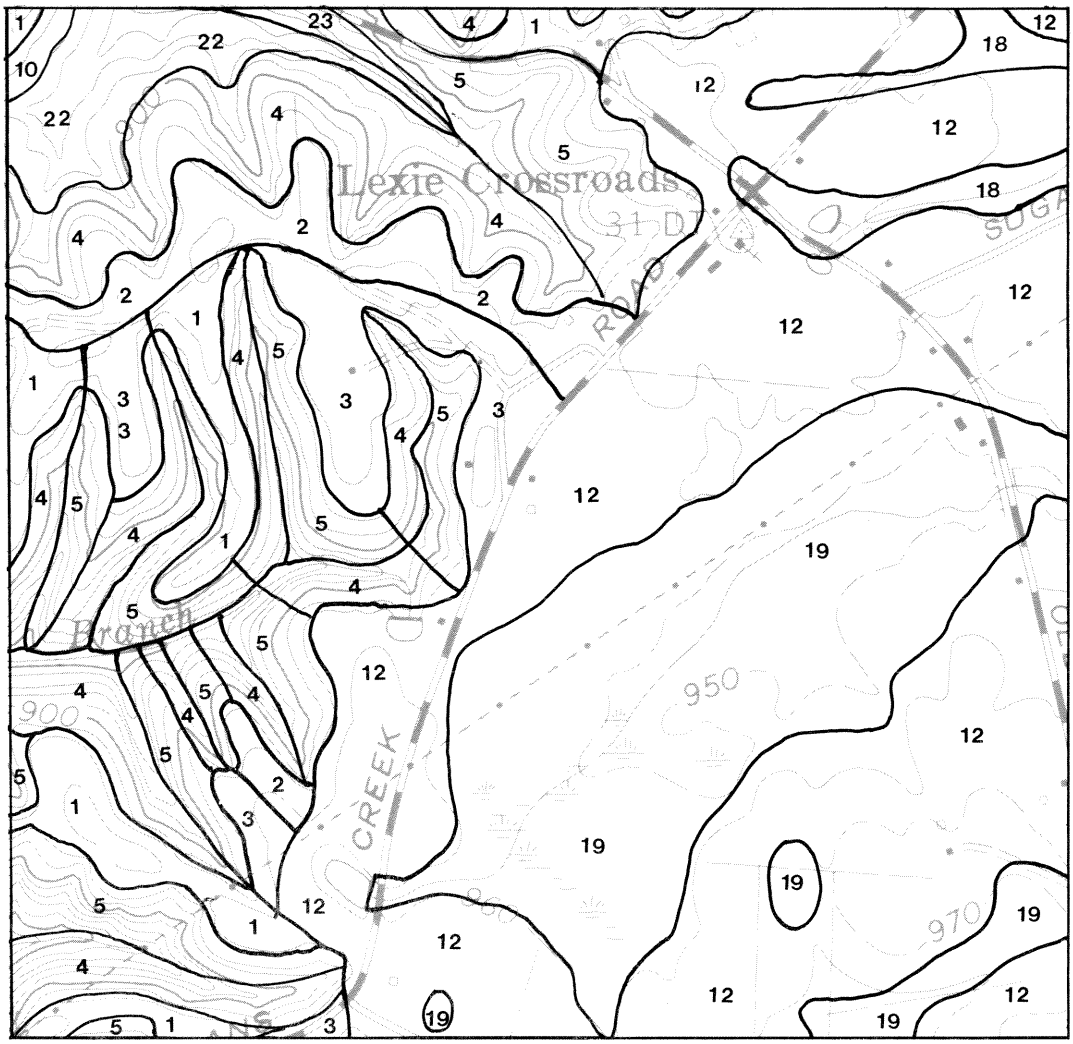

Figure 7.—*A sample landtype map showing Landtype Associations C (Weakly dissected plateau—gray soils) and E (Tennessee Knobs) in Subregions 1 and 2, respectively. Map covers a tract of about 700 ac. in the southeast quarter of the Lois Quadrangle near the common corner of Moore, Franklin, and Lincoln Counties, Tenn. Scale is 1:12,000. See table 4 for names of landtypes.*

Description of Landtype 1: Narrow Ridges and Convex Upper Slopes

Geographic Setting—Deep, silty and clayey, cherty or gravelly soils on gently sloping to steep, narrow winding ridgetops, hills and adjoining convex upper slopes in Subregions 1, 2, and 4. Slope ranges from 2 to 30 percent. Typically this landtype is no wider than 250 ft. Chert or sandstone fragments are common on the surface. Fifteen to 80 percent of the soil mass may be chert fragments mostly 1 to 5 in., but some fragments may be 2 ft. across.

Dominant Soils—Bodine, Fullerton, Christian, and Frankstown.

Bedrock—Cherty limestone and interbedded limestone, sandstone, siltstone, and shale.

Depth to Bedrock—40 to more than 80 in.

Texture—Silt loam, loam, or sandy loam, and cherty or gravelly analogs.

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, northern red oak, and eastern redcedar. Flowering dogwood, sourwood, eastern hophornbeam, winged elm, sassafras, vacciniums, 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 120*

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	117
Shortleaf pine	65		113	84
Virginia pine	65		70	
Eastern redcedar	40			
Upland oaks	55		38	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate to severe	Moderate to severe	Slight to 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
	N. red oak	Blackjack oak
	Black oak	Winged elm
	S. red oak	Sassafras
	Scarlet oak	Red maple
	Yellow-poplar	Blackgum
		Flowering dogwood
		Sourwood

Description of Landtype 2:
Broad Ridges—North Aspect

Geographic Setting—Deep, silty and clayey, cherty soils on gently sloping to strongly sloping north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregions 1, 2, and 4. 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 4 ft. of silty deposits over clayey residuum from limestone some of which is cherty, or from residuum from sandstone, shale, siltstone and limestone. Chert, as much as 35 percent of the soil mass, is concentrated in the lower solum. Chert fragments occur on the surface in places.

Dominant Soils—Mountview, Dickson, Bewleyville, Baxter, Bedford, Frederick and Christian.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 4 ft. Dickson and Bedford soils have fragipans at depths of 24 to 36 in.

Texture—Silt loam; occasionally loam or silty clay 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 eastern redcedar, chestnut oak, post oak, yellow-poplar, red maple, black walnut, white ash, black cherry, and Virginia pine. Flowering dogwood, scarlet oak, sassafras, persimmon, vacciniums, and winged elm are common in the understory.

Table 6.—*Forest management interpretations for Landtype 2: Broad Ridges—North Aspect. Footnotes appear on page 120*

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	133
Shortleaf pine	70		125	119
Virginia pine	70		92	
Upland oaks	70		57	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant Competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight to medium	Slight	Slight to moderate	Slight to moderate	Slight

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Virginia pine	E. redcedar
Loblolly pine	Hickories	Post oak
Black walnut	Chestnut oak	Winged elm
White oak	Black oak	Sassafras
N. red oak	S. red oak	Red maple
Yellow-poplar	Scarlet oak	Blackgum
Black cherry		Flowering dogwood
White ash		Persimmon

Description of Landtype 3:
Broad Ridges—South Aspect

Geographic Setting—Deep, silty, clayey and cherty soils on gently sloping to strongly sloping south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregions 1, 2, and 4. 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 have shallower soils with a higher chert content than north-facing ridges. Soil developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone, some of which is cherty, or from residuum from sandstone, shale, siltstone, and limestone. Chert, as much as 35 percent of the soil mass, is concentrated in the lower solum. Chert fragments occur on the surface in places.

Dominant Soils—Mountview, Dickson, Bewleyville, Baxter, Bedford, Frederick, and Christian.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 4 ft. Dickson and Bedford soils have fragipans at depths of 24 to 36 in.

Texture—Silt loam; occasionally loam or silty clay 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, flowering dogwood, vacciniums, persimmon, and winged elm are common in the understory.

Table 7.—*Forest management interpretations for Landtype 3: Broad Ridges—South Aspect. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index		Average annual growth cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[2]	Old-field plantations[4]
Loblolly pine	75		114	117
Shortleaf pine	65		113	102
Virginia pine	65		70	
Upland oaks	65		51	
Yellow-poplar	80		71	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Slight	Slight to moderate	Slight to moderate	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
	Yellow-poplar	Flowering dogwood
		Sourwood
		Persimmon

Description of Landtype 4: Cherty North Slopes

Geographic Setting—Moderately deep to deep, silty and clayey soils that are mostly cherty on sloping to very steep north-facing linear or nearly linear midslopes in Subregions 1, 2, and 4. In Subregions 1 and 4 this landtype lies between narrow winding ridgetops, broad uplands, and broad ridgetops and convex upper slopes (Landtypes 1, 2, 12, 13, 14, and 40) and lower concave footslopes, terraces, and bottoms of streams and creeks (Landtypes 8 and 9) or terraces and floodplains of major river bottoms (Landtypes 44 to 49). In Subregion 2 Landtype 4 occurs in an upper slope position above Landtype 22 which occupies the lower slopes. Slope ranges from 10 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, Fullerton, Baxter, Christian, Trimble, and Talbott.

Bedrock—Limestone, cherty limestone, or interbedded limestone, shale, and sandstone.

Depth to Bedrock—More than 60 in. under Bodine, Fullerton, Baxter, and Trimble soils; 40 to 80 in. under Christian soils; and 20 to 40 in. under Talbott soils.

Texture—Cherty silt loam, cherty loam, and silt loam; occasionally fine sandy loam. Eroded areas have finer texture.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—High to medium. Soil water supply is augmented 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, chinkapin oak, post oak, elms, white ash, black walnut, black cherry, eastern redcedar, American beech, sugar maple, shortleaf pine, loblolly pine, and Virginia pine. Flowering dogwood, sassafras, persimmon, eastern hophornbeam, eastern redbud, devil's club, euonymuses, hydrangea, and vacciniums are common in the understory.

Table 8.—*Forest management interpretations for Landtype 4: Cherty North Slopes. Footnotes appear on page 120*

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	50	113	120
Virginia pine	70		92	
E. redcedar	50			
N. red oak	75		57	
Black oak, S. red oak	70		52	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight to moderate	Moderate	Slight to moderate	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	Chinkapin oak	American beech
White oak	Black oak	Sassafras
N. red oak	S. red oak	E. redbud
Yellow-poplar	Scarlet oak	Maples
Black cherry	Elm	Blackgum
White ash		Flowering dogwood
		Sourwood
		Persimmon

Description of Landtype 5: Cherty South Slopes

Geographic Setting—Moderately deep to deep, silty and clayey soils that are mostly cherty on sloping to very steep south-facing linear or nearly linear midslopes in Subregions 1, 2, and 4. In Subregions 1 and 4 this landtype lies between the narrow winding ridgetops, broad uplands, and broad ridges and convex upper slopes (Landtypes 1, 3, 12, 13, 15, and 40) and the lower concave footslopes, terraces, and bottoms of streams and creeks (Landtypes 9 and 10) or terraces, and floodplains of major river bottoms (Landtypes 44 to 49). In Subregion 2 Landtype 5 occurs in an upper slope position above Landtype 23 which occupies the lower slopes. Slope ranges from 10 to 60 percent. South-facing slopes tend to have shallower soils with higher rock contents than north-facing slopes. 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, Fullerton, Baxter, Christian, Trimble and Talbott.

Bedrock—Limestone, cherty limestone, or interbedded limestone, shale and sandstone.

Depth to Bedrock—More than 60 in. under Bodine, Fullerton, Baxter, and Trimble soils; 40 to 80 in. under Christian soils; and 20 to 40 in. under Talbott soils.

