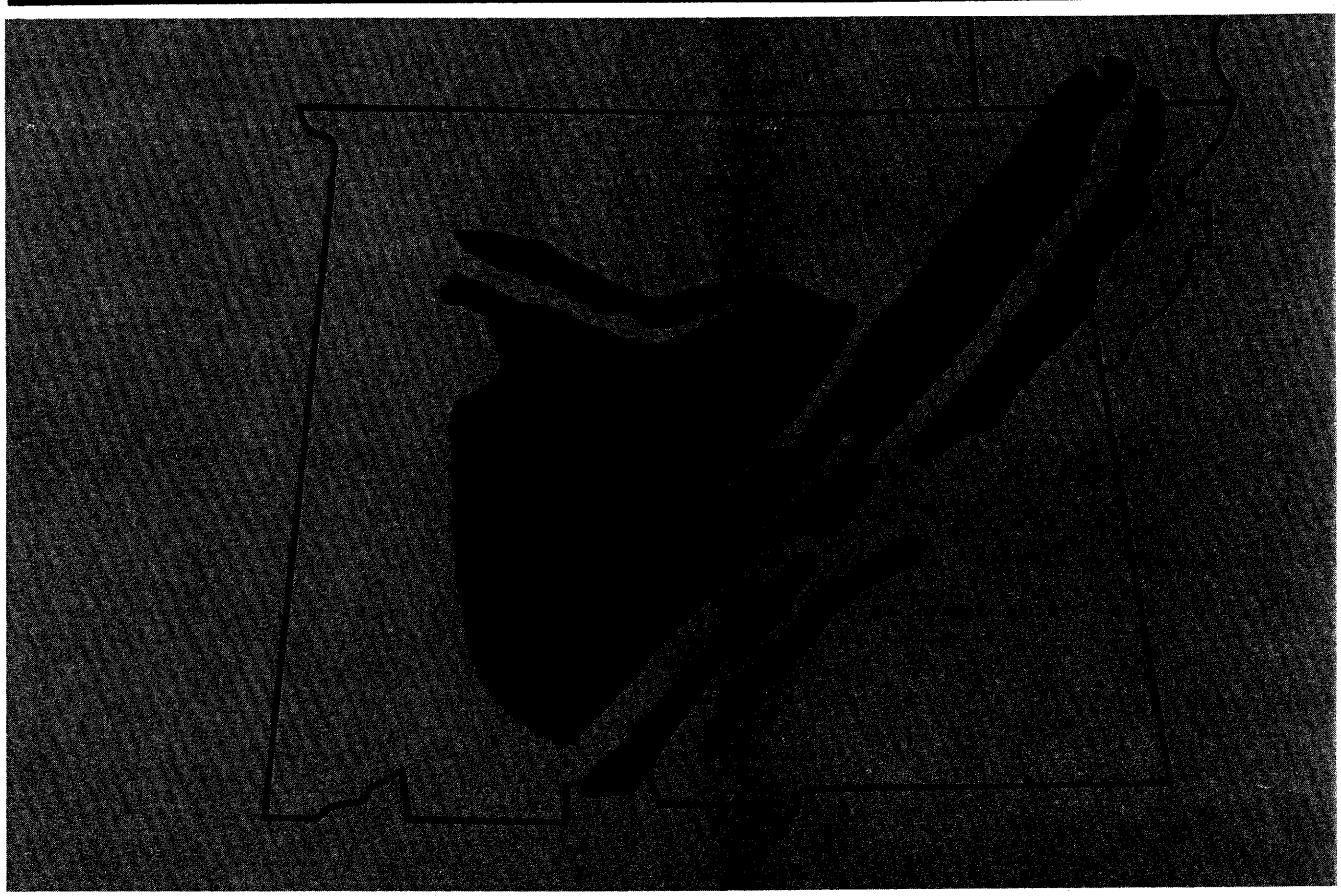
U.S. Department of Agriculture
Forest Service
General Technical Report SO-23

Classification and Evaluation of Forest Sites on the Southern Cumberland Plateau

Glendon W. Smalley



Southern Forest Experiment Station

Summary

This paper presents a comprehensive forest site classification system for the southern portion of the Cumberland Plateau in northern Alabama, northwest Georgia, and extreme south-central Tennessee. The system is based on physiography, geology, soils, topography, and vegetation. Twenty-one landtypes are described, and each landtype is evaluated in terms of productivity and desirability of selected pines and hardwoods for timber production. Also, each landtype is rated for five soil-related problems that can affect forest management 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.

1979

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402
Stock No. 001-001-00477-4

TABLE OF CONTENTS

	Page
Introduction	1
Southern Cumberland Plateau Region	1
Subregions	4
Landtypes	5
Forest Management Interpretations	9
Using the System	10
Descriptions and Forest Management Interpretations for Landtypes in Subregions A, Table Plateaus, B, Moderately Dissected Plateau, and C, Strongly Dissected Plateau	13
Descriptions and Forest Management Interpretations for Landtypes in Subregion D, Shale Hills	41
Footnotes for Tables 4-24	58
Literature Cited	58
Appendix — County Soils Surveys Available for the Southern Cumberland Plateau	59

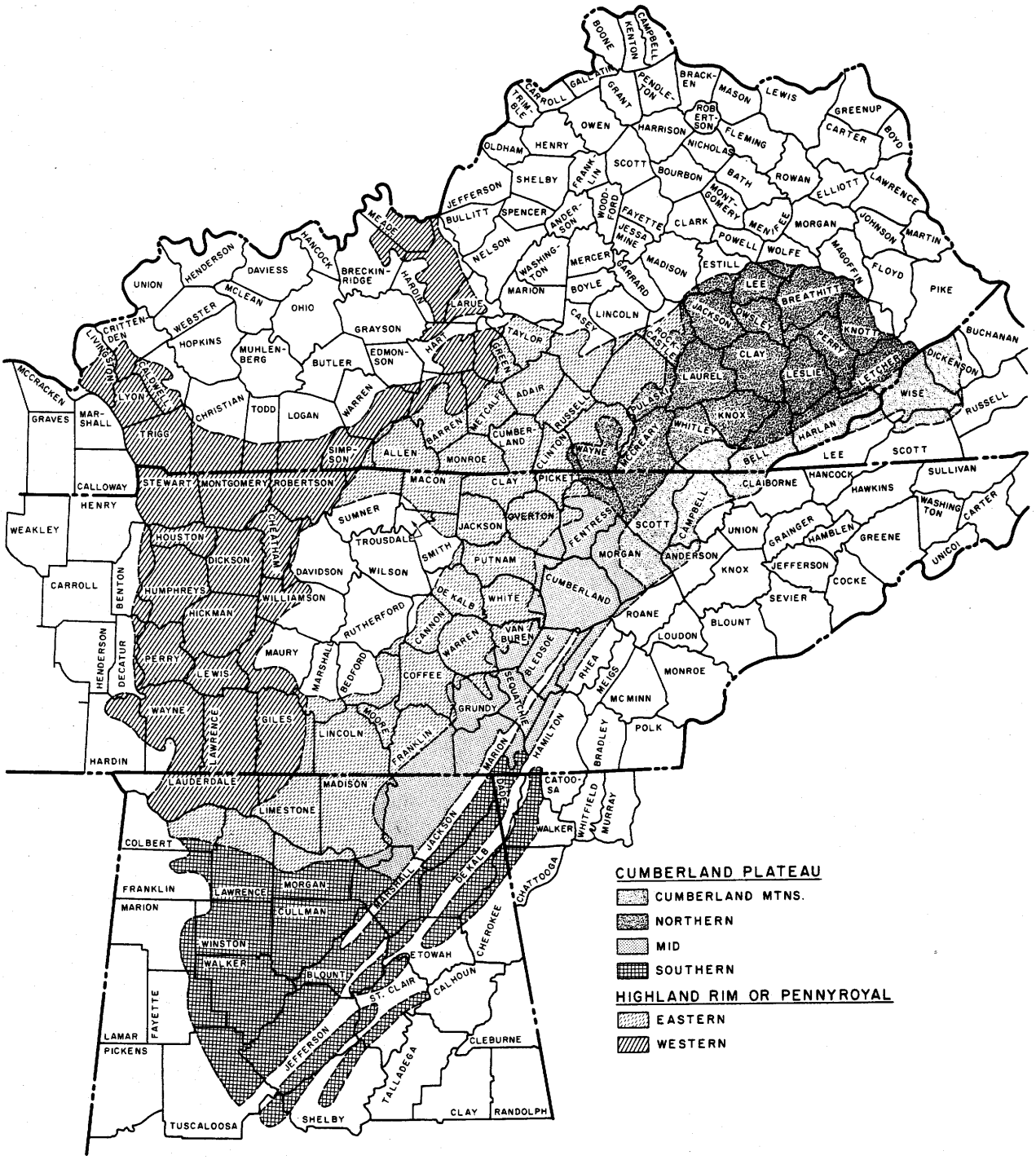


Figure 1. *Physiographic provinces and regions of the Interior Uplands.*

Classification and Evaluation of Forest Sites on the Southern Cumberland Plateau

GLENDON W. SMALLEY

Introduction

This report classifies and evaluates forest sites on the Southern Cumberland Plateau for the management of a number of commercially valuable tree species (fig. 1). It provides forest managers with a land classification system that will enable them to subdivide forest land into logical segments (landtypes) with about equal productivity, 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 because timber is usually a major management objective. However, there is no reason why landtypes cannot be the basis for interpretation for other forest resources.

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

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

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

Southern Cumberland Plateau Region

The Southern Cumberland Plateau (fig. 2) includes all of the Cumberland Plateau east and south of the Tennessee River. Covering all or portions of 18 counties in Alabama, 3 in Georgia, and 2 in Tennessee, it occupies about 8,900 square miles and extends south to north from about north latitude 33° 15′ to 35° 7′ and east to west from about west longitude 85° 20′ to 87° 50′. It extends southwest from Chattanooga, Tennessee, nearly to Tuscaloosa, Alabama, a distance of about 175 miles.

Included in the Region are such well-known landforms as the Warrior Coal Basin and Lookout, Sand and Little Mountains. Not included in the Region are the Moulton and Tennessee River Valleys, which are part of the Highland Rim, and the Sequatchie, Lookout, and Big Wills Valleys, which are part of the Ridge and Valley province.

Climate

The Region has a temperate climate characterized by long, moderately hot summers and short, mild winters. According to Thornthwaite's (1931) classification of climate, it is humid mesothermal. Tables 1 and 2 show average monthly and annual precipitation and temperature values, average frost-free periods,

[1]See Appendix for available soil surveys.

Glendon Smalley is Principal Soil Scientist at the Silviculture Laboratory, maintained at Sewanee, Tennessee, by the Southern Forest Experiment Station, Forest Service-USDA, in cooperation with the University of the South.

