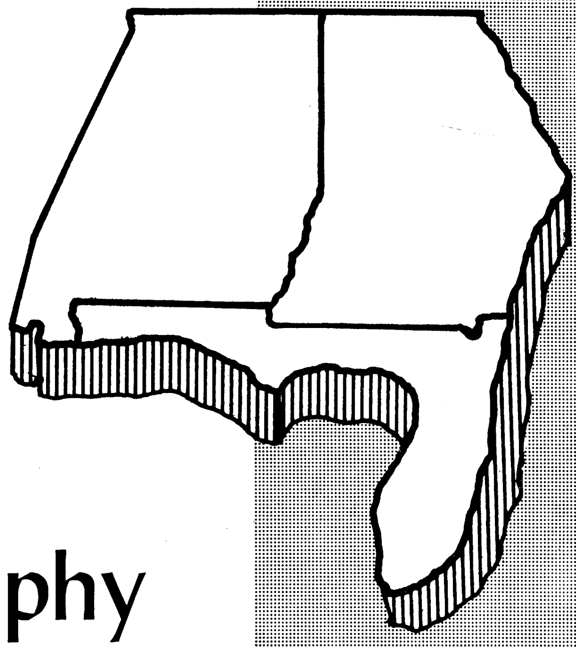

Southeastern FOREST HABITAT REGIONS Based on Physiography

Forestry

Departmental Series No. 2

JUNE 1965

AGRICULTURAL EXPERIMENT STATION

AUBURN UNIVERSITY

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THIS REPORT is the culmination of a project of the Southeastern Section, Society of American Foresters. The project has been directed by Earl J. Hodgkins, in charge of site classification work within the Technical Committee.

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Much of the data was gathered through special Chapter Committees. Alabama Chapter Committee members were J. F. Goggans (chairman), W. C. Aiken, T. C. Croker, J. C. Mitchell, and H. Yoccum. Georgia members were F. A. Bennett (chairman), G. M. Ference, J. W. Johnson, W. H. McComb, and L. C. Walker. Florida members were W. L. Beers, Jr. (chairman), W. A. Bays, and E. Hebb.

Gratefully acknowledged are the special services of G. W. Bengston, R. H. Brendemuehl, M. C. Carter, R. W. Cooper, J. B. Dixon, C. H. Driver, C. M. Kaufman, E. S. Lyle, W. E. Morse, W. L. Pritchett, C. J. Rogers, and Robert Zahner for review of the manuscript of this report; of W. R. and Mary Sizemore who contributed the maps for review copies of the manuscript; of W. B. DeVall who arranged for publication of this report; and finally of W. R. Sizemore, Chairman of the Section, and A. E. Squillace, Chairman of the Technical Committee, for continuing support and encouragement during preparation of the report.

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FIRST PRINTING 3M

Southeastern

FOREST HABITAT REGIONS

Based on Physiography

EARL J. HODGKINS, *Editor* *

THE FOREST SITE CLASSIFICATION COMMITTEE of the Society of American Foresters, Southeastern Section, was established at the Section's 1956 annual meeting.

The first goal of this committee was "to delineate within the Southeastern Region subregions within which site productivity classes are apt to be consistent from one locality to another." These subregions were to be designated as "site regions" or "habitat regions." In subsequent years the Site Classification Committee, later the Site Classification Subcommittee under the Technical Committee, gathered data for fulfilling this goal through chapter site classification committees in the Alabama, Florida, and Georgia Chapters.

The objective of this report is to define and delineate a system of habitat regions for the three-state area. For this purpose, appropriate materials from the disciplines of geology, soils, and botany, primarily from state sources, are used. In addition the knowledge and experience of members of the various chapter committees and of members of the Section Technical Committee are drawn upon.

Descriptions of the habitat regions are in terms of (1) topography, (2) parent rock material, and (3) physical properties of the soil profile. Every effort has been made to keep the descriptions on a common knowledge basis, but complete avoidance of technical terms has not been possible. A glossary is included in the appendix for the benefit of those not familiar with these terms.

REVIEW OF PREVIOUS WORK

Foresters have generally relied upon geologists and soil scientists for major habitat classification units and have confined their own efforts to local classification as in site index and soil-site work.