Texture—Cherty silt loam, cherty loam, and silt loam; occasionally fine sandy loam. Eroded areas have finer texture.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Medium to low. Soil water supply is augmented by subsurface flow, but south slopes dry quickly, especially during the growing season.

Soil Fertility—Moderately low.

Vegetation—White oak, scarlet oak, chestnut oak, chinkapin 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. Eastern redbud, eastern hophornbeam, flowering dogwood, vacciniums, euonymuses, winged elm, sassafras, and wild plum are common in the understory.

Table 9.—*Forest management interpretations for Landtype 5: Cherty South Slopes. Footnotes appear on page 120*

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		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	Moderate	Slight to 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
	Chinkapin oak	Winged elm
	Black oak	E. redbud
	S. red oak	Red maple
	Scarlet oak	Blackgum
	Elms	Flowering dogwood
	Yellow-poplar	

Description of Landtype 6:
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 streambottoms (Landtypes 9 and 10) that have cut deeply into the Highland Rim Plateau in Subregion 1. In Tennessee these shaly north slopes occur below ridges and convex upper slopes (Landtypes 1 and 2) and cherty sideslopes (Landtype 4). In Kentucky shale and shaly limestone are more common and Landtype 6 usually occupies the entire slope below the ridges (Landtypes 1 and 2). Landtype 6 differs from Landtype 22 in Subregion 2 (Transition to the Nashville Basin) and Landtypes 34 and 36 in Subregion 3 (Transition to the Bluegrass) because streams have not cut through the Chattanooga or New Albany shale. Slope ranges from 15 to 50 percent. Shale fragments are common on the soil surface. Outcrops of shale and limestone are common but usually not extensive. The few extensive areas of outcrops and shallow soils should be delineated as Landtype 10 or 11. Fifty percent or more of the soil mass may be shale, chert, or limestone fragments.

Dominant Soils—Sulphura, Garmon, and , in Tennessee, an undefined soil that is 2 to 4 ft. deep over cherty and shaly limestone. Some soils on these shaly slopes resemble Dandridge and Needmore.

Bedrock—Shale, shaly limestone and in places, colluvium from soils formed in cherty limestone residuum.

Depth to Bedrock—20 to 40 in.

Texture—Shaly silt loam.

Soil Drainage—Well drained to excessively drained.

Relative Soil Water Supply—Medium to high. Soil water supply is augmented by subsurface flow. Soil moisture is greater during the dormant season than during the growing season. Soil wetness may be a problem on lower slopes.

Soil Fertility—Moderately low to moderate.

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, sugar maple, eastern redcedar, loblolly pine, shortleaf pine, and Virginia pine. Flowering dogwood, sassafras, eastern hophornbeam, winged elm, American beech, eastern redbud, euonymuses, and vacciniums are common in the understory.

Table 10.—*Forest management interpretations for Landtype 6: Shaly North Slopes. Footnotes appear on page 120*

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	
N. red oak	60		43	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

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

Description of Landtype 7: 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 stream bottoms (Landtypes 9 and 10) that have cut deeply into the Highland Rim Plateau in Subregion 1. In Tennessee these shaly south slopes occur below ridges and convex upper slopes (Landtypes 1 and 3) and cherty sideslopes (Landtype 5). In Kentucky, shale and shaly limestone are more common and Landtype 7 usually occupies the entire slope below the ridges (Landtypes 1 and 3). Landtype 7 differs from Landtype 23 in Subregion 2 (Transition to the Nashville Basin) and Landtypes 35 and 37 in Subregion 3 (Transition to the Bluegrass) because streams have not cut through the Chattanooga or New Albany shales. Slope ranges from 15 to 50 percent. South-facing slopes tend to have shallower soils with higher rock content than north-facing slopes. Outcrops of shale and limestone are common but usually not extensive. The few extensive areas of outcrops and shallow soils should be delineated as Landtypes 10 or 11. Fifty percent or more of the soil mass may be shale, chert, or limestone fragments.

Dominant Soils—Sulphura, Garmon, and in Tennessee an undefined soil that is 2 to 4 ft. deep over cherty and shaly limestone. Some soils on these shaly slopes resemble Dandridge and Needmore.

Bedrock—Shale, shaly limestone, and in places colluvium from soils formed in cherty limestone residuum.

Depth to Bedrock—20 to 40 in.

Texture—Shaly silt loam.

Soil Drainage—Well drained to excessively drained.

Relative Soil Water Supply—Low. Soil water supply augmented by subsurface flow, but south slopes dry quickly, especially during the growing season.

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. Flowering dogwood, sassafras, winged elm, vacciniums, eastern hophornbeam, and euonymuses are common in the understory.

Table 11.—*Forest management interpretations for Landtype 7: Shaly South Slopes. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index: Natural stands[1]	Site index: Old-field plantations[2]	Average annual growth cubic feet per acre: Natural stands[3]	Average annual growth cubic feet per acre: 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	
Loblolly pine	Hickories	E. redcedar
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	Flowering dogwood

Description of Landtype 8: Footslopes, Terraces, and Streambottoms With Good Drainage

Geographic Setting—Deep and very deep, silty and loamy soils with good internal drainage on level to moderately steep concave footslopes, terraces, and streambottoms in Subregions 1 and 4. Slope ranges from 0 to 20 percent. This landtype typically occurs below Landtypes 4–7, 16 and 17 as long, narrow strips along intermittent drainages and as level bottomlands along permanent streams. When Landtypes 8 and 9 are adjacent, Landtype 8 occupies a higher position on the landscape.

Dominant Soils—Cherty Minvale, Humphreys, Tarklin and Sensabaugh on footslopes and terraces; Cannon, Lobelville, Ennis, and Greendale on streambottoms. Noncherty Etowah, Emory, Sequatchie, and Otwell on footslopes and terraces; Staser, Pruitton, Hamblen, Huntington, Lindside, and Nolin on streambottoms.

Parent Material—Alluvium and colluvium from cherty limestone, limestone, and silty deposits, occasionally shale, siltstone, and sandstone.

Depth to Bedrock—4 to 15 ft. Tarklin and Otwell soils have fragipans at depths of 19 to 23 in.

Texture—Silt loam and occasionally silty clay loam, clay loam, and fine sandy loam or their cherty and gravelly analogs.

Soil Drainage—Moderately well drained to well drained.

Relative Soil Water Supply—High. Soil water supply is augmented by subsurface flow.

Soil Fertility—Moderately high.

Vegetation—White oak, yellow-poplar, 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, river birch, shortleaf pine, and Virginia pine. Dogwoods, cane, persimmon, American hornbeam, spicebush, eastern redbud, vacciniums, sassafras, boxelder, pawpaw, euonymuses, hawthorns, and hydrangea are common in the understory.

Table 12.—*Forest management interpretations for Landtype 8: Footslopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 120*

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	60	144	148
Shortleaf pine	75	55	136	134
Virginia pine	70		92	
N. red oak	80		62	
S. red oak	80		62	
White oak	75		57	
Yellow-poplar	(100)		107	
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
Loblolly pine	Shortleaf pine	E. redcedar
Cottonwood	Virginia pine	River birch
Black walnut	Hickories	American hornbeam
N. red oak	White oak	American beech
Yellow-poplar	Black oak	Hackberry
Sweetgum	S. red oak	Sassafras
American sycamore	Elms	E. redbud
Black cherry		Maples
White ash		Blackgum
		Dogwoods
		Persimmon

Description of Landtype 9: Terraces and Streambottoms With Poor Drainage

Geographic Setting—Deep and very deep, silty and loamy soils with poor internal drainage on level to gently sloping terraces and streambottoms in Subregions 1 and 4. Slope ranges from 0 to 3 percent. This landtype typically occurs below Landtypes 4–7, 16 and 17 as long, narrow strips along intermittent drainages and as level bottom lands along permanent streams and creeks. When Landtypes 8 and 9 are adjacent, Landtype 9 occupies a lower position on the landscape.

Dominant Soils—Cherty Lee and noncherty Taft, Lawrence, Robertsville, Newark, and Melvin.

Parent Material—Alluvium from cherty limestone, limestone, and loess; occasional shale, siltstone and sandstone.

Depth to Bedrock—More than 5 ft. Taft, Lawrence, and Robertsville soils have fragipans at depths ranging from 15 to 36 in.

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

Soil Drainage—Somewhat poorly drained to poorly drained.

Relative Soil Water Supply—Very high to high. Soil water supply is augmented by subsurface flow. Soils have a seasonally fluctuating water table and are subject to occasional flooding.

Soil Fertility—Moderately high.

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

Table 13.—*Forest management interpretations for Landtype 9: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 120*

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	
Pin oak	95			
Bottomland oaks	90			
White oak	75		57	
Yellow-poplar	95		98	
Sweetgum	90		81	
Cottonwood	95			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	Willows
Cottonwood	White oak	American hornbeam
Pin oak	N. red oak	American beech
Sweetgum	Elms	Maples
Green ash	Yellow-poplar	Blackgum
	American sycamore	Dogwoods

Description of Landtype 10: 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 sloping to very steep knobs and hills projecting above the surrounding surface of the Highland Rim and Pennyroyal plateau; on gently sloping to moderately steep ridges and slopes; along incised streams; and in sinkholes in Subregions 1 to 4. In some places along larger streams and rivers this landtype is actually a bluff 50 to 200 ft. high. This intricate pattern of soil and rockland occurs in association with many landtypes. Eastern redcedar often dominates this landtype. Slope ranges from 0 to 60 percent. Soils developed in clayey residuum from limestone, phosphatic limestone, and thin strata of shale. Soil mass may contain up to 65 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 and projects 1 to 5 ft. above the surface, but the slope of each terrace is nearly level.

Dominant Soils—Barfield, Gladeville, Fairmount, Corydon, and Limestone Rockland. Pockets of moderately deep Ashwood, Talbott, Caneyville, and Fredonia soils may occur in this landtype.

Bedrock—Limestone, phosphatic limestone, and thin strata of shale.

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

Texture—Silty clay loam, silt loam, silty clay, and 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, Shumard oak, and post oak; occasional bur oak, honeylocust, Virginia pine, blackjack oak, blue ash, and white ash. Forbs, grasses, sumacs, eastern redbud, winged elm, osage-orange, Carolina buckthorn, hawthorns, and prickly pear are common in the understory.

Table 14.—*Forest management interpretations for Landtype 10: Limestone Rockland and Shallow Soils. Footnotes appear on page 120*

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 E. redcedar	Hickories Bur oak Post oak Chinkapin oak Shumard oak Rock elm White ash Blue ash	Blackjack oak Winged elm Hackberry Osage-orange E. redbud Honeylocust

Description of Landtype 11: Shale Rockland and Shallow Soils

Geographic Setting—Small to extensive areas of hard shale outcrops interspersed with patches of shallow to moderately deep, silty and clayey soils on sloping to steep slopes and along incised streams. This intricate pattern of soils and rockland occurs mostly in association with Landtypes 6–9 in Subregion 1, Landtypes 22–25 in Subregion 2, and Landtypes 31 and 34–37 in Subregion 3. Slope ranges from 15 to 50 percent. Soil mass, particularly B and C horizons, may contain up to 60 percent shale or chert fragments. Shale fragments are common on the soil surface. Soft shale weathers rapidly and seldom forms outcrops, but may form shaly talus slopes or be exposed on road cuts.

Dominant Soils—Colyer, Weikert, Dandridge or similar unnamed soils. Pockets of moderately deep Sulphura, Garmon, Trappist, Berea, and Needmore occur in this landtype.

Bedrock—Hard, acid shale; occasionally calcareous shale, shaly limestone, or siltstone.

Depth to Bedrock—0 to 20 in. but ranges up to 40 in. where Sulphura, Garmon, Trappist, Bera, and Needmore soils occur.