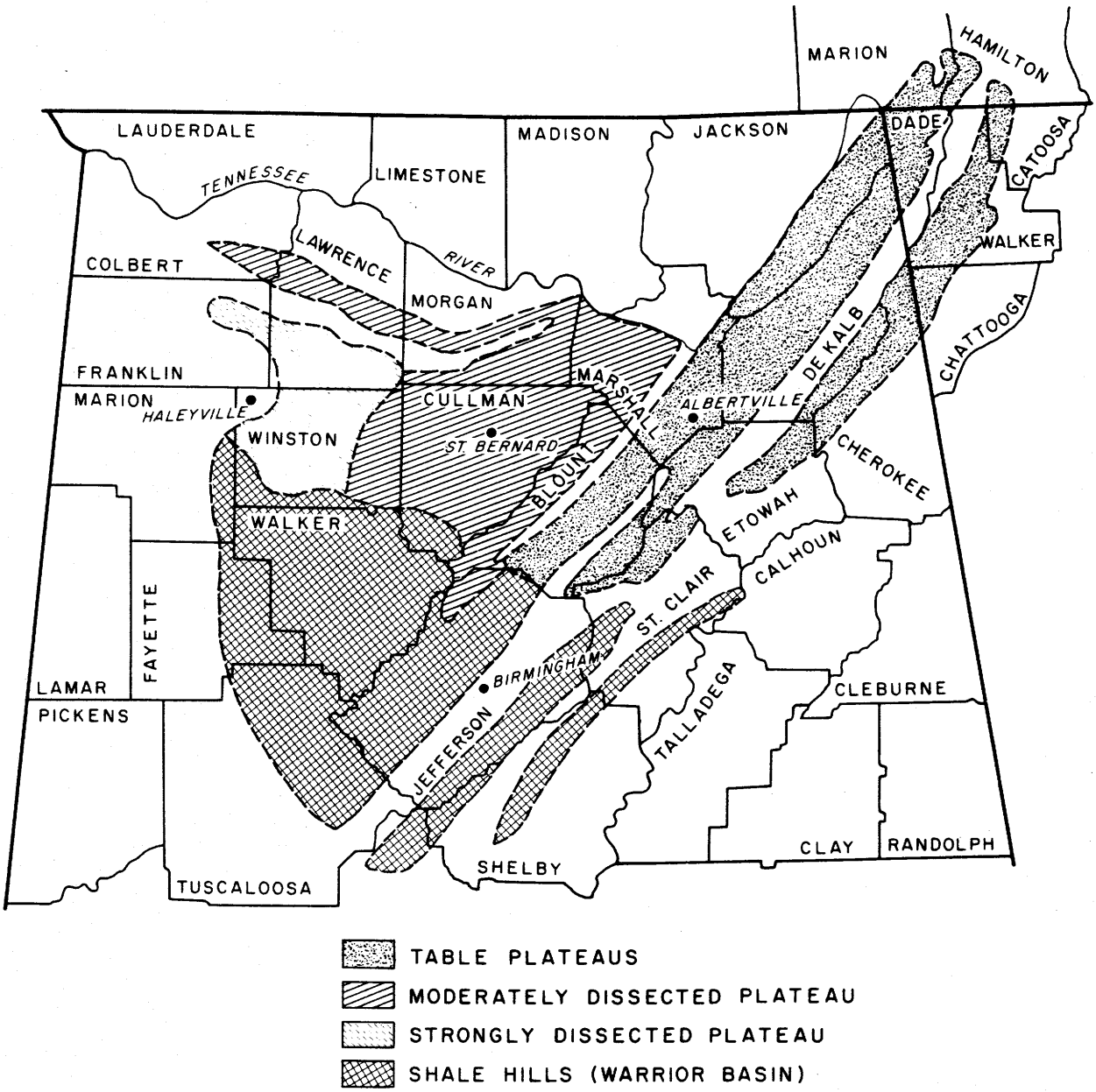


Figure 2. *Subregions of the Southern Cumberland Plateau and location of weather stations.*

and elevation above sea level for Albertville, Birmingham, Haleyville, and Saint Bernard (fig. 2). Albertville and Saint Bernard are the only stations on the Southern Plateau with long-term records of temperature and precipitation. Many stations like Haleyville and Birmingham have adequate records but are located off the Plateau in adjacent Highland Rim, Ridge and Valley, and Coastal Plain provinces.

Mean temperature for the Region is about 60°F. No long-term freeze data are available for Haleyville, but average date of last freeze is March 3 for Albertville, March 16 for Birmingham, and April 8 for Saint Bernard. Average date of first freeze is October 24 for Saint Bernard, November 6 for Albertville, and November 11 for Birmingham. Therefore, most of the Southern Plateau has an average frost-free period of 200 or more days. The temperature often falls below freezing at night in December, January, and February. The ground freezes 2 to 6 inches deep several times during the average winter season and commonly remains frozen for 2 to 10 days. Temperature does not vary much across the Region, but midafternoon temperatures in the summer may be 3 to 7 degrees cooler on the Plateau, particularly on Sand and Lookout Mountains, than in the adjacent valleys.

Table 1.—*Average monthly and annual precipitation in inches for four weather stations in northern Alabama.*[1]

Station and County	Years of Record	Elevation Ft	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Albertville Marshall, AL	51	1140	5.3	5.1	5.9	5.0	4.1	3.4	4.6	3.3	3.5	2.8	4.1	5.3	52.5
St. Bernard Cullman, AL	70	802	5.6	5.7	6.2	5.1	4.0	3.8	4.5	3.9	4.0	2.8	4.4	5.4	55.2
Birmingham Jefferson, AL	39	620	4.8	5.3	6.2	4.6	3.6	4.0	5.2	4.3	3.6	2.6	3.7	5.2	53.2
Haleyville Winston, AL	40	950	6.0	5.8	6.4	5.6	3.8	4.0	5.0	4.1	3.8	2.6	4.3	5.9	57.3

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

Average wind velocity is low with southerly winds prevailing from May to September and northerly ones from November to March. Severe winds are infrequent and usually associated with summer thunderstorms.

Annual precipitation on the Plateau averages about 54 inches and ordinarily is fairly well distributed throughout the year. Precipitation is greatest from January through April. Least precipitation is from August through November. Short periods of very wet and very dry weather are common. Thunderstorms with high intensity rainfall are common in summer. Snowfall seldom exceeds a few inches and melts in a few days. Soils are wettest from December to April and driest from July to October. Tree growth is commonly retarded for periods of a few to several days up to six times each growing season.

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

Table 2.—*Average monthly and annual temperature in °F and length of warm period for four weather stations in northern Alabama.*[1]

Station and County	Years of Record	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Year	Warm Per.[2] Days
Albertville Marshall, AL	49	41	43	50	60	68	75	78	77	71	61	50	42	60	192
St. Bernard Cullman, AL	68	41	44	50	61	69	76	78	78	72	61	50	42	60	175
Birmingham Jefferson, AL	37	44	47	53	63	70	77	80	79	74	63	52	45	62	236
Haleyville Winston, AL	38	41	44	50	61	69	76	78	78	72	62	50	43	60	177

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

drought days per month is about 35 percent.

Geology, Topography, and Soils

In general the area is underlain by thick nearly horizontal beds of sandstone and shale, but in places only remnants of the old plateau surface remains (Fenneman, 1938). The highest elevations of the Southern Cumberland Plateau are on the northern end of Sand and Lookout Mountains, where the undulating surface averages 1,800 to 2,000 feet above sea level. Elevation of the Plateau declines southward at about 10 feet per mile. At the junction with the upper Coastal Plain, the Plateau averages 600 to 700 feet high.

The margins of Sand and Lookout Mountains have a conspicuous escarpment. South of the Tennessee River the escarpment is less conspicuous and faces north, and the Plateau top is 1,000 to 1,200 feet above sea level. As elevation declines, the sandstone caprock thins and is often cut through and sapped by drainages. Eventually, the caprock becomes so thin that the escarpment disappears.

Topography of the Southern Plateau varies from undulating to rugged and complex, and slope ranges from nearly level to steep. Relief is commonly 150 to 400 feet in the interior of the Plateau and is 1,000 feet or more at the escarpments bordering the Highland Rim and Ridge and Valley provinces.

Slope and topography affect the rate and amount of both surface runoff and subsurface movement of soil water. Soil loss by erosion increases as gradient and length of slope increase. Although rare under forested conditions, surface runoff is important during forest management operations. Soils on steep slopes are often shallower than soils on more nearly level terrain. Sediment deposited on gentle terrain by surface runoff is greatest below the longer and steeper slopes.

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

Soil temperatures are lower on north-facing than on south-facing slopes. Because soils on north-facing slopes retain moisture longer during the growing season than those on south-facing slopes, both rate of tree growth and species composition are better on north-facing than on south-facing slopes. Gradient, aspect, slope length, and soil moisture are important in the delineation of landtypes described later.

Subregions

I have divided the Southern Cumberland Plateau into four subregions (fig. 2) that correspond fairly well to the forest habitat regions delineated by Hodgkins and others (1976). The subregions are: A—**Table Plateaus,** B—**Moderately Dissected Plateau,** C—**Strongly Dissected Plateau,** and D—**Shale Hills.** Subregions A, B, and C are reasonably similar, varying mostly in the degree of dissection. Soils are derived primarily from sandstone and in places from siltstone or shale or mixtures of the three. Subregion D is well dissected and soils are derived mostly from shale.

Subregion A — The **Table Plateaus** consist of Sand and Lookout Mountains. These two plateaus exhibit relatively little geologic dissection. Extensive areas of gently sloping soil are the dominant feature, and agriculture is common where soil depth exceeds 30 inches.

Subregion B — The **Moderately Dissected Plateau,** locally known as Brindley Mountain, occupies all of Cullman County, the southern part of Morgan County, and small parts of several other counties. Also included in Subregion B is Little Mountain, a narrow (2 to 8 miles) undulating low (600 to 800 feet high) plateau paralleling the Tennessee River and separated from the main Cumberland Plateau by the Moulton Valley. Subregion B has more geologic dissection than Subregion A, so there is a higher proportion of strongly sloping land and shallow soils. Soils on Little Mountain are simliar to those on Brindley Mountain, but parent rock (Harsells sandstone) is of Mississippian age, not Pennsylvanian as is the rest of the Cumberland Plateau. Agriculture is the dominant land use on the broad uplands and in the wider valleys.

Subregion C — The **Strongly Dissected Plateau** is the smallest of the four subregions and is so dissected that it no longer resembles a plateau. Topography is complex, and strongly sloping land predominates. The area is mostly forested and the Bankhead National Forest lies within this subregion.