There are, of course, national geology and soil maps that have been published *(13, 14)*. These have been helpful to some foresters who have the background in geology and soil science to use them effectively. The classification units are necessarily broad, however, and they are never described in terminology familiar to most foresters.

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Two southeastern regional maps or systems are worthy of note. Lytle's *(10)* map and discussion of the physiographic regions of the South describe approximately the major divisions (but not the subdivisions) used in this report. Putnam *(11)* designed a system for use in bottom land hardwood forest of the southern alluvial flood plains. Putnam's classification is understood and commonly used by foresters.

Geology and soil maps published by the individual states have been much more useful than the regional and national maps because they have been generally more detailed and more precise. State maps of surface geological formations have been of tremendous fundamental importance *(1, 12)*. In Alabama, Harper *(8)* made an attempt to translate the surface geology directly into a regional system of habitats and vegetation. The various state soil area maps are, of course, based to a considerable extent on surface geology. These state soil maps have been the forester's best sources thus far for systems of major forest habitat classification. Alabama has two such maps, a generalized map and a more detailed one *(2, 3)*. Florida has three somewhat different soil maps; two are included in bulletins *(5, 9)*, while a third – the most recent one – was published as a separate map *(4)*. Georgia has a soil area map included in a publication by Carter and Giddens *(6)*.

It would appear that vegetation maps, including forest type maps, have in some places had considerable independent influence on location of habitat boundaries. The most striking example of this is the location of the line dividing the so-called Upper Coastal Plain from the Middle or Lower Coastal Plain. Parts of this line clearly indicate nothing more than the northern extent of the main longleaf-slash pine forest of the Coastal Plain. This is not to say that the two classes of habitat should be one class, but does cast doubt on the accuracy of the boundary in some instances.

PROCEDURE

Habitat regions were first placed on individual state maps, using as nearly as possible a uniform system of classification. The three individual state maps were then combined into a regional map. For the Coastal Plain, the designations "Upper," "Middle," and "Lower" were dropped because these have different meanings in the different states. Instead the terms "Hilly," "Undulating," and "Flatlands" were adopted for the major subdivisions of the Coastal Plain.

For Alabama, the main source of information was the 1951 "Soil Areas of Alabama" map *(2)*. One major change involved moving the boundary between the Hilly Coastal Plain and the Undulating Coastal Plain farther to the south in the southeastern part of the State. The soils and topography of the area in question seemed to fit more properly into the former province rather than the latter. Another major change involved a reorganization of the subdivisions in the Mountain and Valley Province. The Georgia map of Carter and Giddens *(6)* was used almost as published. For Florida a recent and unpublished vegetation map of the State by Davis *(7)* was used in conjunction with the three soil maps previously mentioned. The vegetation map was used for refining purposes and for helping to compromise differences among the three soil maps. The inclusion of the alluvial areas and swamp areas was attempted only on the Florida map. "Hammocks" were excluded as such because it was found that this term was ambigious when used to describe the physical habitat.

Drafting the regional map generally involved obtaining agreement in habitat boundaries along the common state boundaries and making some eliminations of smaller map units because of the change in scale. Obtaining agreement along state lines involved (1) some mechanical manipulation and (2) some reappraisal of individual state concepts where there was obvious disagreement on the fundamental bases for defining habitat classes. For number (2), intensive use was made of topographic and geological material. The principal elimination because of change in scale was the alluvial flood plains. One of the sandstone-shale and one of the limestone-dolomite subdivisions of the Ridge and Valley Province of Alabama had to be eliminated. Created in their stead was an artificial subdivision combining the intermixed elements of the two eliminated subdivisions.

In the "Descriptions of the Habitat Provinces and Regions," that follow, a good many habitat classes are described that are not shown on the map. These are designated as "unmapped categories." They are major ecological categories that could not be shown on the map either because they are too dispersed to plot or because their distribution is not well enough known for placement. The most important of these is Province VII, the Alluvial Flood Plains Province. The reader should note that this province includes all flood plain habitats and that he should not expect to find descriptions of such under other provinces.