Texture—Shaly or cherty silt loam, loam, and silty clay loam.

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—Low.

Vegetation—White oak, scarlet oak, chestnut oak, hickories, southern red oak, black oak, eastern redcedar, shortleaf pine, and Virginia pine; occasional post oak, blackjack oak, chinkapin oak, elms, yellow-poplar, blackgum, American beech, white ash, sugar maple, black walnut, black cherry, and red maple. Flowering dogwood, sassafras, sourwood, winged elm, vacciniums, eastern hophornbeam, American hornbeam, and euonymuses are common in the understory.

Table 15.—*Forest management interpretations for Landtype 11: Shale Rockland and Shallow Soils. Footnotes appear on page 120*

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	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 to severe

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Shortleaf pine	Black walnut	E. redcedar
Virginia pine	Hickories	American hornbeam
White oak	Post oak	E. hophornbeam
S. red oak	Chestnut oak	American beech
	Chinkapin oak	Blackjack oak
	Black oak	Winged elm
	Scarlet oak	Sassafras
	Elms	Maples
	Yellow-poplar	Blackgum
	Black cherry	Flowering dogwood
	White ash	Sourwood

Description of Landtype 12: Broad Silty Uplands

Geographic Setting—Deep, silty soils on nearly level to strongly sloping broad uplands in Subregions 1 and 2. Slope ranges from 1 to 15 percent, but it is commonly 8 percent or less; aspect is not a dominant site factor. This landtype is the dominant one in Landtype Association C where it may exceed 0.25 mi. in width. Areas with greater slope should be classified as Landtypes 2 or 3. Landtype 12 is not as common in LTA-B as in LTA-C and occurs infrequently in LTA's A and D. In Landtype Association E, this landtype ranges from 250 to 500 ft. wide and occupies the broader tops of narrow hills and stringer ridges that comprise the transition from the Highland Rim Plateau to the Nashville Basin.

Dominant Soils—Mountview, Dickson, and Bedford.

Bedrock—2 to 4 ft. of silty deposits over residuum from cherty clayey limestone.

Depth to Bedrock—More than 5 ft. Dickson and Bedford soils have fragipans at depths ranging from 24 to 36 in.

Texture—Silt loam.

Soil Drainage—Well drained to 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, water oak, and red maple. Flowering dogwood, vaccinums, sourwood, sassafras, Carolina buckthorn, and winged elm are common in the understory.

Table 16.—*Forest management interpretations for Landtype 12: Broad Silty Uplands. Footnotes appear on page 120*

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	60	123	148
Shortleaf pine	65	45	113	102
Virginia pine	65		70	
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	Water oak	Red maple
Scarlet oak	Yellow-poplar	Carolina buckthorn
	Sweetgum	Blackgum
	Black cherry	Flowering dogwood
		Sourwood

Description of Landtype 13: Broad Undulating Redlands

Geographic Setting—Deep, silty and clayey soils on nearly level to sloping uplands in Subregions 1 and 4. Slope ranges from 0 to 10 percent, but it is commonly 6 percent or less; aspect is not a dominant site factor. This landtype may extend for 0.5 mi. Typically, it occupies the highest part of the landscape with the exception of Landtype 20. Sinkholes and depressions (Landtypes 18 and 19) are common. Landtype 13 grades into Landtypes 8 and 9 in upper reaches of the drainage network, into Landtypes 16 and 17 if side slopes are short and drainageways are shallow, or into Landtypes 4 and 5 if sideslopes are long and drainageways are incised. Soils developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone or in old alluvium. Volume of chert is negligible in the upper solum and occasionally ranges up to 25 percent in the lower solum below the discontinuity.

Dominant Soils.—Bewleyville, Curtistown, Decatur, Dewey, Waynesboro, Cumberland, Pembroke, Crider, and Frederick.

Bedrock—Limestone.

Depth to Bedrock—More than 5 ft.

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

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderate to moderately high.

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

Table 17.—*Forest management interpretations for Landtype 13: Broad Undulating Redlands. Footnotes appear on page 120*

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	45	136	102
Virginia pine	75		120	
N. red oak	80		62	
S. red oak	70		52	
White oak	75		57	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Slight	Slight	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	Hackberry
White oak	Scarlet oak	Red mulberry
N. red oak	Elms	Sassafras
Yellow-poplar	Sugar maple	Red maple
Black cherry		Flowering dogwood
White ash		Sourwood
		Persimmon

Description of Landtype 14:
Hilly Redlands—North Aspect

Geographic Setting—Deep silty and clayey soils on sloping to hilly north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregions 1 and 4. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point the gradient usually increases noticeably. Slope ranges from 6 to 20 percent, but it is commonly less than 15 percent. Landtypes 14 and 15 occupy the highest part of the landscape where the drainage pattern is more defined than the irregular pattern common to Landtype 13. Sinkholes and depressions (Landtypes 18 and 19) are common. Landtype 14 grades into Landtypes 8 and 9 in the upper reaches of the drainage network, into Landtype 16 if sideslopes are short and drainageways are shallow, or into Landtype 4 if sideslopes are long and drainageways are incised. Soils developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone that sometimes is cherty or in old alluvium.

Dominant Soils—Decatur, Dewey, Waynesboro, Bewleyville, Cumberland, Fullerton, Crider, Baxter, and Frederick.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 5 ft.

Texture—Silt loam, loam and cherty analogs.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderate to moderately high.

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

Table 18.—*Forest management interpretations for Landtype 14: Hilly Redlands—North Aspect. Footnotes appear on page 120*

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	60	123	148
Shortleaf pine	70	50	125	120
Virginia pine	70		92	
N. red oak	80		62	
White oak, S. red oak	70		52	
Yellow-poplar	90		90	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to 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	Chestnut oak	American beech
Black walnut	Black oak	Hackberry
White oak	S. red oak	Red mulberry
N. red oak	Scarlet oak	Sassafras
Yellow-poplar	Elms	Red maple
Black cherry	Sugar maple	Flowering dogwood
White ash		Sourwood
		Persimmon

Description of Landtype 15:
Hilly Redlands—South Aspect

Geographic Setting—Deep, silty and clayey soils on sloping to hilly south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregions 1 and 4. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point, the gradient usually increases noticeably. Slope ranges from 6 to 20 percent, but it is commonly less than 15 percent. South-facing portions of ridges tend to have shallow soils with a higher chert content than north-facing portions. Landtypes 14 and 15 occupy the highest part of the landscape where the drainage pattern is more defined than the irregular pattern common to Landtype 13. Sinkholes and depressions (Landtypes 18 and 19) are common. Landtype 15 grades into Landtypes 8 and 9 in the upper reaches of the drainage network, into Landtype 17 if sideslopes are short and drainageways shallow, or into Landtype 5 if sideslopes are long and drainageways are incised. Soils developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone that sometimes is cherty or in old alluvium.

Dominant Soils—Decatur, Dewey, Waynesboro, Bewleyville, Cumberland, Fullerton, Crider, Baxter, and Frederick.

Bedrock—Limestone and cherty limestone.

Depth to Bedrock—More than 5 ft.

Texture—Silt loam, loam, and cherty analogs.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderate to moderately high.

Vegetation—Southern red oak, scarlet oak, hickories, white oak, black oak, and eastern redcedar, occasional chestnut oak, bur oak, post oak, red maple, elms, hackberry, white ash, sugar maple, black walnut, black cherry, shortleaf pine, Virginia pine, and loblolly pine. Flowering dogwood, persimmon, sassafras, sourwood, eastern hophornbeam, wild plum, winged elm, and vacciniums are common in the understory.

Table 19.—*Forest management interpretations for Landtype 15: Hilly Redlands—South Aspect. Footnotes appear on page 120*

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	40	113	84
Virginia pine	65		70	
E. redcedar	40			
White oak, S. red oak	65		48	
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	Post oak	Winged elm
Black walnut	Chestnut oak	Hackberry
White oak	Black oak	Sassafras
S. red oak	Scarlet oak	Maples
	Elms	Flowering dogwood
	Yellow-poplar	Sourwood
	Black cherry	Persimmon
	White ash	

Description of Landtype 16:
Redland Slopes—North Aspect

Geographic Setting—Deep, silty and clayey soils on strongly sloping to steep north-facing slopes between broad undulating and hilly redlands (Landtypes 13 and 14) and terraces and streambottoms (Landtypes 8 and 9) in Subregions 1 and 4. This landtype also includes north-facing portions of funnel-shaped sinkholes with little or no level bottomland. Slope ranges from 15 to 30 percent. Limestone outcrops in places. Soils developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone that sometimes is cherty or in alluvium. Volume of chert is negligible in the upper solum and occasionally ranges up to 25 percent in the lower solum below the discontinuity.

Dominant Soils—Cumberland, Decatur, Dewey, Waynesboro, Pembroke, and Crider.

Bedrock—Limestone.

Depth to Bedrock—More than 5 ft.

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

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderate to 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. Flowering dogwood, persimmon, sassafras, sourwood, red mulberry, eastern hophornbeam, wild plum, winged elm, and vacciniums are common in the understory.

Table 20.—*Forest management interpretations for Landtype 16: Redland Slopes—North Aspects. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index: Natural stands[1]	Site index: Old-field plantations[2]	Average annual growth cubic feet per acre: Natural stands[3]	Average annual growth cubic feet per acre: Old-field plantations[4]
Loblolly pine	80	65	123	162
Shortleaf pine	75	50	136	120
Virginia pine	70		92	
E. redcedar	50			
N. red oak	90		>62	
White oak	70		52	
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	Winged elm
White oak	Scarlet oak	Red mulberry
N. red oak	Elms	Sassafras
Yellow-poplar	Sugar maple	Red maple
Black cherry		Flowering dogwood
White ash		Sourwood
		Persimmon

Description of Landtype 17: Redland Slopes—South Aspect

Geographic Setting—Deep, silty and clayey soils on strongly sloping to steep south-facing slopes between broad undulating and hilly redlands (Landtypes 13 and 15) and terraces and streambottoms (Landtypes 8 and 9) in Subregions 1 and 4. This landtype also includes south-facing portions of funnel-shaped sinkholes with little or no level bottomland. Slope ranges from 15 to 30 percent. South-facing slopes tend to have shallower soils with a higher chert content than north-facing slopes. Limestone outcrops in places. Soils developed in 2 to 4 ft. of silty deposits over clayey residuum from limestone that sometimes is cherty or in old alluvium. Volume of chert is negligible in the upper solum and occasionally ranges up to 25 percent in the lower solum below the discontinuity.

Dominant Soils—Decatur, Dewey, Waynesboro, Cumberland, Pembroke, and Crider.

Bedrock—Limestone.

Depth to Bedrock—More than 5 ft.

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

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderate to moderately high.

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. Flowering dogwood, persimmon, eastern hop-hornbeam, sassafras, wild plum, winged elm, and vacciniums are common in the understory.

Table 21.—*Forest management interpretations for Landtype 17: Redland Slopes—South Aspect. Footnotes appear on page 120*

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	55	104	133
Shortleaf pine	65	(45)	113	102
Virginia pine	65		70	
E. redcedar	35			
White oak	70		52	
N. red oak	75		57	
S. red oak	70		52	

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
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Bur oak	E. hophornbeam
Virginia pine	Post oak	American beech
Black walnut	Chestnut oak	Winged elm
White oak	Black oak	Sassafras
N. red oak	Scarlet oak	Maples
S. red oak	Elms	Flowering dogwood
Yellow-poplar		Persimmon
Black cherry		
White ash		

Description of Landtype 18: Upland Flats, Depressions, and Sinkholes With Good Drainage

Geographic Setting—Deep, mostly silty soils with good internal drainage on level to gently sloping upland flats and depressions and in sinkholes in Subregions 1 and 4. Landtype 18 occurs in association with broad silty uplands, broad undulating redlands, and hilly redlands (Landtypes 12–15). Slope ranges up to 6 percent, but is dominantly 0 to 3 percent. Flats and depressions may be as large as 20 acres; bottoms of sinkholes are usually smaller.