Subregion D — The **Shale Hills** or Warrior Coal Basin comprise the southern extremity of the Cumberland Plateau. Dissection has largely removed the sandstone cap and exposed the underlying shale. Topography is rugged and fairly complex. Because ridgetops are much lower than those in more northerly sections of the Plateau, the character of the subregion is one of extensive hills, not mountains or a plateau. Strongly sloping land predominates, and the area is mostly forested although there is more farming than in Subregion C. Coal mining, both shaft and strip, is a major industry.

Landtypes

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

The Southern Cumberland Plateau Region has 21 recognizable landtypes (table 3) with landtypes 1-13 occurring in Subregions A, B, and C (figs. 3 and 4) and landtypes 14-21 occurring in Subregion D (fig. 5). Landtypes 1-6 occur exclusively on top of the Plateau. Landtypes 10-13 occur on the sides of the Plateau between the escarpment and the adjacent limestone valleys in Subregions A, B, and C and also between the escarpment and streambottoms in highly dissected Subregion C. Landtype 7 occurs almost anywhere on the landscape. Landtypes 8 and 9 occur in drainages both above and below the escarpment. Because no escarpment exists in Subregion D, all landtypes (14-21) occur only on top of the Plateau.

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.

Table 3.—*Summary of landtypes and their occurrence by subregions.*

Landtype Location and Name	*Landtype Number* Subregions A, B, and C	Subregion D
Upland Landtypes on Top of the Plateau		
Narrow Ridges and Convex Upper Slopes	1	14
Broad Undulating Uplands	2	
Broad Ridges — North Aspect	3	15
Broad Ridges — South Aspect	4	16
North Slopes	5	17
South Slopes	6	18
Sandstone Glades, Rock Outcrops, and Plateau Edges	7	
Shale Rockland and Shallow Soils		19
Upland Landtypes on the Sides of the Plateau		
Sandstone Escarpment, Talus Slopes, and Benches — North Aspect	10	
Sandstone Escarpment, Talus Slopes, and Benches — South Aspect	11	
Lower Slopes, Benches, and Spur Ridges — North Aspect	12	
Lower Slopes, Benches, and Spur Ridges — South Aspect	13	
Sandstone Glades, Rock Outcrops, and Plateau Edges	7	
Landtypes Associated with Drainages		
Lower Slopes, Terraces, and Streambottoms with Good Drainage	8	20
Terraces and Streambottoms with Poor Drainage	9	21

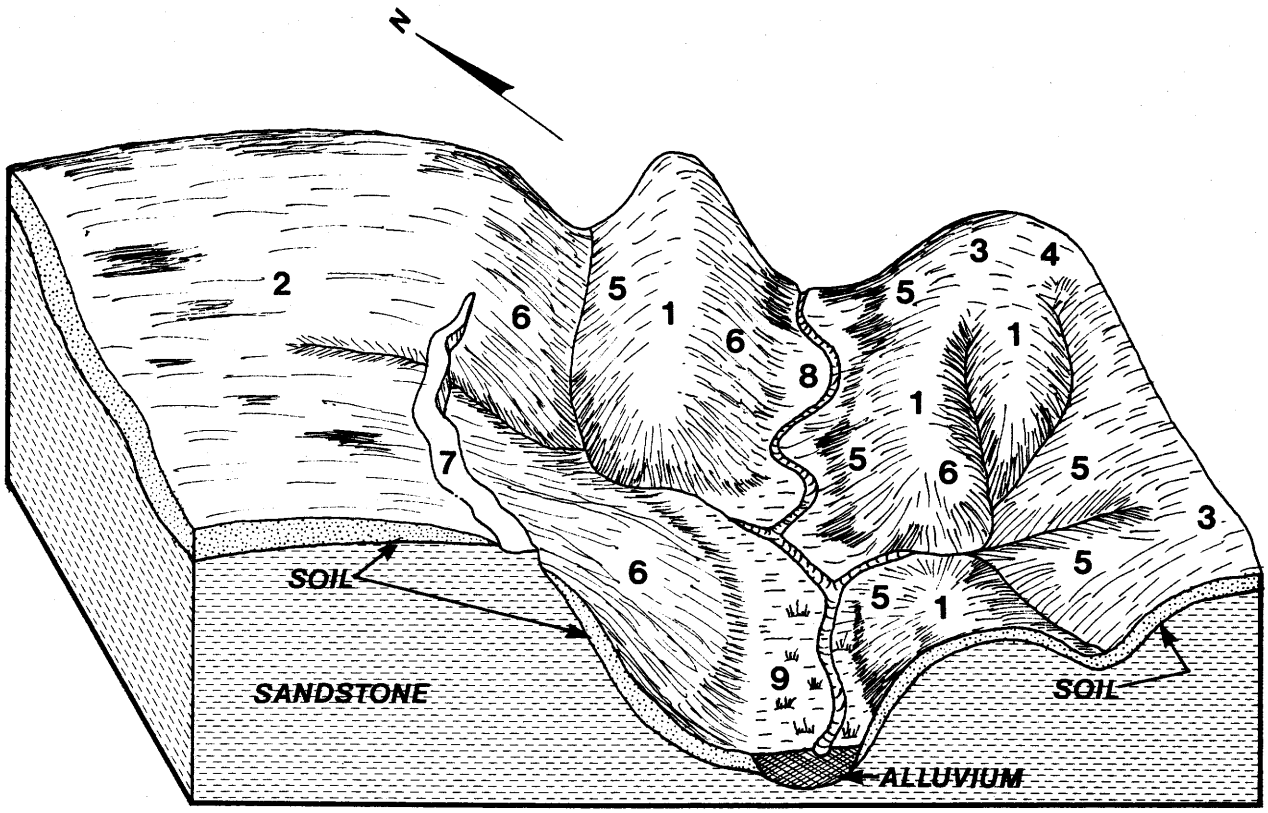


Figure 3. *Landforms on top of the Plateau and in drainages in Subregions A, B, and C where the caprock is mostly sandstone.*

FIGURE 3

Legend

1. Narrow ridges and convex upper slopes.
2. Broad undulating uplands.
3. Broad ridges, north aspect.
4. Broad ridges, south aspect.
5. North slopes.
6. South slopes.
7. Sandstone glades, rock outcrops, and plateau edges.
8. Lower slopes, terraces, and streambottoms with good drainage.
9. Terraces and streambottoms with poor drainage.

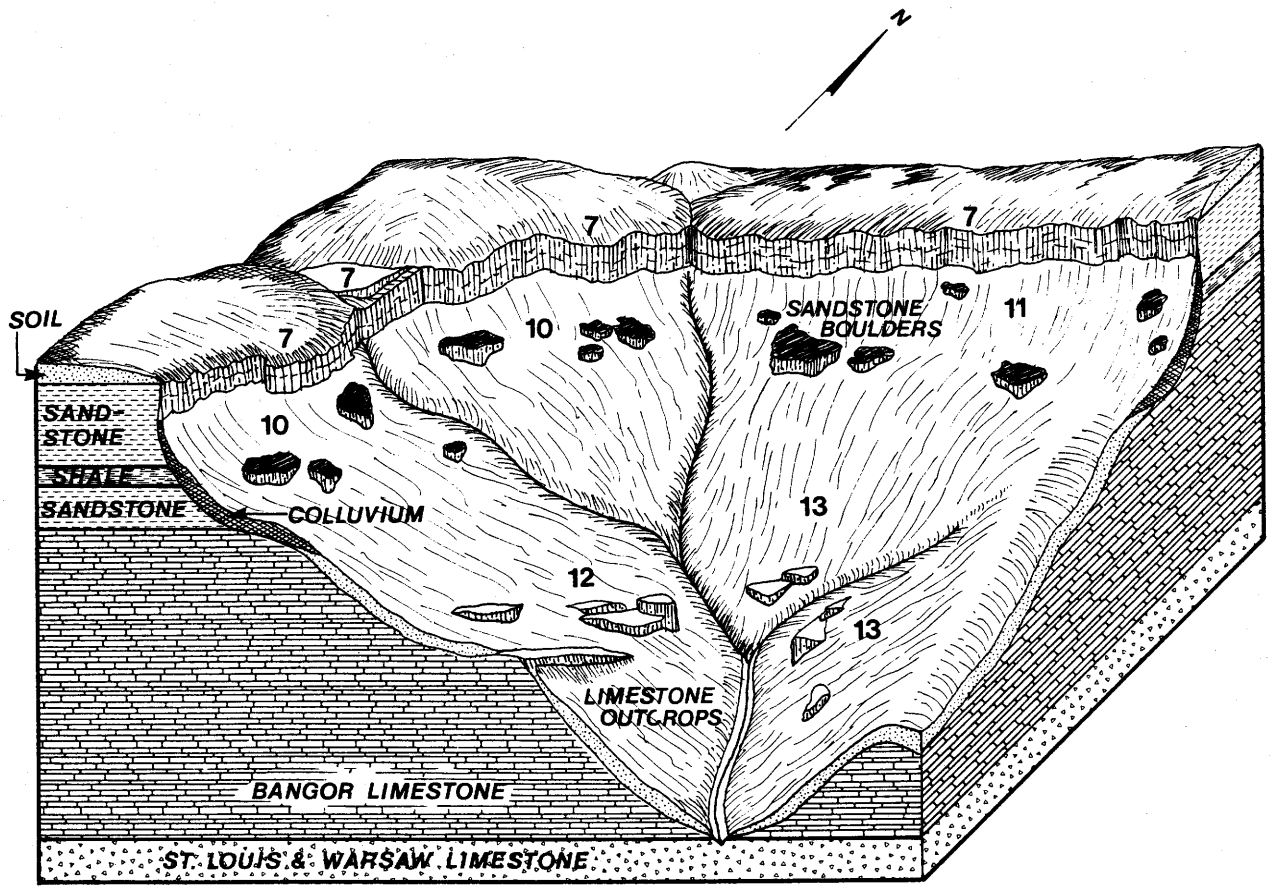


Figure 4. *Landforms on the sides of the Plateau in Subregions A, B, and C.*

FIGURE 4

Legend

7. Sandstone glades, rock outcrops, and plateau edges.
10. Sandstone escarpment, talus slopes, and benches; north aspect.
11. Sandstone escarpment, talus slopes, and benches; south aspect.
12. Lower slopes, benches, and spur ridges; north aspect.
13. Lower slopes, benches, and spur ridges; south aspect.