DESCRIPTIONS OF HABITAT PROVINCES AND REGIONS

The descriptions that follow are keyed to the regional map. They are arranged in an approximate geographical sequence from north to south.

I. RIDGE AND VALLEY PROVINCE

The soils are formed from sedimentary rocks of Paleozoic origin.

I LD. Limestone and Dolomite Region. Topography is gentle to rough, nearly mountainous. Soils are generally fine in texture. Unmapped categories follow:

1. Soils of gentle topography, generally not "cherty" (i.e., not containing numerous hard quartz rocks). Silt loam or clay loam topsoils are over friable clay subsoils. Decatur and Dewey are typical soil series. Some soils, such as the Colbert, are shallow and have very sticky or plastic clay subsoils. Some, such as the Sango, are cherty silt loams with fragipans. All except the sticky clay subsoil group are highly desirable for cultivated agriculture.

2. Soils of rough topography. (a) Cherty silt loam slopes and ridges. Although very rocky and low in fertility, these normally are fairly deep soils that are well penetrated by tree roots. Occasionally, the chert occurs in massive layers close to the surface, thus restricting the soil to shallow depths. Subsoils, which occur normally more than 12 inches below the surface, may be silt loam to clay in texture. Most of the area is occupied by hardwood or pine-hardwood forests. Baxter and Clarksville are typical soil series. *(b) Limestone lithosols of hilly or mountainous topography.* Rock outcrops are frequent. These sites owe their existence geologically to weather-resistant sandstone caps that may or may not still be present at tops of the ridges or plateaus. The common vegetative cover is cedar-hardwood forest.

I SS. Region of Sandstone Plateaus and of Shale and Sandstone Slopes. The topography is gentle on the plateaus and hilly to mountainous elsewhere. Unmapped categories follow:

1. Sandstone soils of gently rolling to moderately hilly topography. Topsoils are sandy loam to loam in texture and subsoils are sandy loam to friable clay loam. Bedrock, consisting of sandstone or of sandstone and shale interbedded, occurs at 1½ to 5 feet. These soils are extensively cultivated. Typical soil series are Hartsells, Enders, and Tilsit.

2. Soils of sandstone hills and steep slopes. Although these are generally shallow sandy loam soils, often with numerous rock outcrops, deeper soils are not uncommon, particularly on north slopes. The rock may contain little to much shale. Forest cover, pines and hardwoods, is common. The principal soil series is Ramsey (formerly Muskingum).

3. Soils of shale hills and ridges. These are mostly lithosols (forested) with shallow silt loam over thin silt loam to silty clay subsoils. Productivity is likely to be low because of shallowness of soil and steepness of the slope, but much depends on orientation and structure of the shale bedrock. Vertically oriented, loose shale may act as additional soil material, while horizontally oriented shale is normally impenetrable to roots. Erosion hazard is high. Typical soil series are Pottsville and Montevallo.

I LS. Region of Closely Intermixed Limestone, Dolomite, Sandstone and Shale Soils. This region consists of narrow ridges and valleys, and some narrow plateaus, oriented northeast to southwest, starting in northwestern Georgia and northeastern Alabama and extending southwesterly to central Alabama. The region makes up the southwestern extremity of the Great Appalachian Valley. The large main ridges and the plateaus are of sandstone and shale origin, with many of the lower slopes being colluvial. Limestone lithosols are commonly found on the side-slopes of these main ridges and plateaus. Lesser ridges within the valleys are usually chert ridges of limestone or dolomite origin, but some of the "valley ridges" are shale ridges. The undulating to rolling hills, which are most characteristic of the valley floors, have developed (1) from colluvium and ancient alluvium transported from the adjoining sandstone, shale and chert ridges, and limestone slopes; and (2) from residual calcareous shale. Residual noncherty and nonshaly limestone soils are present in the valleys but are minor in area. The region contains all of the soils described under **I LD** and **I SS** plus the following unmapped categories:

1. *Colluvial and old alluvial soils of undulating to rolling topography in the valleys.* The soils are variable because of the variety of parent materials. Most of them are deep. Normal topsoils are 4 to 12 inches deep and are sandy loam, silt loam, or loam in texture. The deep subsoils, sandy clay loam to clay in texture, may be friable throughout, firm or plastic throughout and of poor penetrability to roots and water, or friable becoming firm with increased depth. Many of the soils contain numerous gravel, cobbles, stones, or even boulders. While cultivation and pasturage is extensive, large acreages in more hilly areas support pine, oak-hickory, and cedar forests. Typical soil series are Jefferson and Cumberland.