Dominant Soils—Cherty Cannon, Lobelville, and Greendale; noncherty Staser, Hamblen, Huntington, Lindside, Nolin, Sango, and Grasmere. Sango soils are associated with Landtype 12 and the other alluvial soils are associated with Landtypes 13–15.

Parent Material—Silty deposits over residuum from cherty limestone or red alluvium, and mixed silty and loamy alluvium from limestone and silty deposits.

Depth to Bedrock—More than 5 ft. Sango soils have a fragipan at depths ranging from 20 to 34 in.

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

Soil Drainage—Moderately well drained to well drained.

Relative Soil Water Supply—High.

Soil Fertility—Moderate to moderately high.

Vegetation—White oak, black oak, hickories, red maple, northern red oak, sweetgum, yellow-poplar, and elms; occasional black cherry, black walnut, white ash, sugar maple, American sycamore, southern red oak, scarlet oak, hackberry, sugarberry, American beech, loblolly pine, shortleaf pine, and eastern redcedar. Dogwoods, euonymuses, vaccinums, cane, sassafras, and elms are common in the understory.

Table 22.—*Forest management interpretations for Landtype 18: Upland Flats, Depressions, and Sinkholes with Good Drainage. Footnotes appear on page 120*

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	60	144	148
Shortleaf pine	75	50	114	120
N. red oak	85		>62	
S. red oak	75		57	
White oak	80		62	
Yellow-poplar	100		107	
Sweetgum	90		81	
American sycamore	100			

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
Black walnut	Hickories	American beech
N. red oak	Black oak	Hackberry
S. red oak	Scarlet oak	Sugarberry
White oak	Elms	Sassafras
Yellow-poplar		Maples
Sweetgum		Dogwoods
American sycamore		
Black cherry		
White ash		

Description of Landtype 19: Upland Flats, Depressions, and Sinkholes With Poor Drainage

Geographic Setting—Deep, mostly silty soils with poor internal drainage on nearly level upland flats and depressions and in sinkholes in Subregions 1 and 4. Landtype 19 occurs in association with broad silty uplands, broad undulating redlands, and hilly redlands (Landtypes 12–15). Slope is less than 3 percent. Flats and depressions may be as large as 20 acres; bottoms of sinkholes are usually smaller.

Dominant Soils—Taft, Guthrie, Lawrence, Robertsville, Newark, Melvin, and Dunning. Taft and Guthrie soils are associated with Landtype 12 and the other alluvial soils are associated with Landtypes 13–15.

Parent Material—Silty deposits over residuum from limestone or old alluvium and mixed silty and loamy alluvium from limestone and silty deposits.

Depth to Bedrock—More than 5 ft. Taft, Guthrie, Lawrence, and Robertsville soils have fragipans at depths ranging from 15 in. to 40 in.

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

Soil Drainage—Somewhat poorly drained to poorly drained.

Relative Soil Water Supply—High to very high. Soils are often flooded for short periods during winter and spring.

Soil Fertility—Moderate to moderately high.

Vegetation—Willow oak, water oak, blackgum, sweetgum, red maple, pin oak and elms; occasional hickories, American sycamore, northern red oak, Shumard oak, swamp white oak, southern red oak, white oak, boxelder, green ash, black willow, cottonwood, yellow-poplar, and loblolly pine. Dogwoods, alder, willows, euonymuses, and cane are common in the understory.

Table 23.—*Forest management interpretations for Landtype 19: Upland Flats, Depressions, and Sinkholes with Poor Drainage. Footnotes appear on page 120*

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
White oak	60		43	
S. red oak	75			
Pin oak	95			
Willow oak	85			
Yellow-poplar	95		98	
Sweetgum	90		81	
Cottonwood	95			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Cottonwood	Loblolly pine	Black willow
Swamp white oak	Hickories	Red maple
Shumard oak	White oak	Boxelder
Pin oak	N. red oak	Blackgum
Willow oak	S. red oak	Dogwoods
Water oak	Elms	
Yellow-poplar	Green ash	
Sweetgum		
American sycamore		

Description of Landtype 20: Narrow Limestone Ridges and Knoblike Hills

Geographic Setting—Mostly moderately deep clayey soils on gently sloping to steep crests and sideslopes of narrow ridges and hills that project up above the surrounding Highland Rim and Pennyroyal plateau in Subregions 1 and 4. These outliers are erosional remnants of the Cumberland Plateau. Landtypes common to spur ridges of the Cumberland Plateau and outliers capped with Pennsylvania sandstone are described in the guides for the Southern Cumberland Plateau, Mid-Cumberland Plateau region (Smalley 1979b, 1982) and the Northern Cumberland Plateau region (in preparation). This landtype is of small extent and no attempt was made to separate the crests from the slopes or to recognize differences due to aspect. Some crests are fairly broad and 5 to 30 ac. tracts of Landtype 12 (Broad Silty Uplands) exist. Limestone outcrops may be extensive enough to recognize Landtype 10. Slope ranges up to 60 percent but it is commonly less than 35 percent. Pockets of shallower and deeper soils may occur. The mass of shallow soils and some of the deeper ones contain up to 65 percent limestone slabs.

Dominant Soils—Talbott, Fredonia, and Caneyville. Pockets of shallow Barfield, Gladeville, Fairmount, and Croydon, and deep Allen, Nella, and Hagerstown occur in this type landtype.

Bedrock—Limestone.

Depth to Bedrock—Mostly 20 to 40 in., but may be shallower or deeper.

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

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderately low to moderate.

Vegetation—Southern red oak, post oak, hickories, hackberry, eastern redcedar, white ash, and elms; occasional honeylocust, chinkapin oak, Shumard oak, scarlet oak, sugar maple, black oak, white oak, blackgum, northern red oak, blue ash, black walnut, red maple, black locust, yellow-poplar, and American beech. Eastern redbud, winged elm, flowering dogwood, sumacs, sourwood, sassafras, eastern hophornbeam, and hawthorns are common in the understory.

Table 24.—*Forest management interpretations for Landtype 20: Narrow Limestone Ridges and Knoblike Hills. Footnotes appear on page 120*

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	70		52	
N. red oak	70		52	
Scarlet oak	70			

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
Black walnut	E. redcedar	E. hophornbeam
White oak	Hickories	American beech
N. red oak	Post oak	Winged elm
Black oak	Chinkapin oak	Hackberry
S. red oak	Shumard oak	Sassafras
Yellow-poplar	Scarlet oak	E. redbud
White ash	Elms	Honeylocust
Blue ash	Sugar maple	Black locust
		Blackgum
		Red maple
		Flowering dogwood
		Sourwood

Description of Landtype 21: Footslopes, Terraces, and Streambottoms With Good Drainage in Coves

Geographic Setting—Deep, loamy alluvial soils with good internal drainage level to sloping concave footslopes, terraces, and streambottoms in long narrow coves that finger deeply into the western margin of the Cumberland Plateau in Subregion 1. Slope ranges from 0 to 10 percent. These coves begin as V-shaped gorges on the sides of the Plateau (see LTA-C, Mid-Cumberland Plateau Region; Smalley 1982) and gradually widen as they progress onto the Highland Rim and Pennyroyal. Most coves are less than 1 mi. in width. Landtype 21 merges into Landtypes 8 and 9. There is no comparable landtype with poor drainage in the coves.

Dominant Soils—Etowah, Sequatchie, Whitwell, and Welchland on footslopes and terraces, and Hamblen, Egam, Staser, and Sullivan on streambottoms.

Parent Material—Alluvium from limestone, shale, and sandstone.

Depth to Bedrock—More than 5 ft.

Texture—Silt loam, loam, sandy loam; occasionally silty clay loam. Sandstone cobbles are common on the surface and in the soil in places, especially near the heads of the coves.

Soil Drainage—Moderately well drained and well drained.

Relative Soil Water Supply—High.

Soil Fertility—High.

Vegetation—White oak, yellow-poplar, 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 southern red oak, boxelder, and Virginia pine. Flowering dogwood, cane, persimmon, American hornbeam, eastern redbud, vacciniums, sassafras, sourwood, pawpaw, euonymuses, hawthorns, and hydrangeas are common in the understory.

Table 25.—*Forest management interpretations for Landtype 21: Footslopes, Terraces, and Streambottoms with Good Drainage in Coves. Footnotes appear on page 120*

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	75		136	
Virginia pine	70		92	
N. red oak, S. red oak	(80)		62	
White oak	80		62	
Yellow-poplar	100		107	
Sweetgum	90		81	

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to severe	Slight to moderate	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	American beech
N. red oak	White oak	Hackberry
S. red oak	Black oak	Sassafras
Yellow-poplar	Elms	E. redbud
Sweetgum		Maples
American sycamore		Blackgum
Black cherry		Flowering dogwood
White ash		Sourwood
		Persimmon

Description of Landtype 22: 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 mid-slopes and lower slopes in Subregion 2. This landtype lies between the high broad uplands, narrow winding ridges and knoblike hills, or cherty north slopes (Landtypes 1, 4, and 12) and lower slopes, terraces, and streambottoms (Landtypes 24 and 25). Slope ranges from 2 to 50 percent, but it 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 moderate to high in phosphates. Sulphura soils lie as narrow strips below Bodine, Mountview, Dickson, and Fullerton soils that occur on ridges and upper slopes and above Dellrose soils. Mimosa soils occur below Dellrose soils.

Bedrock—Shale and phosphatic limestone.

Depth to Bedrock—20 to 40 in. to shale; 60 to 80 in. or more 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. Soil water supply is augmented by subsurface flow. Seeps occur in places.

Soil Fertility—Moderate to moderately high.

Vegetation—White oak, black oak, northern red oak, yellow-poplar, hickories, 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, blackgum, chinkapin oak, sugar maple, and loblolly pine. Flowering dogwood, sourwood, eastern redbud, American hophornbeam, eastern hophornbeam, devil's club, pawpaw, vacciniums, Carolina buckthorn, and euonymuses are common in the understory.

Table 26.—*Forest management interpretations for Landtype 22: North Slopes. Footnotes appear on page 120*

PRODUCTIVITY				
	Site index		Average annual growth cubic feet per acre	
Species	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75		114	
N. red oak	75		57	
White oak	(70)		52	
Yellow-poplar	100		107	
Hickories	(70)			
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	Chinkapin oak	E. hophornbeam
N. red oak	Black oak	American beech
Yellow-poplar	S. red oak	Hackberry
Black cherry	Scarlet oak	Sassafras
White ash	Elms	E. redbud
	Cucumbertree	Black locust
	Sugar maple	Red maple
		Carolina buckthorn
		Blackgum
		Flowering dogwood
		Sourwood

Description of Landtype 23: 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 mid-slopes and lower slopes in Subregion 2. This landtype lies between the high broad uplands, narrow winding ridges and knoblike hills, or cherty south slopes (Landtypes 1, 5, and 12) and lower slopes, terraces, and streambottoms (Landtypes 24 and 25). Slope ranges from 2 to 50 percent, but it 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 topsoils 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 ft. thick. Mimosa soils formed mostly in residuum from limestone that was moderate to high in phosphates. Sulphura soils lie as narrow strips below Bodine, Mountview, Dickson, and Fullerton soils that occur on ridges and upper slopes and above Dellrose soils. Mimosa soils occur below Dellrose soils.

Bedrock—Shale and phosphatic limestone.