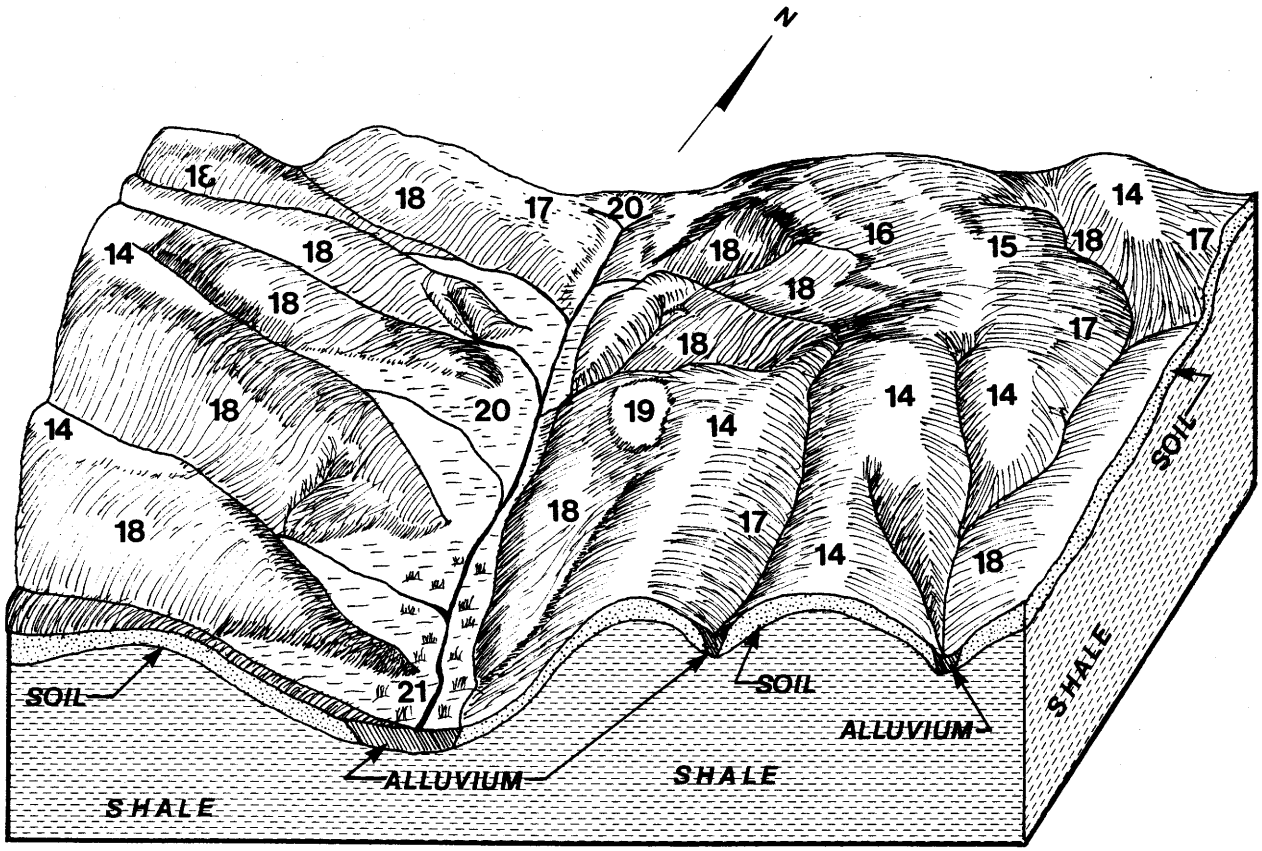


Figure 5. *Landforms on top of the Plateau and in drainages in Subregion D where the caprock is mostly shale.*

FIGURE 5

Legend

14. Narrow ridges and convex upper slopes.
15. Broad ridges, north aspect.
16. Broad ridges, south aspect.
17. North slopes.
18. South slopes.
19. Shale rockland and shallow soils.
20. Lower slopes, terraces, and streambottoms with good drainage.
21. Terraces and streambottoms with poor drainage.

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).

Slope Classes and Corresponding Percent of Slope

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

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

The kind of **Bedrock** or **Soil Parent Material** and **Depth to Bedrock,** are listed next. **Soil Texture** is described in terms of the 12 conventional classes, which are 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 the influence of soil drainage, topographic position, and aspect.

Soil Fertility is described as: *very low, low, moderately low, moderate, moderately high, high,* or *very high.* Because soils of the Southern Cumberland Plateau are fairly acid and derived from rocks with few weatherable minerals, the most fertile soils in the region are rated only moderate (Francis and Loftus, 1977). The most common woody species in approximate order of abundance are listed under **Vegetation.** Some distinctive herbaceous species are included. Species nomenclature follows Little (1953) 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 and as average annual growth in cubic feet per acre. Site index is the total height attained by dominant and codominant trees at some specified age.

For all naturally occurring species but upland oaks, site indices are the means of values from soil survey interpretations for dominant soils in each landtype. Interpretations are issued by the SCS as part of each soil series description. SCS personnel obtained height and age measurements in well-stocked, even-aged, essentially unmanaged stands that had not been damaged excessively by fire, insects, disease, or 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, Broadfoot and Krinard 1959, Nelson and others 1961, and U.S. Forest Service 1929) to convert height and age data to site indices. Curves for yellow-poplar, sweetgum, and the pines are based on age 50 years; those for cottonwood on age 30 years.

For upland oaks average site indices, base age 50 years, were derived from Smalley's (1967) soil-site study in Subregion C and Schnur's (1937) curves.

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

In a few cases when no values were available, site indices, base age 50 years, of important species were estimated. Where they occur in tables 4 to 24 these estimated values are enclosed in parentheses.

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

Average annual growth rates for loblolly and shortleaf pine plantations were derived from Smalley and Bailey's (1974a, 1974b) variable-density yield tables, and a planting density of 1,000 seedlings per

acre was assumed. Average growth was based on 40 years, the oldest age reported in the yield tables.

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

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 4 to 24 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 preparaton or special maintenance practices. Competition ratings in tables 4 to 24 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 use of conventional wheeled or tracked equipment. Soil and topographic characteristics such as slope, drainage, texture, and rockiness influence equpment limitations, sometimes necessitating the use of different kinds of equipment and methods of operation, or restricting the season when equipment is used. Generally, limitation is *slight* if slope is 20 percent or less and farm machinery can operate efficiently during all seasons. The rating is *moderate* if slope is 20 to 30 percent, limits the use of ordinary farm machinery, and requires track-type equipment; or if soil wetness prevents the use of logging vehicles for 2 to 6 months in a year. The rating is *severe* if slope exceeds 30 percent, making track-type equipment inadequate and requiring power vehicles and other special equipment; or if wetness prevents use of vehicles for 6 months or more in a year.

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

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

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

Using the System

This guide will allow professional foresters, forest landowners, landuse specialists, forest researchers, and other resource professionals to make on-site determination 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 identify specific landtypes by referring to the Landtype Descriptions. Then the user should refer to the table on the facing page to obtain information about productivity, severity of mangement problems, and species desirability.

This site classification system provides a sound biological basis for forest management planning be-

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

A logical vehicle to transfer this site classification system into a valuable forest management tool is a landtype map (fig. 6), which can be used in all phases of management from day-to-day activities to long-range planning. The number and scale of maps will depend on size of ownership and how intensively one wishes to manage. Landtypes can be mapped at scales

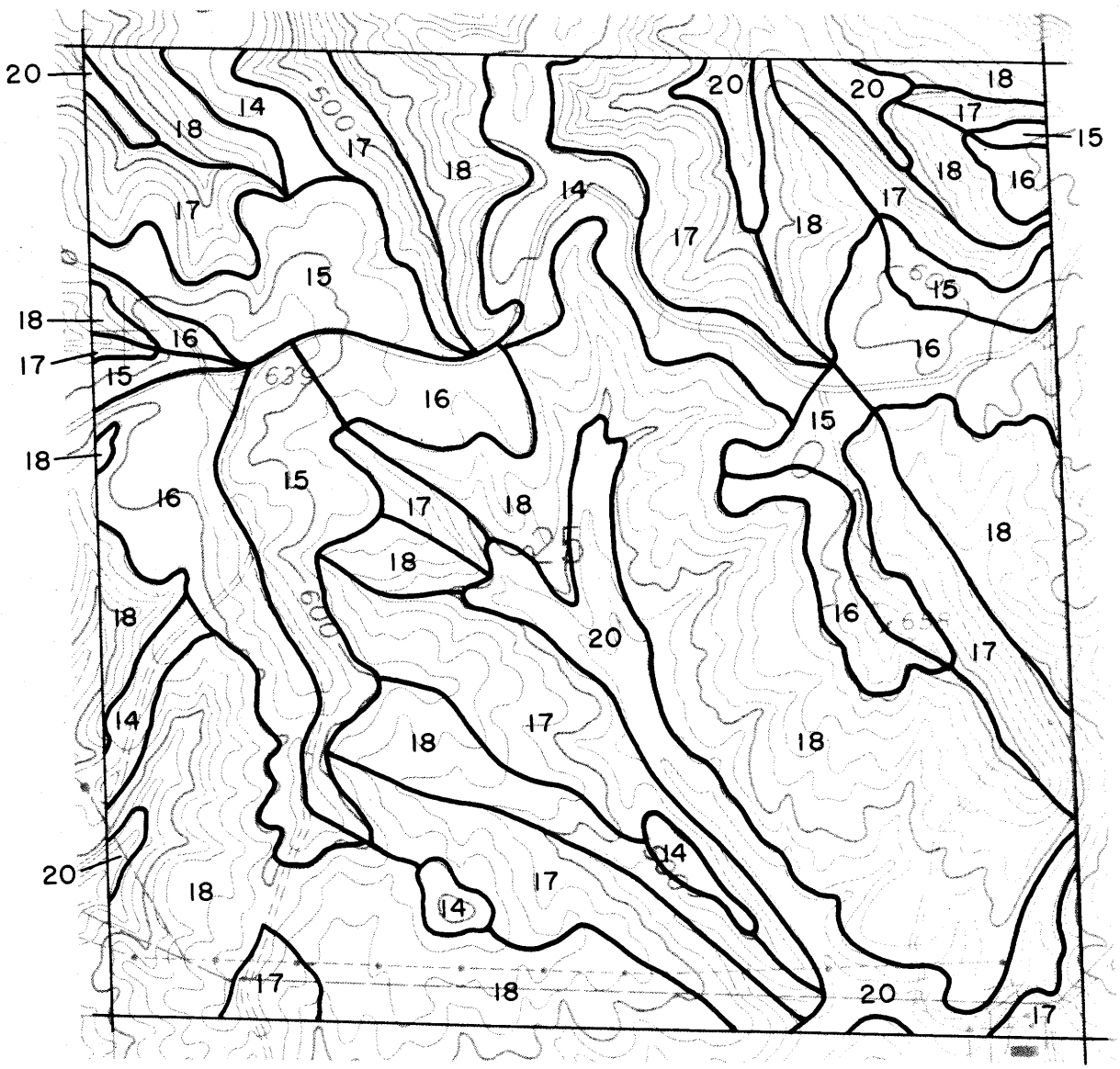


Figure 6. *A sample landtype map for Subregion D, the Shale Hills. Brookside Quadrangle, Jefferson County, Alabama. Section 25, T 15 S, R 4 W.*

of 1:10,000 to 1:40,000. So the U.S. Geological Survey 7½ minute quadrangle sheets (1:24,000) make excellent base maps on which to delineate landtypes. Black and white or color aerial photos of high contrast can also serve as base maps. A reasonable amount of ground checking should be part of the mapping process. Owners or managers of large tracts should explore the advantages of computer-generated mapping 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 that need to be researched. For example, it became apparent in compiling site index and growth information that little mensuration data specific to the region are available. Finally, the system provides researchers with a vehicle for quick transfer of research results to the practitioner. Study results can be reported on the basis of their applicability to specific landtypes.