2. *Shaly soils of nearly level to rolling topography in the larger valleys.* These are residual soils that have developed from calcareous shales interbedded with some limestone. Topsoils are normally 5 to 10 inches deep and are fine sandy loam to loam in texture. The acid subsoils, 3 feet or more in depth, are usually very fine in texture, silty clay loam to clay. They are normally sticky and plastic, but vary somewhat in this respect. Small pieces of weathered yellow or brown shale are usually abundant in the subsoil. Old-field pine forests are common on these soils where cultivation has been abandoned because of poor internal drainage. Hardwood forest is also common. The principal soil series is Conasauga.

3. *Quartzite ridges.* These are isolated and scattered in this region. They are much more important in the Mountain Province to the southeast.

II. THE MOUNTAIN PROVINCE

The province is characterized by mountain topography and hard parent materials of crystalline and near-crystalline rocks. The rocks are of Cambrian (earliest Paleozoic) and pre-Cambrian origins.

II Q. Region of Quartzite Soils of Slopes and Ridges (unmapped category). Exposed boulders of quartzite and sometimes sandstone and conglomerate, are common. The slopes are the steepest and the ridges are some of the highest of the Mountain Province. The soils are normally sandy loam lithosols. Site quality is generally the poorest of the Mountain Province.

II P. Region of Soils Developed Primarily from Thin Platy Rocks — Slate, Phyllite, or Schist, Singly or in Combination (unmapped category). Small quartzite rocks may be common. The soils on the steeper slopes are often lithosols. Most common topsoil texture is loam. Subsoils are clay loam to clay, normally friable. Sites tend to be poor, but much depends upon composition, arrangement, and orientation of the rock materials. Dark-colored biotite schist produces the best soils of the group; slate produces the poorest. Talladega is the most common soil series.

II G. Region of Soils Developed Primarily from Granite or Granite-like Rocks (unmapped category). The parent rock consists mainly of granites and gneisses. Schists, if present, do not exert a major influence on the soil. While normally the soils have a zonal profile, on the steeper slopes they are often lithosols. The topsoils are commonly loams or sandy loams, and the subsoils are friable sandy clay loam to clay. These are the best and the most stable of the mountain slope and ridge soils formed from residual rock. Typical soil series are Porters and Ashe.

II CA. Colluvial Soils and Soils of Old Alluvial Terraces (unmapped category). The colluvial soils occupy foothills, footslopes, lower slopes, and coves. They extend far up the slopes of many mountains, ending in terrace-like escarpments. Soils of old alluvial terraces are the principal soils of the hills within the larger valleys. These colluvial and old alluvial soils are secondary soils derived from the rocks and soils described in **II Q, II P,** and **II G** above. They comprise the best sites of the Mountain Province. Soil profiles are normally deep. Rocks including boulders are often abundant. Topsoils are loams, silt loams, or sandy loams. Subsoils are usually fine in texture but friable. Typical soil series are Tusquitee, Georgeville, and Altavista.

III. THE PIEDMONT PROVINCE

This is characterized by rolling to hilly topography and crystalline parent material of very ancient igneous or sedimentary rocks, often metamorphosed.

III UB. Region of Soils from Ultra-Basic Rocks (unmapped category). Chlorite, serpentine, hornblende schist, and diorite are common. The topsoil is usually shallow. The subsoil is normally a sticky or plastic clay. Bedrock occurs commonly at 3 feet or less. Most of these are poor soils. Fortunately, they are comparatively small in acreage. The Iredell soil series represents the poorest of this category. The Mecklenburg soils represent the best. These may have up to 10 inches of loam topsoil and a clay subsoil that is only "slightly" plastic. Main tree species are pines, oaks, hickories, and redcedar.