Depth to Bedrock—20 to 40 in. to shale; 60 to 80 or more in. 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. Soil water supply is augmented 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. Flowering dogwood, sassafras, sourwood, eastern redbud, sumacs, and hawthorns are common in the understory.

Table 27.—*Forest management interpretations for Landtype 23: South Slopes. Footnotes appear on page 120*

PRODUCTIVITY				
	Site index		Average annual growth cubic feet per acre	
Species	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	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	Flowering dogwood
	Yellow-poplar	Sourwood
	Black cherry	
	White ash	

Description of Landtype 24: Footslopes, Terraces, and Streambottoms With Good Drainage

Geographic Setting—Deep, mostly silty soils with good internal 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 22, 23, 29, and 30 as long, narrow strips along intermittent drainages and as level bottomlands along permanent streams. When Landtypes 24 and 25 are adjacent, Landtype 24 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 ft. of silty deposits over alluvium.

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

Texture—Silt loam and silty clay loam.

Soil Drainage—Well drained to moderately well drained.

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

Soil Fertility—Moderately high to high.

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

Table 28.—*Forest management interpretations for Landtype 24: Footslopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 120*

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, S. red oak	80		62	
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		Sugarberry
N. red oak		Osage-orange
S. red oak		Maples
Yellow-poplar		Blackgum
Sweetgum		Dogwoods
Black cherry		
White ash		
Green ash		

Description of Landtype 25: Terraces and Streambottoms With Poor Drainage

Geographic Setting—Deep, mostly clayey soils with poor internal 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 22, 23, 29, and 30 as long, narrow strips along intermittent drainages and on level bottomlands along permanent streams. When Landtypes 24 and 25 are adjacent, Landtype 25 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 silty deposits.

Depth to Bedrock—More than 5 ft. 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. Dogwoods, sedges, grasses, and cane are common in the understory.

Table 29.—*Forest management interpretations for Landtype 25: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 120*

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	Dogwoods
Sweetgum	White ash	
Green ash		

Description of Landtype 26: Broad Undulating 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, 4–7, and 12) of the Highland Rim Plateau in Subregion 2. Slope ranges from 0 to 10 percent, but it is usually 6 percent or less; aspect is not a dominant site factor. Soils developed in 2 ft. or less of loess over old alluvium or in old valley fill and residuum from phosphatic limestone.

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

Bedrock—Phosphatic limestone.

Depth to Bedrock—5 to 15 ft.

Texture—Silt loam and silty clay loam. Some chert fragments occur in the lower horizons of Maury soils and Braxton soils may have up to 30 precent chert in the topsoil and up to 15 percent in the subsoil.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderately high to high. Phosphorus content in the solum is variable, but is typically medium to high.

Vegetation—White oak, northern red oak, black oak, hickories, sugar maple, scarlet oak, southern red oak, Shumard oak, elms, white ash, and eastern redcedar; occasional hackberry, black locust, 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 30.—*Forest management interpretations for Landtype 26: Broad Undulating Ridges. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index: Natural stands[1]	Site index: Old-field plantations[2]	Average annual growth cubic feet per acre: Natural stands[3]	Average annual growth cubic feet per acre: Old-field plantations[4]
Loblolly pine	85		134	
Shortleaf pine	80		148	
E. redcedar	50			
Upland oaks	75		57	
Yellow-poplar	90		90	
Black walnut	(80)			

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate to 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	Shumard oak	Hackberry
N. red oak	S. red oak	Sassafras
Yellow-poplar	Scarlet oak	E. redbud
Black cherry	Elms	Kentucky coffeetree
White ash	Black locust	Honeylocust
	Sugar maple	Persimmon

Description of Landtype 27: Broad Ridges—North Aspect

Geographic Setting—Deep, silty and clayey soils in gently sloping to steep north-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 2. Landtype 27 occurs in association with landtypes 26 and 28 and is lower than the surrounding Highland Rim Plateau and Knobs. 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 2 to 20 percent, but it is commonly greater than 6 percent. Soils developed in 2 ft. or less of silty deposits over old alluvium or in valley fill or in residuum from phosphatic limestone, phosphatic sandy limestone, and shale.

Dominant Soils—Maury, Hampshire, Braxton, and Stiversville.

Bedrock—Phosphatic limestone, phosphatic sandy limestone, and shale.

Depth to Bedrock—40 to 120 in.

Texture—Silt loam, silty clay loam, and occasionally loam. Content of chert or limestone fragments ranges from 0 to 30 percent.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium to high.

Soil Fertility—Moderately high to high. Phosphorus content in the solum is variable, but is typically medium to high.

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

Table 31.—*Forest management interpretations for Landtype 27: Broad Ridges—North Aspect. Footnotes appear on page 120*

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	85		134	
Shortleaf pine	80		148	
Upland oaks	80		62	
Yellow-poplar	90		90	
E. redcedar	55			
Black walnut	(80)			

MANAGEMENT PROBLEMS

Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Slight	Moderate	Slight to moderate	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	Shumard oak	Hackberry
Yellow-poplar	S. red oak	Sassafras
White ash	Scarlet oak	E. redbud
	Elms	Kentucky coffeetree
	Black locust	Honeylocust
	Sugar maple	Persimmon

Description of Landtype 28: Broad Ridges—South Aspect

Geographic Setting—Deep, silty and clayey soils on gently sloping to steep south-facing portions of broad ridgetops and adjoining convex upper slopes in Subregion 2. Landtype 28 occurs in association with Landtypes 26 and 27 and is lower than the surrounding Highland Rim Plateau and Knobs. 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 2 to 20 percent, but it is commonly greater than 6 percent. South-facing ridges tend to be steeper and have shallower soils with higher rock contents than north-facing ridges. Soils developed in 2 ft. or less of silty deposits over old alluvium or in valley fills or in residuum from phosphatic limestone, phosphatic sandy limestone, and shale.

Dominant Soils—Maury, Hampshire, Braxton, and Stiversville.

Bedrock—Phosphatic limestone, phosphatic sandy limestone, and shale.

Depth to Bedrock—40 to 120 in.

Texture—Silt loam, silty clay loam, and occasionally loam. Content of chert or limestone fragments ranges from 0 to 30 percent.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderately high to high. Phosphorus content in the solum is variable, but is typically medium to high.

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

Table 32.—*Forest management interpretations for Landtype 28: Broad Ridges—South Aspect. Footnotes appear on page 120*

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	75		136	
Upland oaks	70		52	
Yellow-poplar	80		71	
E. redcedar	45			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

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

Description of Landtype 29: North Slopes

Geographic Setting—Moderately deep and deep, mostly clayey soils on north-facing linear and concave mid and lower slopes in Subregion 2. Slope ranges from 6 to 40 percent. This landtype usually occurs below Landtypes 26 and 27. When Landtype 29 occurs with low, narrow ridges, all land to the ridge crest is included. Landtypes 24 and 25 occur below this landtype. Soils developed in old valley fill and clayey residuum from phosphatic limestone.

Dominant Soils—Braxton, Ashwood, Mimosa, Inman, Stiversville, and Sandhill. Limestone outcrops are common.

Bedrock—Phosphatic limestone.

Depth to Bedrock—20 to 80 in.

Texture—Silt loam, silty clay loam, and cherty silt loam. Soils may contain up to 30 percent chert, limestone, siltstone, or shale fragments.

Soil Drainage—Well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderate to moderately high. Phosphorus content in the solum is variable, but is typically medium.

Vegetation—White oak, northern red oak, black oak, hickories, sugar maple, scarlet oak, southern red oak, Shumard oak, elms, white ash, and eastern redcedar; occasional hackberry, black locust, 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 33.—*Forest management interpretations for Landtype 29: North Slopes. Footnotes appear on page 120*

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	
E. redcedar	50			
Upland oaks	70		52	
Yellow-poplar	90		90	
Black walnut	(80)			

MANAGEMENT PROBLEMS				
Plant competition	Seedling mortality	Equipment limitations	Erosion hazard	Windthrow hazard
Moderate	Slight	Moderate	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	Shumard oak	Hackberry
Yellow-poplar	S. red oak	Sassafras
Black cherry	Scarlet oak	E. redbud
White ash	Elms	Kentucky coffeetree
	Black locust	Honeylocust
	Sugar maple	Persimmon

Description of Landtype 30: South Slopes

Geographic Setting—Moderately deep and deep, mostly clayey soils on south-facing linear and concave mid and lower slopes in Subregion 2. Slope ranges from 6 to 40 percent. This landtype usually occurs below Landtypes 26 and 28. When Landtype 30 occurs with low, narrow ridges, all land to the ridge crest is included. Landtypes 24 and 25 occur below this landtype. South-facing slopes tend to have shallower soils with higher rock contents than north-facing slopes. Soils developed in old valley fill and clayey residuum from phosphatic limestone.

Dominant Soils—Braxton, Ashwood, Mimosa, Inman, Stiversville, and Sandhill.

Bedrock—Phosphatic limestone.

Depth to Bedrock—20 to 80 in.

Texture—Silt loam, silty clay loam, and cherty silt loam. Soils may contain up to 30 percent chert, limestone, or shale fragments.

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, black locust, American beech, Kentucky coffeetree, shortleaf pine, and loblolly pine. Winged elm, persimmon, eastern redbud, and sassafras are common in the understory.

Table 34.—*Forest management interpretations for Landtype 30: South Slopes. Footnotes appear on page 120*

PRODUCTIVITY				
	Site index		Average annual growth cubic feet per acre	
Species	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65		95	
Shortleaf pine	60		102	
E. redcedar	45			
Upland oaks	65		48	

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

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

Description of Landtype 31: Crests of Knobs, Narrow Ridges

Geographic Setting—Moderately deep to shallow silty and clayey soils on gently sloping to moderately steep, narrow winding ridgetops and crests of knoblike hills in Subregions 1 and 3. Slope ranges from 3 to 25 percent. Typically this landtype is no wider than 300 ft. As much as 60 percent of the soil mass may be fragments of sandstone, siltstone or shale mostly 2 to 6 in. wide, but some fragments may be 2 ft. across. Shallow soils and shale rockland may be extensive enough to recognize Landtype 11.

Dominant Soils—Rockcastle and Weikert.

Bedrock—Soft to hard acid gray and brown clay shale, siltstone, and some sandstone.

Depth to Bedrock—20 to 40 in.

Texture—Shaly or channery silt loam, silty clay loam, or loam.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Low.

Soil Fertility—Low.

Vegetation—Chestnut oak, scarlet oak, post oak, white oak, hickories, southern red oak, Virginia pine, shortleaf pine; occasional black oak, northern red oak, blackgum, red maple, blackjack oak, eastern redcedar, sugar maple, and American beech. Flowering dogwood, persimmon, vacciniums, and sassafras are common in the understory.

Table 35.—*Forest management interpretations for Landtype 31: Crests of Knobs and Narrow Ridges. Footnotes appear on page 120*

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	55		90	
Virginia pine	55		41	
N. red oak	(55)		38	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	American beech	Post oak
Chestnut oak	White oak	Blackjack oak
N. red oak	Black oak	Sassafras
	S. red oak	Blackgum
	Scarlet oak	Flowering dogwood
	Maples	Persimmon

Description of Landtype 32: Broad Ridges—North Aspect

Geographic Setting—Moderately deep to deep, silty and clayey soils on gently sloping to strongly sloping north-facing portions of moderately broad ridges in Subregions 1 and 3. This landtype extends from the ridge crest down to where the slope becomes linear or the gradient noticeably steepens. Slope ranges from 2 to 15 percent, but it is mostly more than 6 percent. Coarse fragments of shale, siltstone, or sandstone constitute less than 15 percent of the soil mass except on a few high ridges capped with cherty limestone where the content may be as much as 35 percent. Some ridges are capped with 2 ft. or more of silty deposits or old mixed alluvium.