DESCRIPTIONS AND FOREST MANAGEMENT INTERPRETATIONS FOR LANDTYPES IN SUBREGIONS

A. TABLE PLATEAUS

B. MODERATELY DISSECTED PLATEAU

C. STRONGLY DISSECTED PLATEAU

Description of Landtype 1:

NARROW RIDGES AND CONVEX UPPER SLOPES

Geographic setting — Shallow to moderately deep soils on gently sloping to steep, narrow, winding ridgetops and adjoining convex upper slopes. Slope ranges from 0 to 40 percent. Typically this landtype is no wider than 250 feet. Rock fragments, mostly sandstone, are common on the surface. Up to 50 percent of the soil mass may be coarse fragments. Along the western boundary of Little Mountain in Subregion B and in Subregion C in the transition to the Upper Coastal Plain, ridgetops may be capped with a few inches to several feet of unconsolidated Coastal Plain sediments. If these sediments are extensive, this site classification does not apply.

Dominant soils — Hartsells, Linker, Mountainburg, and Hector.

Bedrock — Predominantly sandstone and conglomerate with thin strata of shale or siltstone in places.

Depth to bedrock — 40 inches or less.

Texture — Fine sandy loam, sandy loam, loam; often channery, flaggy, or stony.

Soil drainage — Well-drained to somewhat excessively drained.

Relative soil water supply — Low to very low.

Soil fertility — Low.

Vegetation — White oak, southern red oak, scarlet oak, post oak, chestnut oak, black oak, shortleaf pine, Virginia pine, blackjack oak, hickories, and blackgum; occasional sweetgum and yellow-poplar. Dogwood, sassafras, sourwood, and huckleberries are common understory associates.

Table 4.—*Forest management interpretations for Landtype 1: Narrow Ridges and Convex Upper Slopes. Footnotes appear on page 58.*

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	55	40	90	84
Virginia pine	60		53	
White oak	55 }		38-45	
Red oaks	60 }			
E. redcedar	35			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Post oak
Virginia pine	S. red oak	Blackgum
Shortleaf pine	Black oak	Hickories
	Chestnut oak	E. redcedar

Description of Landtype 2:

BROAD UNDULATING UPLANDS

Geographic setting — Moderately deep to deep soils on level to gently sloping uplands with slopes not exceeding 6 percent. Slopes are so gentle that aspect is not a factor. These uplands may be up to 0.5 mile in width. This landtype occurs frequently on Sand Mountain and occasionally on Lookout and Brindley Mountains but is rare in the more highly dissected portions of the Plateau. Rock fragments occur infrequently on the surface. Although as much as 50 percent of the soil mass may be coarse fragments, less rocky conditions predominate. Typically this landtype occupies the highest part of the landscape and grades into steeper broad ridges (Landtypes 3 and 4) or into mid-slopes (Landtypes 5 and 6). Depressions within these uplands should be classified as Landtype 9.

Dominant soils — Hartsells, Linker, Nectar, Wynnville, Albertville, and Enders.

Bedrock — Sandstone, conglomerate, shale, or siltstone; often interbedded.

Depth to bedrock — 20 inches to 6 feet.

Texture — Fine sandy loam, sandy loam, loam, and silt loam; occasionally channery, shaly, or stony.

Soil drainage — Well-drained except Wynnville soils which are moderately well drained.

Relative soil water supply — Medium.

Soil fertility — Moderately low.

Vegetation — White oak, southern red oak, scarlet oak, hickories, chestnut oak, black oak, yellow-poplar, blackgum, red maple, loblolly pine, and shortleaf pine. Dogwood, sassafras, and persimmon are common in the understory and abundant on abandoned fields and in stands that have been commercially clearcut. In some places huckleberries are abundant in the understory.

Table 5.—*Forest management interpretations for Landtype 2: Broad Undulating Uplands. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75	55	114	133
Shortleaf pine	65	45	113	102
Virginia pine	70		92	
White oak	65 }		51	
Red oaks	65 }			
E. redcedar	40			
Yellow-poplar	75		63	

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
Loblolly pine	White oak	Hickories
Yellow-poplar	S. red oak	Blackgum
Virginia pine	Black oak	Red maple
Shortleaf pine	N. red oak	E. redcedar

Description of Landtype 3:
BROAD RIDGES – NORTH ASPECT

Geographic setting — Moderately deep to deep soils on nearly level to steep north-facing portions of broad ridgetops and the adjoining convex upper slopes. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point there is usually an obvious increase in gradient. Slope ranges from 6 to 35 percent. Rock fragments occur on the surface in places. As much as 50 percent of the soil mass may be coarse fragments. These broad ridges may occur below the broad uplands (Landtype 2) in Subregions A and B. Along the western edge of the region, ridgetops may be capped with a few inches to several feet of unconsolidated Coastal Plain sediments. If these sediments are extensive, this site classification does not apply.

Dominant soils — Hartsells, Linker, Nectar, Wynnville, Albertville, and Enders.

Bedrock — Sandstone, conglomerate, shale, or siltstone; often interbedded.

Depth to bedrock — 20 inches to 6 feet.

Texture — Fine sandy loam, sandy loam, loam, and silt loam; occasionally channery, shaly, or stony.

Soil drainage — Well-drained except Wynnville soils, which are moderately well drained.

Relative soil water supply — Medium.

Soil fertility — Moderately low to low.

Vegetation — White oak, southern red oak, scarlet oak, hickories, black oak, yellow-poplar, blackgum, red maple, loblolly pine, and shortleaf pine. Dogwood, sassafras, and persimmon are common understory species that are abundant on abandoned fields and in stands that have been commercially clearcut. In some places, huckleberries are abundant in the understory.

Table 6.—*Forest management interpretations for Landtype 3: Broad Ridges – North Aspect. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	75	55	114	133
Shortleaf pine	65	45	113	102
Virginia pine	70		92	
White oak	65 }		51	
Red oaks	65 }			
E. redcedar	40			
Yellow-poplar	75		63	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Yellow-poplar	S. red oak	Blackgum
Virginia pine	Black oak	Red maple
Shortleaf pine	N. red oak	E. redcedar

Description of Landtype 4:
BROAD RIDGES – SOUTH ASPECT

Geographic setting — Moderately deep to deep soils on nearly level to steep south-facing portions of broad ridgetops and the adjoining convex upper slopes. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point there is usually an obvious increase in gradient. Slope ranges from 6 to 35 percent. Rock fragments occur on the surface in places. The soil mass may have as much as 50 percent coarse fragments in some areas. South-facing ridges tend to be somewhat steeper and have shallower soils with a higher rock content than north-facing ridges. These broad ridges may occur below the broad uplands (Landtype 2) in Subregions A and B. Along the western edge of the region, ridgetops may be capped with a few inches to several feet of unconsolidated Coastal Plain sediments. If these sediments are extensive, this site classification does not apply.

Dominant soils — Hartsells, Linker, Nectar, Wynnville, Albertville, and Enders.

Bedrock — sandstone, conglomerate, shale, or siltstone; often interbedded.

Depth to bedrock — 20 inches to 5 feet.

Texture — Fine sandy loam, sandy loam, loam, silt loam; occasionally channery, shaly, or stony.

Soil drainage — Well-drained except Wynnville soils, which are moderately well drained.

Relative soil water supply — Medium to low.

Fertility — Moderately low to low.

Vegetation — White oak, southern red oak, scarlet oak, hickories, chestnut oak, Virginia pine, black oak, shortleaf pine, red maple, blackgum, and loblolly pine. Dogwood, sassafras, and persimmon are common in the understory and are abundant on abandoned fields and in stands that have been commercially clearcut. In some places, huckleberries are abundant in the understory.

Table 7.—*Forest management interpretations for Landtype 4: Broad Ridges – South Aspect. Footnotes appear on page 58.*

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	55	40	90	84
Virginia pine	60		53	
White oak	60		45	
Red oaks	60			
E. redcedar	35			

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
Loblolly pine	White oak	Hickories
Virginia pine	S. red oak	Red maple
Shortleaf pine	Chestnut oak	Blackgum
	Black oak	E. redcedar
		Post oak

Description of Landtype 5:
NORTH SLOPES

Geographic setting — Shallow to moderately deep soils on north-facing linear or nearly linear mid-slopes. This landtype lies between the narrow winding ridgetops, broad uplands, or broad ridgetops and convex upper slopes (Landtypes 1, 2, and 3) and the lower concave slopes, terraces, and streambottoms (Landtypes 8 and 9). Slope ranges from 6 to 60 percent. Rock fragments are common on the surface. As much as 50 percent of the soil mass of sandy soils and 90 percent of shaly soils may be coarse fragments.

Dominant soils — Mountainburg, Hector, and Montevallo.

Bedrock — Sandstone or siltstone and sandy shale with lenses of sandstone.

Depth to bedrock — Less than 20 inches to sandstone; 20 to 40 inches to siltstone or shale.

Texture — Fine sandy loam, loam, and silt loam; usually channery, shaly, or stony.

Soil drainage — Well-drained.

Relative soil water supply — High to medium. Irrigated by subsurface flow.

Soil fertility — Moderately low to low.

Vegetation — White oak, northern red oak, black oak, chestnut oak, hickories, loblolly pine, southern red oak, scarlet oak, shortleaf pine, and Virginia pine; occasional American beech. Dogwood, persimmon, bigleaf magnolia, sourwood, and switch cane are common understory species.

Table 8.—*Forest management interpretations for Landtype 5: North Slopes. Footnotes appear on page 58.*

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	55	40	90	84
Virginia pine	60		53	
White oak	75 }		63-69	
Red oaks	70 }			
Yellow-poplar	(80)		71	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Virginia pine	N. red oak	American beech
Shortleaf pine	Black oak	
Yellow-poplar	S. red oak	
	Chestnut oak	

Description of Landtype 6:
SOUTH SLOPES

Geographic setting — Shallow to moderately deep soils on south-facing linear or nearly linear mid-slopes. This landtype occurs between narrow winding ridgetops, broad uplands, or broad ridgetops and convex upper slopes (Landtypes 1, 2, and 4) and lower concave slopes, terraces, and streambottoms (Landtypes 8 and 9). Slope ranges from 6 to 60 percent. Rock fragments are common on the surface. As much as 50 percent of the soil mass of sandy soils and 90 percent of shaly soils may be coarse fragments. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes.