Dominant Soils—Allegheny, Tilsit, and Rockcastle. Baxter soils may occur on high ridges and knobs in LTA-G (Western Knobs) capped with cherty limestone.

Bedrock—Acid gray and brown siltstone, shale, and some sandstone; black fissile shale; possibly cherty limestone.

Depth to Bedrock—20 to 120 in. Tilsit soils have a fragipan at depths of 18 to 28 in.

Texture—Silt loam, silty clay loam, or loam with shaley or cherty analogs.

Soil Drainage—Moderately well drained to somewhat excessively 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; occasional eastern redcedar, scarlet oak, chestnut oak, post oak, yellow-poplar, red maple, Virginia pine, black locust, American beech, sugar maple, black walnut, and white ash. Flowering dogwood, sourwood, sassafras, persimmon, vacciniums, winged elm, and eastern hophornbeam are common in the understory.

Table 36.—*Forest management interpretations for Landtype 32: Broad Ridges—North Aspect. Footnotes appear on page 120*

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	70		125	
Virginia pine	65		70	
N. red oak	70		52	
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
Virginia pine	Post oak	E. hophornbeam
Black walnut	Chestnut oak	American beech
White oak	Black oak	Winged elm
N. red oak	S. red oak	Sassafras
Yellow-poplar	Scarlet oak	Blackgum
White ash	Black locust	Flowering dogwood
	Maples	Sourwood
		Persimmon

Description of Landtype 33: Broad Ridges—South Aspect

Geographic Setting—Moderately deep to deep, silty and clayey soils on gently sloping to strongly sloping south-facing portions of moderately broad ridges in Subregions 1 and 3. The landtype extends from the ridge crest down to where the slope becomes linear or the gradient noticeably steepens. Slope ranges from 2 to 15 percent, but it is commonly more than 6 percent. South-facing portions of broad ridges may have shallower soils with higher coarse fragment content than north-facing portions. Coarse fragments of shale, siltstone, or sandstone constitute less than 15 percent of the soil mass except on a few high ridges capped with cherty limestone where the content may be as much as 35 percent. Some ridges are capped with 2 ft. or more of silty deposits or old mixed alluvium.

Dominant Soils—Allegheny, Tilsit, and Rockcastle. Baxter soils may occur on high ridges and knobs in LTA-G (Western Knobs) that are capped with cherty limestone.

Bedrock—Acid, gray and brown siltstone, shale and some sandstone; black fissile shale; possibly cherty limestone.

Depth to Bedrock—20 to 120 in. Tilsit soils have a fragipan at depths of 18 to 28 in.

Texture—Silt loam, silty clay loam, or loam with shaly or channery analogs.

Soil Drainage—Moderately well drained to somewhat excessively drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Moderately low.

Vegetation—White oak, black oak, hickories, blackgum, shortleaf pine, Virginia pine, scarlet oak, and chestnut oak; occasional eastern redcedar, post oak, southern red oak, northern red oak, yellow-poplar, blackjack oak, black locust, American beech, and red maple. Flowering dogwood, sourwood, sassafras, persimmon, eastern hophornbeam, winged elm, and vacciniums are common in the understory.

Table 37.—*Forest management interpretations for Landtype 33: Broad Ridges—South Aspect. Footnotes appear on page 120*

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	65		113	
Virginia pine	60		53	
N. red oak	60		43	
Yellow-poplar	75		63	

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	E. redcedar	E. hophornbeam
Virginia pine	Hickories	American beech
White oak	Post oak	Blackjack oak
Chestnut oak	N. red oak	Winged elm
	Black oak	Sassafras
	S. red oak	Blackgum
	Scarlet oak	Flowering dogwood
	Yellow-poplar	Sourwood
	Black locust	Persimmon
	Red maple	

Description of Landtype 34: Upper North Slopes

Geographic Setting—Moderately deep to shallow, silty and clayey soils in strongly sloping to very steep north-facing linear or convex upper slopes in Subregions 1 and 3. This landtype lies between the crests of knobs and narrow winding ridgetops or broad ridgetops (Landtypes 31 and 32) and linear to convex lower slopes or concave footslopes, terraces, and bottoms of streams and creeks (Landtypes 36, 38, and 39). Slope ranges from 10 to 60 percent. As much as 60 percent of the soil mass may be fragments of sandstone, siltstone, or shale mostly 2 to 6 in. wide but some may be 2 ft. across.

Dominant Soils—Rockcastle and Weikert.

Bedrock—Acid, gray and brown clay shale, siltstone, and some sandstone.

Depth to Bedrock—10 to 40 in.

Texture—Shaly or channery silt loam, silty clay loam, or loam.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Low.

Vegetation—White oak, black oak, northern red oak, hickories, yellow-poplar, and red maple; occasional scarlet oak, chestnut oak, Virginia pine, shortleaf pine, black locust, sugar maple, black walnut, southern red oak, white ash, and blackgum. Flowering dogwood, sourwood, sassafras, persimmon, and vacciniums are common in the understory.

Table 38.—*Forest management interpretations for Landtype 34: Upper North Slopes. Footnotes appear on page 120*

PRODUCTIVITY				
	Site index		Average annual growth cubic feet per acre	
Species	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Shortleaf pine	60		102	
Virginia pine	60		53	
N. red oak	60		43	

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

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	Sassafras
Virginia pine	Chestnut oak	Blackgum
Black walnut	Southern red oak	Flowering dogwood
White oak	Scarlet oak	Sourwood
N. red oak	Black locust	Persimmon
Black oak	Maples	
Yellow-poplar		
White ash		

Description of Landtype 35: Upper South Slopes

Geographic Setting—Moderately deep to shallow, silty and clayey soils on strongly sloping to very steep south-facing linear or convex upper slopes in Subregions 1 and 3. This landtype lies between the crests of knobs and narrow winding ridgetops, or broad ridgetops (Landtypes 31 and 33) and linear to convex lower slopes or concave footslopes, terraces and bottoms of streams and creeks (Landtypes 37–39). Slope ranges from 10 to 60 percent. As much as 60 percent of the soil mass may be fragments of sandstone, siltstone, or shale mostly 2 to 6 in. wide but some may be 2 ft. across. South-facing slopes tend to have shallower soils with higher rock contents than north-facing slopes.

Dominant Soils—Rockcastle and Weikert.

Bedrock—Acid, gray and brown clay shale, siltstone, and some sandstone.

Depth to Bedrock—10 to 40 in.

Texture—Shaly or channery silt loam, silty clay loam or loam.

Soil Drainage—Well drained to somewhat excessively drained.

Relative Soil Water Supply—Medium to low.

Soil Fertility—Low.

Vegetation—White oak, black oak, scarlet oak, chestnut oak, hickories, blackgum, shortleaf pine, and Virginia pine; occasional post oak, southern red oak, black locust, red maple, American beech, and northern red oak. Flowering dogwood, sourwood, sassafras, vacciniums, eastern hophornbeam, and winged elm are common in the understory.

Table 39.—*Forest management interpretations for Landtype 35: Upper South Slopes. Footnotes appear on page 120*

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	55		90	
Virginia pine	55		41	
Upland oaks	(55)		38	

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

SPECIES DESIRABILITY		
Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. hophornbeam
Virginia pine	Post oak	American beech
White oak	S. red oak	Winged elm
Chestnut oak	Scarlet oak	Sassafras
N. red oak	Black locust	Blackgum
Black oak	Red maple	Flowering dogwood
		Sourwood

Description of Landtype 36: Lower North Slopes

Geographic Setting—Shallow to moderately deep, shaly and clayey soils on strongly sloping to very steep north-facing linear or convex lower slopes in Subregions 1 and 3. This landtype lies between upper slopes (Landtype 34) and concave footslopes, terraces, and bottoms of streams and rivers (Landtypes 38 and 39). Slope ranges from 15 to 60 percent. As much as 90 percent of the soil mass may be shale fragments.

Dominant Soils—Colyer, Trappist, Berea, and Shrouts.

Bedrock—Hard, black, fissile shale and possible alkaline soft clay shale.

Depth to Bedrock—8 to 40 in. Berea soils have a fragipan at a depth of about 21 in.

Texture—Shaly silt loam and silty clay loam.

Soil Drainage—Well drained and moderately well drained.

Relative Soil Water Supply—Medium to high. Soil water supply is augmented by subsurface flow.

Soil Fertility—Low.

Vegetation—White oak, northern red oak, black oak, hickories, yellow-poplar, and blackgum; occasional scarlet oak, chestnut oak, southern red oak, Virginia pine, shortleaf pine, sugar maple, red maple, white ash, American beech, American elm, eastern redcedar, and hackberry. Sassafras, flowering dogwood, persimmon, eastern hophornbeam, and vacciniums are common in the understory.

Table 40.—*Forest management interpretations for Landtype 36: Lower North Slopes. Footnotes appear on page 120*

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	(60)		102	
Virginia pine	60		53	
E. redcedar	45			
N. red oak	65		48	
Scarlet oak	60		43	

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 to moderate

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Hickories	E. redcedar
Virginia pine	Chestnut oak	E. hophornbeam
White oak	S. red oak	American beech
N. red oak	Scarlet oak	Hackberry
Black oak	Elms	Sassafras
Yellow-poplar	Maples	Blackgum
White ash		Flowering dogwood
		Persimmon

Description of Landtype 37: Lower South Slopes and Crests of Low Knobs and Narrow Ridges

Geographic Setting—Shallow to moderately deep, shaly and clayey soils on sloping to very steep south-facing linear or convex lower slopes and crests of low knobs and narrow ridges in Subregions 1 and 3. This landtype lies between upper slopes (Landtype 35) and concave footslopes, terraces, and bottoms of streams and rivers (Landtypes 38 and 39). The low knobs and narrow ridges occur near the Outer Bluegrass Region and are erosional remnants of the Eastern Pennyroyal Plain stripped of all rocks younger than the Devonian black shale. Slope ranges from 15 to 60 percent. As much as 90 percent of the soil mass may be shale fragments. South-facing slopes tend to have shallower soils with higher rock contents than north-facing slopes.

Dominant Soils—Colyer, Trappist, Berea, and Shrouts.

Bedrock—Hard, black fissile shale and possibly alkaline soft clay shale.

Depth to Bedrock—8 to 40 in. Berea soils have a fragipan at a depth of about 21 in.

Texture—Shaly silt loam and silty clay loam.

Soil Drainage—Well drained.

Relative Soil Water Supply—Low to medium. Soil water supply is augmented by subsurface flow. but lower south slopes dry quickly, especially during the growing season.

Soil Fertility—Low.

Vegetation—White oak, chestnut oak, hickories, post oak, scarlet oak, shortleaf pine, blackjack oak, eastern redcedar, and Virginia pine; occasional black oak, northern red oak, southern red oak, blackgum, red maple, and American beech. Sassafras, flowering dogwood, vacciniums, winged elm, sourwood and persimmon are common in the understory.

Table 41.—*Forest management interpretations for Landtype 37: Lower South Slopes and Crests of Low Knobs and Narrow Ridges. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index: Natural stands[1]	Site index: Old-field plantations[2]	Average annual growth cubic feet per acre: Natural stands[3]	Average annual growth cubic feet per acre: Old-field plantations[4]
Virginia pine	(50)		<41	
E. redcedar	(35)			
N. red oak, Scarlet oak	(55)		38	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Shortleaf pine	Eastern redcedar	American beech
Virginia pine	Hickories	Blackjack oak
White oak	Post oak	Winged elm
Chestnut oak	S. red oak	Sassafras
N. red oak	Scarlet oak	Blackgum
Black oak	Red maple	Flowering dogwood
		Sourwood
		Persimmon

Description of Landtype 38: Upland Depressions, Sinkholes, Footslopes, Terraces, and Streambottoms With Good Drainage

Geographic Setting—Deep, mostly silty, alluvial and colluvial soils with good internal drainage on level to sloping sinkholes, upland depressions, terraces, and streambottoms, and on gently sloping to moderately steep concave footslopes in Subregions 1 and 3. Slope ranges from 0 to 25 percent. This landtype occurs below Landtypes 34 and 35 as long narrow strips along upper reaches of intermittent drainages and below Landtypes 36 and 37 as narrow to moderately broad bottomlands along permanent streams. When Landtypes 38 and 39 are adjacent, Landtype 38 occupies a slightly higher position on the landscape. This landtype also occurs interspersed with Landtypes 32 and 33 (Broad ridges) in upland depressions and sinks that seldom exceed 10 ac.

Dominant Soils—Huntington, Lindside, Nolin, Elk, Muse, and Cruze.

Parent Material—Alluvium and colluvium from soils developed in residuum from limestone, shale, siltstone, sandstone, and silty deposits.

Depth to Bedrock—5 to 20 ft.

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

Soil Drainage—Well drained to moderately well drained.

Relative Soil Water Supply—High. Footslopes and high terraces are irrigated by subsurface flow. Low terraces and bottoms are subject to occasional flooding.

Soil Fertility—Moderate to moderately high.

Vegetation—White oak, northern red oak, red maple, blackgum, southern red oak, hickories, scarlet oak, sweetgum, yellow-poplar, and elms; occasional shortleaf pine, Virginia pine, black cherry, black walnut, white ash, sugar maple, black oak, Shumard oak, American sycamore, American beech, river birch, hackberry, eastern hemlock, and eastern redcedar. Dogwoods, sourwood, American hornbeam, eastern hophornbeam, grape, vacciniums, sassafras, winged elm, euonymuses, pawpaw, eastern redbud, and cane are common in the understory.

Table 42.—*Forest management interpretations for Landtype 38: Upland Depressions, Sinkholes, Footslopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 120*

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	80		148	
Virginia pine	60		53	
N. red oak, White oak	85		>62	
Yellow-poplar	95		98	
Black walnut	85			
Sweetgum	85		70	

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
Black walnut	E. hemlock	E. redcedar
White oak	Shortleaf pine	River birch
N. red oak	Virginia pine	American hornbeam
Shumard oak	Hickories	E. hophornbeam
Yellow-poplar	Bur oak	American beech
Sweetgum	Black oak	Winged elm
American sycamore	S. red oak	Sassafras
Black cherry	Scarlet oak	E. redbud
White ash	Hackberry	Maples
	Elms	Blackgum
		Dogwoods
		Sourwood

Description of Landtype 39: Upland Flats, Sinkholes, Terraces, and Streambottoms With Poor Drainage

Geographic Setting—Deep, silty and clayey alluvial and colluvial soils with poor internal drainage on level to gently sloping sinks, upland flats, terraces, and streambottoms in Subregions 1 and 3. Slope ranges from 0 to 3 percent. This landtype typically occurs below Landtypes 34 and 35 as long narrow strips along the upper reaches of intermittent drainages and below Landtypes 36 and 37 as narrow to moderately broad bottomlands along permanent streams. When Landtypes 38 and 39 are adjacent, Landtype 39 occupies a slightly lower position on the landscape. This landtype also occurs interspersed with Landtypes 32 and 33 (Broad ridges) in upland flats and sinkholes that seldom exceed 10 ac.

Dominant Soils—Lawrence, Newark, Melvin, Morehead, Robertsville, and Dunning.

Parent Material—Alluvium and colluvium washed from soils developed from soft clay shale, siltstone, black fissile shale, some sandstone and limestone, and possibly silty deposits.

Depth to Bedrock— 5 to 16 ft. or more. Lawrence and Robertsville soils have fragipans at depths ranging from 15 to 30 in.

Texture—Silty clay loam, silt loam, and occasionally loam and clay loam.

Soil Drainage—Somewhat poorly drained to very poorly drained.

Relative Soil Water Supply—High to very high. Soils have a seasonally fluctuating water table and are subject to brief periods of flooding in late winter and early spring.

Soil Fertility—Moderately high to high.

Vegetation—Willow oak, sweetgum, red maple, blackgum, green ash, and American sycamore; occasional boxelder, elms, white ash, swamp white oak, cottonwood, pin oak, shingle oak, black willow, yellow-poplar, silver maple, American beech, and shagbark hickory. Cane, alder, dogwoods, grasses, and sedges are common in the understory.

Table 43.—*Forest management interpretations for Landtype 39: Upland Flats, Sinkholes, Terraces, and Streambottoms with Poor Drainage. Footnotes appear on page 120*

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	
Pin oak	95			
Bottomland oaks	(90)			
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 to moderate

SPECIES DESIRABILITY

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

Description of Landtype 40: Undulating Coastal Plain Uplands

Geographic Setting—Moderately deep and deep soils and nearly level to sloping, usually broad ridges and convex upper slopes that typically occupy the smoother and higher parts of the landscape in Subregion 4. Slope ranges up to 15 percent, but the area with slope exceeding 6 percent is small and aspect is not a dominant site factor. Soils developed in marine or stream deposited stratified sands and loams, sometimes high in gravel (20 to 70 percent of soil mass). On steep sideslopes (Landtypes 4 and 5) below these broad ridges, the Coastal Plain sediments have been truncated and soils have developed in the underlying cherty limestone.

Dominant Soils—Flomaton, Smithdale, and Laverne.

Bedrock—Cherty limestone.

Depth to Bedrock—More than 5 ft.

Texture—Loam, sandy loam, loamy sand, sand, gravelly loamy sand and gravelly sand.

Soil Drainage—Well drained to excessively drained.

Relative Soil Water Supply—Low to medium.

Soil Fertility—Moderately low.

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

Table 44.—*Forest management interpretations for Landtype 40: Undulating Coastal Plain Uplands. Footnotes appear on page 120*

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	(40)	113	84
Virginia pine	(70)		92	

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	American beech
Loblolly pine	Chestnut oak	Post oak
Virginia pine	Black oak	Sassafras
White oak	S. red oak	Red maple
Yellow-poplar	Scarlet oak	Blackgum
	Elms	Flowering dogwood
	Sweetgum	Persimmon

Description of Landtype 41: Broad Undulating Valleys

Geographic Setting—Moderately deep and deep soils on level to gently sloping broad valleys between the higher Cumberland Plateau and Little Mountain in Subregion 4. Slope may be as steep as 15 percent, but the area with slope greater than 6 percent is small and aspect is not a dominant site factor. Soils developed mainly in clayey residuum from shale and limestone. Volume of gravel varies from 0 to 20 percent in the A horizon and soft shale fragments occupy 10 to 30 percent of the B horizon.

Dominant Soils—Conasauga, Firestone and Colbert.

Bedrock—Level-bedded, fractured shale, and argillaceous and shaly limestone.

Depth to Bedrock—20 in. to 5 ft. or more.

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

Soil Drainage—Moderately well drained to well drained.

Relative Soil Water Supply—Medium.

Soil Fertility—Low to moderate.

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, sweetgum, loblolly pine, shortleaf pine, and Virginia pine. Flowering dogwood, sassafras, eastern hophornbeam, winged elm, American hornbeam, vacciniums, eastern redbud, and euonymuses are common in the understory.

Table 45.—*Forest management interpretations for Landtype 41: Broad Undulating Valleys. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index		Average annual growth cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantataions[4]
Loblolly pine	70		104	
Shortleaf pine	65		113	
Virginia pine	65		70	
E. redcedar	50			
Upland oaks	(65)		48	
Yellow-poplar	(75)		63	

MANAGEMENT PROBLEMS

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

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	Sweetgum	E. redbud
Black cherry		Black locust
White ash		Maples
		Blackgum
		Flowering dogwood

Description of Landtype 42: Broad Valley Flats, Depressions, Terraces, and Streambottoms With Good Drainage

Geographic Setting—Deep, mostly clayey soils with good internal drainage on level to gently sloping terraces, streambottoms, depressions, and broad valley flats in Subregion 4. Slope ranges from 0 to 10 percent, but is is commonly less than 6 percent, and aspect is not a dominant site factor. This landtype is interspersed throughout Landtype 41. When Landtypes 42 and 43 are adjacent, Landtype 42 occupies a slightly higher position on the landscape. Flats and depressions may be as large as 20 ac.

Dominant Soils—Capshaw and Egam.

Parent Material—Old clayey alluvium washed from soils developed in residuum from limestone and clayey residuum from shale and shaly limestone.

Depth to Bedrock—More than 5 ft. to shale or limestone.

Texture—Silt loam and silty clay loam.

Soil Drainage—Moderately well drained.

Relative Soil Water Supply—High. Flooding may occur for brief periods in the winter and early spring.

Soil Fertility—Moderately high to high.

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

Table 46.—*Forest management interpretations for Landtype 42: Broad Valley Flats, Depressions, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 120*

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	85		134	
Yellow-poplar	95		98	
Upland oaks	(80)		62	

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
Shortleaf pine	Hickories	E. redcedar
Loblolly pine	Willow oak	American hornbeam
Cottonwood	Water oak	American beech
Black walnut	Elms	Hackberry
White oak	American sycamore	Sugarberry
N. red oak		Osage-orange
S. red oak		Maples
Yellow-poplar		Blackgum
Sweetgum		Dogwoods
Black cherry		
White ash		

Description of Landtype 43: Broad Valley Flats, Depressions, Terraces, and Streambottoms With Poor Drainage

Geographic Setting—Deep, mostly clayey soils with poor internal drainage on level to gently sloping terraces, streambottoms, broad valley flats, and depressions in Subregion 4. Slope ranges up to 6 percent, but it is commonly 3 percent or less. This landtype is interspersed throughout Landtype 41. When Landtypes 42 and 43 are adjacent, Landtype 43 occupies a lower position on the landscape. Flats and depressions may be as large as 20 ac.

Dominant Soils—Dowellton, Iberia, and Tupelo.

Parent Material—Old clayey alluvium washed from soils developed in residuum from limestone, and clayey residuum from shale and shaly limestone.

Depth to Bedrock—More than 5 ft. to shale or limestone.

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

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. Soil reaction ranges from slightly acid to mildly alkaline.

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

Table 47.—*Forest management interpretations for Landtype 43: Broad Valley Flats, Depressions, Terraces, and Streambottoms with Poor Drainage. Footnotes appear on page 120*

PRODUCTIVITY

Species	Site index		Average annual growth cubic feet per acre	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantataions[4]
Loblolly pine	80		123	
Yellow-poplar	90		90	
Sweetgum	85		70	
Bottomland oaks	90			
Green ash	80			
Cottonwood	95			
Upland oaks	70		52	

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
Loblolly pine	Hickories	American hornbeam
Cottonwood	Elms	Alder
White oak	American sycamore	Red maple
Shumard oak	White ash	Boxelder
Willow oak		Blackgum
Water oak		Dogwoods
Yellow-poplar		
Sweetgum		
Green ash		

Description of Landtype 44: Terraces and Floodplains With Good Drainage

Geographic Setting—Deep, mostly silty and loamy alluvial soils with good internal drainage on level to rolling terraces and floodplains along the Tennessee River and its major tributaries in Subregion 5. Slope ranges from 0 to 15 percent, but is is commonly less than 10 percent. On floodplains this landtype occurs in stringers paralleling the rivers and creeks in association with Landtype 45, which has poor soil drainage.

Dominant Soils—Wolftever, Sequatchie, and Statler on terraces; Egam, Huntington, Lindside, Hamblen, and Staser on floodplains.