Dominant soils — Mountainburg, Hector, and Montevallo.

Bedrock — Sandstone or siltstone and sandy shale with lenses of sandstone.

Depth to bedrock — Less than 20 inches to sandstone; 20 to 40 inches to siltstone or shale.

Texture — Fine sandy loam, loam, and silt loam; usually channery, shaly, or stony.

Soil drainage — Well-drained.

Relative soil water supply — Medium to low.

Soil fertility — Low to very low.

Vegetation — White oak, southern red oak, hickories, scarlet oak, chestnut oak, Virginia pine, post oak, black oak, shortleaf pine, red maple, blackgum, and black locust. Dogwood, sassafras, and huckleberries are common in the understory.

Table 9.—*Forest management interpretations for Landtype 6: South Slopes. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	60	45	86	98
Shortleaf pine	50	35	79	65
Virginia pine	50		<41	
White oak	65		45-51	
Red oaks	60			
E. redcedar	30			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Virginia pine	S. red oak	Blackgum
Shortleaf pine	Chestnut oak	Black locust
	Black oak	Red maple
		E. redcedar
		Post oak

Description of Landtype 7:
SANDSTONE GLADES, ROCK OUTCROPS, AND PLATEAU EDGES

Geographic setting — Small to moderately large areas of shallow soils and bare rock on nearly level to moderately steep ridgetops, slopes, and edges of the Plateau above nearly vertical cliffs, and along deeply incised streams. Slope ranges from 0 to 45 percent. Outcropping sandstone occupies more surface in some areas than others. Slope of the rock surface usually is 5 percent or less. The very shallow dark brown or gray soils at the margins of these outcrops contain a very high percentage of organic matter. This landtype is associated with Landtypes 2, 3, 4, 5, 10, and 11 and sometimes with 1. Its extent varies from narrow strips to broad continuous areas. Landtype 7 has the lowest productivity of any Landtype in Subregions A, B, and C.

Dominant soils — Mountainburg, Hector, and Rockland-sandstone.

Bedrock — Predominantly sandstone and conglomerate with thin strata of shale or siltstone in places.

Depth to bedrock — Less than 20 inches.

Texture — Fine sandy loam, sandy loam, and loam; often gravelly, channery, or stony.

Soil drainage — Well-drained to somewhat excessively drained.

Relative soil water supply — Very low. Seepage is common in wet weather, but the soil dries quickly.

Soil fertility — Very low.

Vegetation — Virginia pine, white oak, post oak, blackjack oak, chestnut oak, shortleaf pine, hickories, scarlet oak, and black locust; occasional winged elm. Mountain laurel, huckleberries, lichens, and grasses are common understory species.

Table 10.—*Forest management interpretations for Landtype 7: Sandstone Glades, Rock Outcrops, and Plateau Edges. Footnotes appear on page 58.*

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	
Upland oaks	(50)		32	
E. redcedar	(30)			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Virginia pine	White oak Chestnut oak Shortleaf pine Post oak E. redcedar	Hickories Winged elm Blackjack oak

Description of Landtype 8:
LOWER SLOPES, TERRACES, AND STREAMBOTTOMS WITH GOOD DRAINAGE

Geographic setting — Deep soils with good drainage on level to strongly sloping concave lower slopes, stream terraces, flood plains, and head of hollows on top of the Plateau. Slope ranges from 0 to 15 percent. This landtype typically occurs below Landtypes 5 and 6 as narrow stringers associated with the drainage network, but can also occur below Landtypes 1, 2, 3, or 4 particulaly near the heads of streams. When Landtypes 8 and 9 are adjacent, Landtype 8 occupies a higher position on the landscape. In gorges of the Plateau interior, primarily in Subregion C, this landtype occurs below Landtypes 10 and 11 where stream cutting has not carved through the sandstone caprock and below Landtypes 12 and 13 where stream cutting has carved through the sandstone caprock into the underlying Bangor limestone. This landtype is the second most productive one in the Region.

Dominant soils — Barbourville, Pope, Ealy, Philo, Clifty; occasionally Staser and Hamblen.

Parent material — Alluvium from sandstone, siltstone, and shale underlain by similar rocks on alluvium from sandstone, shale, and limestone underlain by limestone.

Depth to bedrock — 4 to 11 feet or more.

Texture — Fine sandy loam, loam, silt loam; occasionally gravelly.

Soil drainage — Well-drained to moderately well drained.

Relative soil water supply — High. Irrigated by subsurface flow.

Soil fertility — Moderate.

Vegetation — Red maple, yellow-poplar, white oak, blackgum, sweetgum, loblolly pine, northern red oak; occasional American sycamore, American beech, yellow buckeye, white ash, boxelder, eastern hemlock, white basswood, bigleaf magnolia, cucumbertree, and American elm. Sourwood, dogwood, and switch cane are common in the understory.

Table 11.—*Forest management interpretations for Landtype 8: Lower Slopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 58.*

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	65	134	162
Shortleaf pine	80	60	148	148
Virginia pine	75		120	
Yellow-poplar	100		107	
White oak	80 }		57-69	
Red oaks	70 }			
Sweetgum	90		81	
Cottonwood	(105)			
Bottomland oaks	(90)			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Yellow-poplar	White oak	Red maple
Loblolly pine	Shortleaf pine	Blackgum
N. red oak	Virginia pine	E. hemlock
White ash	Black oak	Sourwood
White basswood	S. red oak	American beech
Sweetgum		
American sycamore		
Water oak		
Willow oak		
Cottonwood		

Table 12.—*Forest management interpretations for Landtype 9: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 58.*

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	65	134	162
Sweetgum	90		81	
Cottonwood	105			
Bottomland oaks	90			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Sweetgum	Loblolly pine	Red maple
Cottonwood	Yellow-poplar	Boxelder
Water oak	American sycamore	Black willow
Willow oak	White ash	
	American elm	

Description of Landtype 10:
SANDSTONE ESCARPMENTS, TALUS SLOPES, AND BENCHES – NORTH ASPECT

Geographic setting — Deep to very deep soils formed in colluvium or alluvium from sandstone, shale, and siltstone and underlain by sandstone or shale. Occupies the gently sloping to very steep upper one-third of northerly slopes that extend from the Plateau escarpment to the valley floor. Slope ranges from 2 to 70 percent. Much of the surface is covered with sandstone boulders and fragments. At the Plateau exterior this landtype may be absent if escarpment development has progressed down to limestone. In gorges of the Plateau interior, primarily in Subregion C, this landtype occurs where stream cutting has carved into the sandstone caprock and an escarpment is present. This landtype is a mesic site and has the highest productivity of any landtype in the Region.

Dominant soils — Grimsley and Jefferson. Formerly mapped as Sandstone rockland or Bouldery colluvial land.

Bedrock — Sandstone and shale.

Depth to bedrock — 40 inches to 5 feet or more.

Texture — Gravelly or cobbly loam, silty clay loam, or clay loam; occasionally sandy loam.

Soil drainage — Well-drained.

Relative soil water supply — Very high to high. Irrigated by subsurface flow and seepage.

Soil fertility — Moderate to moderately low.

Vegetation — Northern red oak, white oak, yellow-poplar, loblolly pine, American beech, white ash, white basswood, yellow buckeye, black oak, black cherry, sugar maple, black locust, redmaple, and cucumbertree. Bigleaf magnolia, dogwood, ironwood, and devil's club are common understory species.

Table 13.—*Forest management interpretations for Landtype 10: Sandstone Escarpment, Talus Slopes, and Benches – North Aspect. Footnotes appear on page 58.*

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)		123	
White oaks	(75) }		63-69	
Red oaks	(80) }			
Yellow-poplar	(100)		107	
Black walnut	(90)			
Black cherry	(90)			
Shortleaf pine	65		113	
Virginia pine	(65)		70	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Yellow-poplar	White oak	American beech
N. red oak	Black oak	Red maple
Loblolly pine	White basswood	Sugar maple
White ash	Cucumbertree	Black locust
Black walnut	Shortleaf pine	Bigleaf magnolia
Black cherry		Sourwood

Description of Landtype 11:
SANDSTONE ESCARPMENTS, TALUS SLOPES, AND BENCHES – SOUTH ASPECT

Geographic setting — Deep to very deep soils formed in colluvium or alluvium from sandstone, shale, and siltstone and underlain by sandstone or shale. Occupies the gently sloping to very steep upper one-third of southerly slopes, which extends from the Plateau escarpment to the valley floor. Slope ranges from 2 to 70 percent. Much of the surface is covered with sandstone boulders and fragments. At the Plateau exterior this landtype may be absent if escarpment development has progressed down to limestone. In gorges of the Plateau interior, primarily in Subregion C, this landtype occurs where stream cutting has carved into the sandstone caprock and an escarpment is present. This landtype is not as productive as Landtype 10, and forest stands lack the preponderance of mesic species found on north aspects.

Dominant soils — Grimsley and Jefferson. Formerly mapped as Sandstone rockland or Bouldery colluvial land.

Bedrock — Sandstone and shale.

Depth to bedrock — 40 inches to 5 feet or more.

Texture — Gravelly or cobbly loam, silty clay loam, or clay loam; occasionally sandy loam.

Soil drainage — Well-drained.

Relative soil water supply — Medium to low. Irrigated by subsurface flow and seepage. This landtype is not as moist as Landtype 10

Soil fertility — Moderately low to low.

Vegetation — White oak, chestnut oak, southern red oak, black oak, black locust, hickories, loblolly pine, shortleaf pine, and Virginia pine; occasional yellow-poplar, white ash, and black cherry. Dogwood and sourwood are common understory species.

Table 14.—*Forest management interpretations for Landtype 10: Sandstone Escarpment, Talus Slopes, and Benches – South Aspect. Footnotes appear on page 58.*

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	65		70	
Upland oaks	65		51	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	Hickories	Sourwood
Shortleaf pine	Black locust	
Virginia pine		
White oak		
S. red oak		
Black oak		
Chestnut oak		
Yellow-poplar		

Description of Landtype 12:
LOWER SLOPES, BENCHES, AND SPUR RIDGES – NORTH ASPECT

Geographic setting — Shallow to very deep soils formed in colluvium or alluvium from sandstone and shale and underlain by either limestone or limestone residuum. Occupies the gently sloping to very steep lower two-thirds of northerly slopes that extend from the nearly vertical sandstone cliffs to the valley floor, or the entire northerly slopes of narrow spur ridges that extend into the adjacent valleys. Slope ranges from 2 to 75 percent. Sandstone boulders may be present, but up to 40 percent of the surface is covered with limestone outcrops and boulders. Soil material between the rocks is compact, sticky, heavy clay. Coarse fragments in the soil vary from less than 10 percent to 65 percent. This landtype usually occurs downslope from Landtype 10 and is less productive than north upper slopes. Where the escarpment has developed down to limestone, however, this landtype may extend from the base of the escarpment down to the adjoining valleys. This landtype does not occur in gorges of the Plateau interior where stream cutting has not carved through the sandstone caprock. Where stream cutting has carved through the sandstone caprock into the underlying Bangor limestone, this landtype occurs below Landtype 10 and above Landtypes 8 and 9.