Parent Material—Mixed alluvium of variable age washed from soils formed in residuum weathered mostly from limestone, sandstone, siltstone, and shale, and possibly silty deposits.

Depth to Bedrock— 5 to 15 ft.

Texture—Mostly silt loam, silty clay loam, and loam.

Soil Drainage—Well drained and moderately well 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, hackberry, sugarberry, boxelder, black oak, Shumard oak, cherrybark oak, cottowood, northern red oak, black cherry, white ash, black walnut, white basswood, loblolly pine, honeylocust, persimmon, and sassafras. Dogwoods, cane, hawthorns, sumacs, American hornbeam, eastern hophornbeam, American holly, vacciniums, grape, pawpaw, euonymuses, bladdernut, willows, and red mulberry are common in the understory.

Table 48.—*Forest management interpretations for Landtype 44: Terraces and Floodplains with Good Drainage. Footnotes appear on page 120*

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	(85)		70	
Upland oaks	80		62	
Loblolly pine	90	60	148	
Bottomland oaks	85			

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	Hickories	Willows
Cottonwood	Black oak	River birch
Black walnut	S. red oak	American hornbeam
White oak	Elms	E. hophornbeam
N. red oak	White basswood	American beech
Shumard oak		Hackberry
Cherrybark oak		Sugarberry
Willow oak		Red mulberry
Water oak		Sassafras
Yellow-poplar		Honeylocust
Sweetgum		American holly
American sycamore		Maples
Black cherry		Blackgum
White ash		Dogwoods
		Persimmon

Description of Landtype 45: Terraces and Floodplains With Poor Drainage

Geographic Setting—Deep, silty and clayey alluvial soils with poor internal drainage on level to gently sloping terraces and floodplains along the Tennessee River and its major tributaries in Subregion 5. Slope ranges from 0 to 5 percent. On floodplains this landtype occurs as stringers paralleling the rivers and creeks in association with Landtype 44, which has good soil drainage. Landtype 45 is often wooded, but Landtype 44 is mostly in agriculture.

Dominant Soils—Beason and Robertsville on terraces and Mhoon, Dunning, and Newark on floodplains.

Parent Material—Mixed alluvium of variable age washed from soils formed in residuum weathered mostly from limestone, sandstone, siltstone, and shale, and possible silty deposits.

Depth to Bedrock—5 to 15 ft. Robertsville soils have a fragipan at depths of 15 to 30 in.

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 American beech, red maple, white oak, southern red oak, silver maple, black willow, boxelder, yellow-poplar, American sycamore, loblolly pine, hickories, cottonwood, sugarberry, and hackberry. Willows, elderberry, dogwoods, 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 120*

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	
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	Willows
Willow oak	Baldcypress	Alder
Water oak	Hickories	American beech
Yellow-poplar	White oak	Maples
Sweetgum	S. red oak	Blackgum
Green ash	Elms	Dogwoods
	Hackberry	
	Sugarberry	
	American sycamore	
	Water tupelo	

Description of Landtype 46: Terraces and Floodplains With Good Drainage

Geographic Setting—Deep, silty alluvial soils with good internal drainage on level to strongly sloping terraces and floodplains along the Cmberland, Duck, and Elk Rivers in Subregion 5. Slope ranges from 0 to 15 percent, but it is commonly less than 10 percent. On floodplains this landtype ocurs in stringers paralleling the rivers in association with Landtype 47, which has poor drainage.

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

Parent Material—On terraces, soils formed in 2 to 4 ft. of old silty and clayey alluvium or silty deposits underlain by old alluvium or residuum phosphatic limestone. On floodplains parent material consists of more recent alluvium washed from soils formed in residuum weathered mostly from phosphatic limestone, cherty limestone, and silty deposits, and possibly from shale and sandstone.

Depth to Bedrock—4 to more than 10 ft.

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. Most soils are moderate to high in phosphorus.

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, sugarberry, boxelder, Shumard oak, cottonwood, black oak, northern red oak, black cherry, white ash, black walnut, yellow buckeye, honeylocust, persimmon, and sassafras. Dogwoods, cane, hawthorns, sumacs, American hornbeam, eastern hophornbeam, American holly, vacciniums, grape, pawpaw, euonymuses, bladdernut, willows, 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 120*

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			
Black walnut	(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	Willows
Black walnut	Black oak	River birch
White oak	S. red oak	American hornbeam
N. red oak	Pin oak	Eastern hophornbeam
Shumard oak	Elms	American beech
Willow oak	Yellow buckeye	Hackberry
Water oak		Sugarberry
Yellow-poplar		Red mulberry
Sweetgum		Sassafras
American sycamore		Honeylocust
Black cherry		American holly
White ash		Maples
		Blackgum
		Dogwoods
		Persimmon

Description of Landtype 47: Terraces and Floodplains With Poor Drainage

Geographic Setting—Deep, silty alluvial soils with poor internal drainage on level to gently sloping terraces and floodplains along the Cumberland, Duck, and Elk Rivers in Subregion 5. Slope ranges from 0 to 5 percent. On floodplains this landtype occurs in stringers paralleling the rivers 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 old mixed fine-textured alluvium washed from areas underlain by sedimentary rocks. Parent material on floodplains consists of more recent alluvium washed from soils formed in residuum weathered from phosphatic limestone, cherty limestone, shale, and silty deposits.

Depth to Bedrock—More than 5 ft.

Texture—Silt loam and silty clay loam; occasionally 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. Some soils are moderate to high in phosphorus.

Vegetation—Willow oak, water oak, sweetgum, green ash, elms, and blackgum; occasional silver maple, red maple, black willow, boxelder, American beech, swamp white oak, yellow-poplar, white oak, southern red oak, American sycamore, pin oak, hickories, cottonwood, sugarberry, and hackberry. Dogwoods, alder, cane, grasses, willows, 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 120*

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			
Upland oaks	70		52	
Sweetgum	90		81	
Green ash	85			
Cottonwood	100			

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	Willows
White oak	S. red oak	American beech
Pin oak	Elms	Maples
Swamp white oak	Hackberry	Blackgum
Willow oak	Sugarberry	Dogwoods
Water oak	American sycamore	
Yellow-poplar		
Sweetgum		
Green ash		

Description of Landtype 48: Terraces and Floodplains With Good Drainage

Geographic Setting—Deep, silty and loamy alluvial soils with good internal drainage on level to strongly sloping terraces and floodplains along the Barren, Green, Rolling Fork, Salt, Red, and Kentucky Rivers in Subregion 5. Slope ranges from 0 to 20 percent, but seldom exceeds 10 percent. On floodplains, this landtype occurs in stringers paralleling the rivers in association with Landtype 49 which has poor soil drainage.

Dominant Soils.—Wolftever, Whitwell, Sequatchie, Allegheny, Captina, Bedford, Ashton, Elk, Otwell, Markland, and Tarklin on the footslopes and terraces; Staser, Hamblen, Huntington, Nolin, and Lindside on the floodplains.

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 limestone, and occasionally siltstone, shale, and silty deposits. Soils on footslopes developed in colluvium, old mixed alluvium, or residuum from limestone and shale.

Depth to Bedrock—5 to 20 ft. Bedford, Captina, and Otwell soils have fragipans at depths of about 15 to 30 in.

Texture—Silt loam, loam, and silty clay loam; occasionally fine sandy loam; coarse fragment content is usually less than 15 percent.

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, 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, honeylocust, sugar maple, yellow buckeye, persimmon, and sassafras. Dogwoods, cane, hawthorns, sumacs, American hornbeam, eastern hophornbeam, vacciniums, grape, pawpaw, euonymuses, bladdernut, American holly, willows, and red mulberry are common in the understory.

Table 52.—*Forest management interpretations for Landtype 48: Terraces and Floodplains with Good Drainage. Footnotes appear on page 120*

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	
White oak	75		57	
S. red oak	(75)		57	
Pin oak	100			
Shumard oak	95			
Other bottomland oaks	75			
Sweetgum	85		70	
Sugar maple	75			
Black walnut	(80)			
Yellow-poplar	95		98	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

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

Description of Landtype 49: Terraces and Floodplains With Poor Drainage

Geographic Setting—Deep, silty and clayey alluvial soils with poor internal drainage on level to gently sloping terraces, alluvial fans, flats and floodplains along Barren, Green, Rolling Fork, Salt, Red, and Kentucky Rivers in Subregion 5. Slope ranges for 0 to 6 percent, but it is mostly 3 percent or less. On floodplains this landtype occurs in stringers paralleling the river in association with Landtype 48, which has good soil drainage.

Dominant Soils—Lawrence, Robertsville, McGary, Morehead, and Purdy on the terraces; Lanton, Newark, Melvin, Karnack, and Dunning on the floodplains.

Parent Material—Soils on terraces, alluvial fans, and flats developed in old mixed, fine-textured alluvium or colluvium washed from areas dominated by limestone, siltstone, and shale, and occasionally from sandstone or silty deposits. Soils on floodplains developed in more recent mixed alluvium from similar sources. Karnack and Dunning soils developed in clayey alluvium deposited by slack water. Most parent materials are acid, but some may be calcareous.

Depth to Bedrock—More than 5 ft. Lawrence and Robertsville have fragipans at depths of 15 to 30 in.

Texture—Silt loam and silty clay loam; occasionally loam, silty clay or clay. Coarse fragment content is negligible.

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, pin oak, green ash, elms, and blackgum; occasional silver maple, red maple, American beech, swamp white oak, black willow, boxelder, yellow-poplar, white oak, southern red oak, American sycamore, hickories, cottonwood, and hackberry. Dogwoods, alder, American hornbeam, possumhaw, elderberry, cane, grasses, willows, 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 120*

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	
Bottomland oaks	95			
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	Willows
White oak	Southern red oak	American hornbeam
Swamp white oak	Elms	American beech
Pin oak	Hackberry	Maples
Willow oak	American sycamore	Blackgum
Yellow-poplar		Dogwood
Sweetgum		
Green ash		

Footnotes for Tables 5–53

[1]Site indices for each naturally occuring 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, but sometimes adjusted for aspect and slope position (Beck 1962; Broadfoot 1960, 1963; Broadfoot and Krinard 1959; Curtis and Post 1962; Defler 1937; 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]Site indices for old-field plantations of loblolly and shortleaf pines were obtained from Smalley and Bower's (1971) site curves. Base age is 25 years from seed.

[3]Annual growth of natural stands calculated from published yields at 50 years: Shortleaf and loblolly pines—(U.S. Forest Service 1929, Tables 44 and 108), total volume outside bark, trees >3.5" 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.; Upland oaks—(Schnur 1937, Table 2,Column12), outside-bark volume to 4.0 inch o.b. top, trees >4.5" d.b.h.; Yellow-poplar—(McCarthy 1933, Table 17), inside bark volume to 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.

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

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APPENDIX

County Surveys Available for the Eastern Highland Rim and Pennyroyal[3]

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

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*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., W. C. Jackson, E. P. Davis, C. F. Wharton, and O. G. Sprouse.
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METRIC EQUIVALENTS

1 inch = 2.54 centimeters (exactly)
1 foot = 0.3048 meter (exactly)
1 acre = 0.4047 hectare
1 square foot/acre = 0.2296 square meter/hectare
1 cubic foot/acre = 0.06997 cubic meter/hectare
1 mile = 1.6093 kilometers
1 square mile = 2.5900 square kilometers
$°C = (°F - 32)/1.8$

Smalley, Glendon W.
1983. Classification and evaluation for forest sites on the Eastern Highland Rim and Pennyroyal. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. SO-43, 123p.

Presents a comprehensive forest site classification system for the Eastern Highland Rim and Pennyroyal in north Alabama, east-central Tennessee, and central Kentucky. The system is based on physiography, geology, soils, topography, and vegetation.

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