Dominant soils — Bouldin, Allen, Nella. Formerly mapped as Limestone rockland or Bouldery colluvial land.

Bedrock — Limestone.

Depth to bedrock — A few inches to 10 feet or more.

Texture — Gravelly to stony loam, sandy clay loam, clay loam, and silt loam; occasionally sandy loam.

Soil drainage — Moderately well-drained to well-drained.

Relative soil water supply — Low. Soil water removed by deep percolation into the limestone.

Soil fertility — Moderately low.

Vegetation — Southern red oak, post oak, eastern redcedar, scarlet oak, chestnut oak, white oak, hickories, white ash, slippery elm, shortleaf pine, Virginia pine, and loblolly pine. Redbud, dogwood, winged elm, persimmon, and ironwood are common in the understory.

Table 15.—*Forest management interpretations for Landtype 12: Lower Slopes, Benches, and Spur Ridges – North Aspect. Footnotes appear on page 58.*

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	70		92	
Upland oaks	(60)		45	
E. redcedar	45			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
E. redcedar	Hickories	Dogwood
White oak	Post oak	Persimmon
S. red oak	Scarlet oak	Redbud
White ash	Chestnut oak	Winged elm
Loblolly pine	Slippery elm	Ironwood
Shortleaf pine		E. redcedar
Virginia pine		

Description of Landtype 13:
LOWER SLOPES, BENCHES, AND SPUR RIDGES – SOUTH ASPECT

Geographic setting — Shallow to very deep soils formed in colluvium and alluvium from sandstone and shale and underlain by either limestone or limestone residuum. Occupies the gently sloping to very steep lower two-thirds of south slopes that extend from the nearly vertical sandstone cliffs to the valley floor, or the entire southerly slopes of narrow spur ridges that extend into the adjacent valleys. Slope ranges from 2 to 75 percent. Sandstone boulders may be present, but up to 40 percent of the surface is covered with limestone outcrops and boulders. Soil material between the rocks is compact, sticky, heavy clay. Coarse fragments in the soil vary from less than 10 percent to 65 percent. This landtype usually occurs downslope from Landtype 11. Where the escarpment has developed down to limestone, however, this landtype may extend from the base of the escarpment down to the adjoining valleys. This landtype does not occur in gorges of the Plateau interior where stream cutting has not carved through the sandstone caprock. Where stream cutting has carved through the sandstone caprock into the underlying Bangor limestone, this landtype occurs below Landtype 11 and above Landtypes 8 and 9.

Dominant soils — Bouldin, Allen, Nella. Formerly mapped as Limestone rockland or Bouldery colluvial land.

Bedrock — Limestone.

Depth to bedrock — A few inches to 10 feet or more.

Texture — Gravelly to stony loam, sandy clay loam, clay loam, and silt loam; occasionally sandy loam.

Soil drainage — Moderately well-drained to well-drained.

Relative soil water supply — Low to very low. Soil water removed by deep percolation into the limestone.

Soil fertility — Low to very low.

Vegetation — Southern red oak, post oak, eastern redcedar, chestnut oak, white oak, scarlet oak, hickories, white ash, slippery elm, Virginia pine, shortleaf pine, and loblolly pine. Redbud, dogwood, winged elm, persimmon, and ironwood are common in the understory.

Table 16.—*Forest management interpretations for Landtype 13: Lower Slopes, Benches, and Spur Ridges – South Aspect. Footnotes appear on page 58.*

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	
Upland oaks	50		32	
E. redcedar	40			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
E. redcedar	Post oak	Dogwood
S. red oak	Chestnut oak	Persimmon
White oak	Scarlet oak	Redbud
White ash	Hickories	Winged elm
Shortleaf pine	Slippery elm	Ironwood
Virginia pine		
Loblolly pine		

DESCRIPTIONS AND FOREST MANAGEMENT INTERPRETATIONS FOR LANDTYPES IN SUBREGION

D. SHALE HILLS

Description of Landtype 14:
NARROW RIDGES AND CONVEX UPPER SLOPES

Geographic setting — Moderately deep soils on gently sloping to steep, narrow, winding ridgetops and adjoining convex upper slopes. Slope ranges from 2 to 45 percent. Shale fragments are common on the surface. Up to 90 percent of the soil mass may be coarse fragments.

Dominant soils — Enders, Townley, and Montevallo.

Bedrock — Shale and siltstone with a few thin strata of sandstone.

Depth to bedrock — 20 inches to about 3 feet.

Texture — Fine sandy loam, loam, and silt loam; often shaly.

Soil drainage — Moderately well-drained to well-drained.

Relative soil water supply — Medium to low.

Soil fertility — Moderately low to low.

Vegetation — Loblolly pine, Virginia pine, shortleaf pine, white oak, post oak, hickories, chestnut oak, longleaf pine, and blackgum. Dogwood, sourwood, and huckleberries are common in the understory.

Table 17.—*Forest management interpretations for Landtype 14: Narrow Ridges and Convex Upper Slopes. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	60	55	104	133
Shortleaf pine	60	45	102	102
Virginia pine	65		70	
Upland oaks	55		38	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Virginia pine	Post oak	Blackgum
Shortleaf pine	Chestnut oak	Dogwood
Longleaf pine	S. red oak	Sourwood

Description of Landtype 15:
BROAD RIDGES - NORTH ASPECT

Geographic setting — Moderately deep to deep soils on gently sloping to steep north-facing portions of broad ridgetops and the adjoining convex upper slopes. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point there is usually an obvious increase in gradient. Slope ranges from 0 to 35 percent. Shale fragments occur on the surface in places. As much as 50 percent of the soil mass may be coarse fragments. Along the western edge of Subregion D in the transition to the Upper Coastal Plain, ridgetops may be capped with a few inches to several feet of unconsolidated Coastal Plain sediments. If these sediments are extensive, this site classification does not apply.

Dominant soils — Enders, Albertville.

Bedrock — Shale, siltstone, with a few thin strata of sandstone.

Depth to bedrock — 20 inches to about 5 feet.

Texture — Fine sandy loam, loam, and silt loam; occasionally shaly.

Soil drainage — Well-drained.

Relative soil water supply — Medium.

Soil fertility — Moderate to moderately low.

Vegetation — Shortleaf pine, Virginia pine, loblolly pine, southern red oak, white oak, scarlet oak, hickories, blackgum, sweetgum, and red maple; occasional chestnut oak, blackjack oak, and longleaf pine particularly on the more sandy soils. Dogwood, huckleberries, hawthorn, and sourwood are common in the understory.

Table 18.—*Forest management interpretations for Landtype 15: Broad Ridges – North Aspect. Footnotes appear on page 58.*

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	70		92	
Upland oaks	65		51	
Yellow-poplar	(80)		71	
E. redcedar	40			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Yellow-poplar	N. red oak	Blackgum
Virginia pine	S. red oak	Red maple
Shortleaf pine	Scarlet oak	Blackjack oak
Longleaf pine	Chestnut oak	Sourwood
	Sweetgum	Dogwood

Description of Landtype 16:
BROAD RIDGES – SOUTH ASPECT

Geographic setting — Moderately deep to deep soils on gently sloping to steep south-facing portions of broad ridgetops and the adjoining convex upper slopes. This landtype extends from the ridge crest down to where the slope becomes linear or nearly so. At this point there is usually an obvious increase in gradient. Slope ranges from 0 to 35 percent. Shale fragments occur on the surface in places. As much as 50 percent of the soil mass may be coarse fragments. South-facing ridges tend to be steeper and have shallower soils with higher rock contents than north-facing ridges. Along the western edge of the Region, ridgetops may be capped with a few inches to several feet of unconsolidated Coastal Plain sediments. If these sediments are extensive, this site classification does not apply.

Dominant soils — Enders, Albertville.

Bedrock — Shale, siltstone, with a few thin strata of sandstone.

Depth to bedrock — 20 inches to about 3 feet.

Texture — Fine sandy loam, loam, silt loam; occasionally shaly.

Soil drainage — Well-drained.

Relative soil water supply — Medium to low.

Soil fertility — Moderately low to low.

Vegetation — Shortleaf pine, Virginia pine, longleaf pine, southern red oak, scarlet oak, white oak, chestnut oak, post oak, blackjack oak, hickories, blackgum, and loblolly pine; occasional sweetgum and red maple. Huckleberries, hawthorn, and dogwood are common in the understory.

Table 19.—*Forest management interpretations for Landtype 16: Broad Ridges – South Aspect. Footnotes appear on page 58.*

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	55	40	90	84
Virginia pine	60		53	
Upland oaks	55		38	
E. redcedar	35			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Longleaf pine	Chestnut oak	Blackgum
Virginia pine	S. red oak	Red maple
Shortleaf pine	Scarlet oak	Blackjack oak
	Sweetgum	Post oak
		Sourwood
		Dogwood

Description of Landtype 17:
NORTH SLOPES

Geographic setting — Shallow to moderately deep soils on north-facing linear to nearly linear mid-slopes. This landtype lies between the narrow winding or broad ridgetops and convex upper slopes (Landtypes 14 and 15) and the lower concave slopes, terraces, and streambottoms (Landtypes 20 and 21). Slope ranges from 6 to 45 percent. Shale fragments are common on the surface. Soils contain 10 to 90 percent shale fragments.

Dominant soils — Montevallo.

Bedrock — Predominantly shale.

Depth to bedrock — 20 to 40 inches.

Texture — Shaly loam, shaly silt loam.

Soil drainage — Well-drained.

Relative soil water supply — High to medium. Irrigated by subsurface flow.

Soil fertility — Moderately low to low.

Vegetation — Loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickories, southern red oak, and white oak; occasional longleaf pine and blackgum. Dogwood, sourwood, switch cane, and huckleberries are common understory species.

Table 20.—*Forest management interpretations for Landtype 17: North Slopes. Footnotes appear on page 58.*

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	60	45	102	102
Virginia pine	60		53	
Upland oaks	60		45	
Yellow-poplar	(90)		90	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	N. red oak	Hickories
Yellow-poplar	White oak	Sourwood
Virginia pine	S. red oak	Blackgum
Shortleaf pine	Longleaf pine	Dogwood

Description of Landtype 18:
SOUTH SLOPES

Geographic setting — Shallow to moderately deep soils on south-facing linear to nearly linear mid-slopes. This landtype occurs between narrow winding ridgetops or broad ridgetops and convex upper slopes (Landtypes 14 and 16) and concave lower slopes, terraces and streambottoms (Landtypes 20 and 21). Slope ranges from 6 to 45 percent. Shale fragments are common on the surface. Soils contain 10 to 90 percent shale fragments. South-facing slopes tend to be steeper and have shallower soils with higher rock contents than north-facing slopes.

Dominant soils — Montevallo.

Bedrock — Predominantly shale.

Depth to bedrock — 20 to 40 inches.

Texture — Shaly loam, shaly silt loam.

Soil drainage — Well-drained.

Relative soil water supply — Medium to low. Irrigated by subsurface flow.

Soil fertility — Low.

Vegetation — Virginia pine, shortleaf pine, hickories, southern red oak, white oak, loblolly pine, and longleaf pine. Dogwood and huckleberries are common in the understory.

Table 21.—*Forest management interpretations for Landtype 18: South Slopes. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations[4]
Loblolly pine	65	50	95	117
Shortleaf pine	55	40	90	84
Virginia pine	55		41	
Upland oaks	50		32	
E. redcedar	40			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Loblolly pine	White oak	Hickories
Virginia pine	Chestnut oak	Post oak
Shortleaf pine	S. red oak	Dogwood
	Longleaf pine	
	Scarlet oak	

Description of Landtype 19:
SHALE ROCKLAND AND SHALLOW SOILS

Geographic setting — Small to moderately large areas of very shallow soils and bare rock on mostly steep and very steep slopes in association with Landtypes 14, 17, and 18. Also common along deeply incised streams. Slope ranges from 15 to over 45 percent. This landtype has the lowest productivity of any landtype in Subregion D.

Dominant soils — Rockland-shale and sandstone, Pottsville.

Bedrock — Predominantly shale with strata of siltstone and sandstone in places.

Depth to bedrock — Less than 10 inches.

Texture — Shaly silt loam, loam, and fine sandy loam.

Soil drainage — Well-drained to somewhat excessively drained.

Relative soil water supply — Very low. Seepage occurs in wet weather, but the soil dries quickly.

Soil fertility — Very low.

Vegetation — Virginia pine, southern red oak, chestnut oak, and hickories. Grasses, lichens, huckleberries, and winged elm are common in the understory.

Table 22.—*Forest management interpretations for Landtype 19: Shale Rockland and Shallow Soils. Footnotes appear on page 58.*

PRODUCTIVITY

Species	*Site index*		*Average annual growth Cubic feet per acre*	
	Natural stands[1]	Old-field plantations[2]	Natural stands[3]	Old-field plantations
Loblolly pine	60		86	
Shortleaf pine	50		79	
Virginia pine	50		<41	

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Virginia pine	Chestnut oak	Hickories
Loblolly pine	S. red oak	Winged elm
Shortleaf pine	Scarlet oak	Post oak

Description of Landtype 20:
LOWER SLOPES, TERRACES, AND STREAMBOTTOMS WITH GOOD DRAINAGE

Geographic setting — Moderately deep to deep soils with good drainage on level to strongly sloping concave lower slopes, stream terraces, flood plains, and heads of hollows. Slope ranges from 0 to 6 percent. This landtype occurs below Landtype 17 and 18 as narrow stringers associated with the drainage network. When Landtypes 20 and 21 are adjacent, Landtype 20 occupies a higher position on the landscape. Landtype 20 is the most productive one in Subregion D.

Dominant soils — Leadvale, Sequatchie, Philo.

Parent material — Alluvium from shale, siltstone, and possibly sandstone underlain by shale.

Depth to bedrock — 3.5 feet or more. Leadvale soils have a fragipan at depths of 16 to 38 inches.

Texture — Mostly silt loam, but can range to sandy loam in Philo.

Soil drainage — Well-drained to moderately well-drained.

Relative soil water supply — High. Irrigated by subsurface flow.

Soil fertility — Moderate.

Vegetation — Yellow-poplar, sweetgum, loblolly pine, white oak, northern red oak, southern red oak, scarlet oak, shortleaf pine, and red maple; occasional American sycamore and cottonwood. Dogwood and switch cane are common in the understory.

Table 23.—*Forest management interpretations for Landtype 20: Lower Slopes, Terraces, and Streambottoms with Good Drainage. Footnotes appear on page 58.*

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	65	134	162
Shortleaf pine	75	55	136	134
Upland oaks	75		63	
Yellow-poplar	100		107	
Sweetgum	90		81	
Bottomland oaks	80			
American sycamore	(90)			
Cottonwood	(105)			

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
Yellow-poplar	White oak	Red maple
Loblolly pine	N. red oak	Dogwood
Sweetgum	S. red oak	
American sycamore	Shortleaf pine	
Cottonwood	Scarlet oak	

Description of Landtype 21:
TERRACES AND STREAMBOTTOMS WITH POOR DRAINAGE

Geographic setting — Moderately deep to deep soils with poor drainage on nearly level streambottoms, terraces, and upland depressions. Slope ranges from 0 to 3 percent. This landtype occurs below Landtypes 17 and 18 as narrow stringers and in depressions on broad ridgetops and in saddles in association with Landtypes 14, 15, and 16. When Landtypes 20 and 21 are adjacent, Landtype 21 occupies a lower position on the landscape.

Dominant soils — Tyler, Stendal, Atkins.

Parent material — Alluvium from shale, siltstone, or possibly sandstone underlain by shale.

Depth to bedrock — 4 feet or more.

Texture — Mostly silt loams.

Soil drainage — Somewhat poorly to poorly drained.

Relative soil water supply — Very high to high. Irrigated by subsurface flow.

Soil fertility — Moderate to moderately low.

Vegetation — Sweetgum, red maple, yellow-poplar, loblolly pine, white oak, American sycamore, willow oak, and water oak; occasional cottonwood.

Table 24.—*Forest management interpretations for Landtype 21: Terraces and Streambottoms with Poor Drainage. Footnotes appear on page 58.*

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
Sweetgum	90		81	
Bottomland oaks	80			
Cottonwood	105			

MANAGEMENT PROBLEMS

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

SPECIES DESIRABILITY

Most desirable	Acceptable	Least desirable
Sweetgum	Yellow-poplar	Red maple
Cottonwood	White oak	
Loblolly pine	American sycamore	
Water oak		
Willow oak		

FOOTNOTES FOR TABLES 4-24

[1] Site indices for each naturally occurring species, except those for upland oaks and those enclosed in parentheses, are the means of values from soil survey interpretations issued by the SCS for the dominant soils in each landtype (Beck 1962, Broadfoot 1960, Broadfoot and Krinard 1959, Nelson and others 1961, and U.S. Forest Service 1929). Site indices for white oak and red oaks were derived from Smalley's (1967) soil-site study and Schnur's (1937) site index curves. Estimated site indices are enclosed in parentheses. Base age is 50 years for all naturally grown species except cottonwood, for which it is 30 years.

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

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

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

LITERATURE CITED

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

Beeman, L. E.
1978. Computer-assisted resource management. *In* Integrated Inventories of Renewable Natural Resources; Proceedings of the Workshop, p. 375-381. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. RM-55.

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

Broadfoot, W. M. and R. M. Krinard.
1959. Guide for evaluating sweetgum sites. U.S. Dep. Agric. For. Serv., South. For. Exp. Stn. Occas. Pap. 178, 6 p.

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

Fernald, M. L.
1950. Gray's manual of botany. Ed. 8, New York: Am. Book Co. 1,632 p.

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

Hodgkins, E. J., T. K. Cannon, and W. F. Miller.
1976. Forest habitat regions from satellite imagery: States of Alabama and Mississippi. A supplement to South. Coop. Ser. Bull. 210.

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

Little, E. L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agric. Handb. 41, 472 p.

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

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

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

Smalley, G. W.
1967. Soil-site relations of upland oaks in north Alabama. U.S. Dep. Agric. For. Serv. Res. Note SO-64, 6 p.

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

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

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

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

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

U.S. Department of Commerce.
1974. Climatological data, Alabama, annual summary 80, 13 p.

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

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

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

APPENDIX
County Soil Surveys Available For The Southern Cumberland Plateau[1]

*Cotton, J. A., R. B. McNutt, G. L. Hickman, and K. E. Fussell.
1965. Soil survey of Fayette County, Alabama. USDA Soil Conserv. Serv. Series 1962, No. 4. 117 p. + maps.

Elder, J. A., E. K. Yates, and I. B. Epley.
1958. Soil survey of Marion County, Tennessee. USDA Soil Conserv. Serv. Series 1950, No. 2. 88 p. + maps.

Fussell, K. E., and E. A. Perry.
1959. Soil survey of Marshall County, Alabama. USDA Soil Conserv. Serv. Series 1956, No. 2. 61 p. + maps.

*McNutt, R. B., and E. A. Perry.
1962. Soil survey of Cullman County, Alabama. USDA Soil Conserv. Serv. Series 1959, No. 9. 73 p. + maps.

*Montgomery, C. F.
1978. Soil survey of Cherokee County, Alabama. USDA Soil Conserv. Serv. 78 p. + maps.

*Montgomery, C. F., H. G. Neal, and W. V. Anderson.
1978. Soil survey of Etowah County, Alabama. USDA Soil Conserv. Serv. 132 p. + maps.

Sherard, H., B. E. Young, H. J. Wesson, and M. J. Edwards.
1959. Soil survey of Lawrence County, Alabama. USDA Soil Conserv. Serv. Series 1949, No. 10. 83 p. + maps.

*Sherard, H., R. A. Young, J. P. Bryant, S. J. Smith, and J. A. Gibbs.
1965. Soil survey of Franklin County, Alabama. USDA Soil Conserv. Serv. Series 1961, No. 19. 80 p. + maps.

*Soil Conservation Service.
Soil survey of Blount County, Alabama. (In press).

*Soil Conservation Service.
Soil survey of Marion County, Alabama. (In press).

Swenson, G. A., S. R. Bacon, R. S. Farnham, and J. E. Paseur.
1958. Soil survey of DeKalb County, Alabama. USDA Soil Conserv. Serv. Series 1951, No. 3. 108 p. + maps.

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

Smalley, Glendon W.
1979. Classification and evaluation of forest sites on the Southern Cumberland Plateau. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. SO-23, 59 p.

Presents a comprehensive forest site classification system for the southern portion of the Cumberland Plateau in northern Alabama, northwest Georgia, and extreme south-central Tennessee. The system is based on physiography, geology, soils, topography, and vegetation.
Additional keywords: Site index, mean annual increment, soil properties, pines, hardwoods.

☆ U. S. Government Printing Office: 1979-673-714