III PQ. Region of Soils Developed Primarily from Thin Platy Rocks and from Quartzite (unmapped category). Parent material may be schist (mica schist or quartz schist), slate, quartzite, or any combination of these three. These soils are often on pronounced slopes and ridges, and they are highly erodible. Profile development is imperfect; some are lithosols. Sandy loam topsoil has often been removed by erosion. Friable clay or clay loam subsoil soon grades without any distinct line of transition into decomposed parent material. These are the poorest of the more extensive Piedmont soils. Typical soil series are Louisa, Edgemont, and Alamance. The Pine Mountain area in the southwestern Georgia Piedmont is an extensive forested area of quartzite soil. In the southeastern Georgia Piedmont, mainly in Lincoln County, there is an extensive slate belt.

III G. Region of Soils Developed Primarily from Granite or Granite-like Rocks (unmapped category). The principal parent rocks are granitic in nature – granite, gneisses, and diorites. Schists can be intermixed with these. The original topsoil of sandy loam has often disappeared because of cultivation followed by erosion. The current topsoil is often a "plowsoil" consisting of various mixtures of original topsoil with clay subsoil. The friable clay subsoil is normally deep. These are the best extensive soils of the Piedmont, although they are actually variable in quality. Typical soil series are Cecil, Appling, and Lloyd.

III CA. Colluvial Soils and Zonal Soils of Old Alluvial Terraces (unmapped category). The colluvial soils are in the bottoms of many of the small streams and on the adjoining lowermost slopes. The old alluvial terrace soils are near major streams. These are deeper soils and are generally of good site quality, but they are restricted in total area. The topsoil is usually sandy loam, the subsoil sandy clay loam to clay. Typical soil series are Altavista, Worsham, and Allen.

IV. THE HILLY COASTAL PLAIN PROVINCE

This province is characterized by rolling to strongly hilly topography. The soils are developed from Mesozoic and early Cenozoic marine sedimentary deposits of gravel, sand, silt, clay, and chalk. The south boundary, adjoining the Undulating Coastal Plain Province, is not always precise from the standpoint of differences in physical environment since the transition from one province to the other may be gradual. In such instances, the northern limits of the longleaf-slash pine coastal plain forest is normally taken as the boundary between the two provinces.

IV SH. The Sandhills Region of the Hilly Coastal Plain. This region is mapped in Georgia but not in Alabama, although soil scientists generally agree that it is certainly extensive enough in Alabama to be mapped. It is located mainly in the Tuscaloosa geological formation, which is made up of predominantly coarser deposits from earliest Mesozoic material. Much of the area has more than 3 feet of sand or loamy sand at the surface (Kershaw, Lakeland series). Often, however, the sandy topsoils have friable sandy clay loam at less than 3 feet (Norfolk), or even stiff, compact sandy clay at fairly shallow depths (Gilead, Vaucluse). Longleaf pine forest is common.

IV OH. The Clayhills Region. This region is mapped only in Alabama. The condition exists also in Georgia, but is probably not extensive enough there for plotting on a state or regional map. Clay deposits predominate as the parent material, and a heavy clay subsoil is characteristic. The topography is strongly rolling to extremely hilly, almost mountainous. The topsoils, from a few inches to about 20 inches in depth, are normally sandy loam or fine sandy loam, but may be finer in texture. On the steepest slopes and narrowest ridges, the soil may be lithosol in character, having a bedrock of fine sandstone, siltstone, or claystone close to the surface. Favorable topographic situations in the Clayhills Region may be the most productive upland sites in the Southeast for both pines (loblolly-shortleaf) and hardwoods. Typical soil series of the Clayhills are Sawyer, Lauderdale, and Boswell. Vaiden and Oktibbeha soils also belong in the Clayhills habitat group, even though often associated geographically with the Black Belt Region. Interspersed with typical clayhill conditions are the following unmapped categories:

1. *Coarse soils of high ridgetops and plateaus.* These soils are common near the southern edge of the region in western Alabama. They have developed from coarser and more recent geological deposits. Deep sands (Lakeland) often support pure longleaf forest. Soils with sandy clay loam subsoils at less than 3 feet (Ruston, Norfolk) are often cultivated. They normally support loblolly-shortleaf forest where not in cultivation.

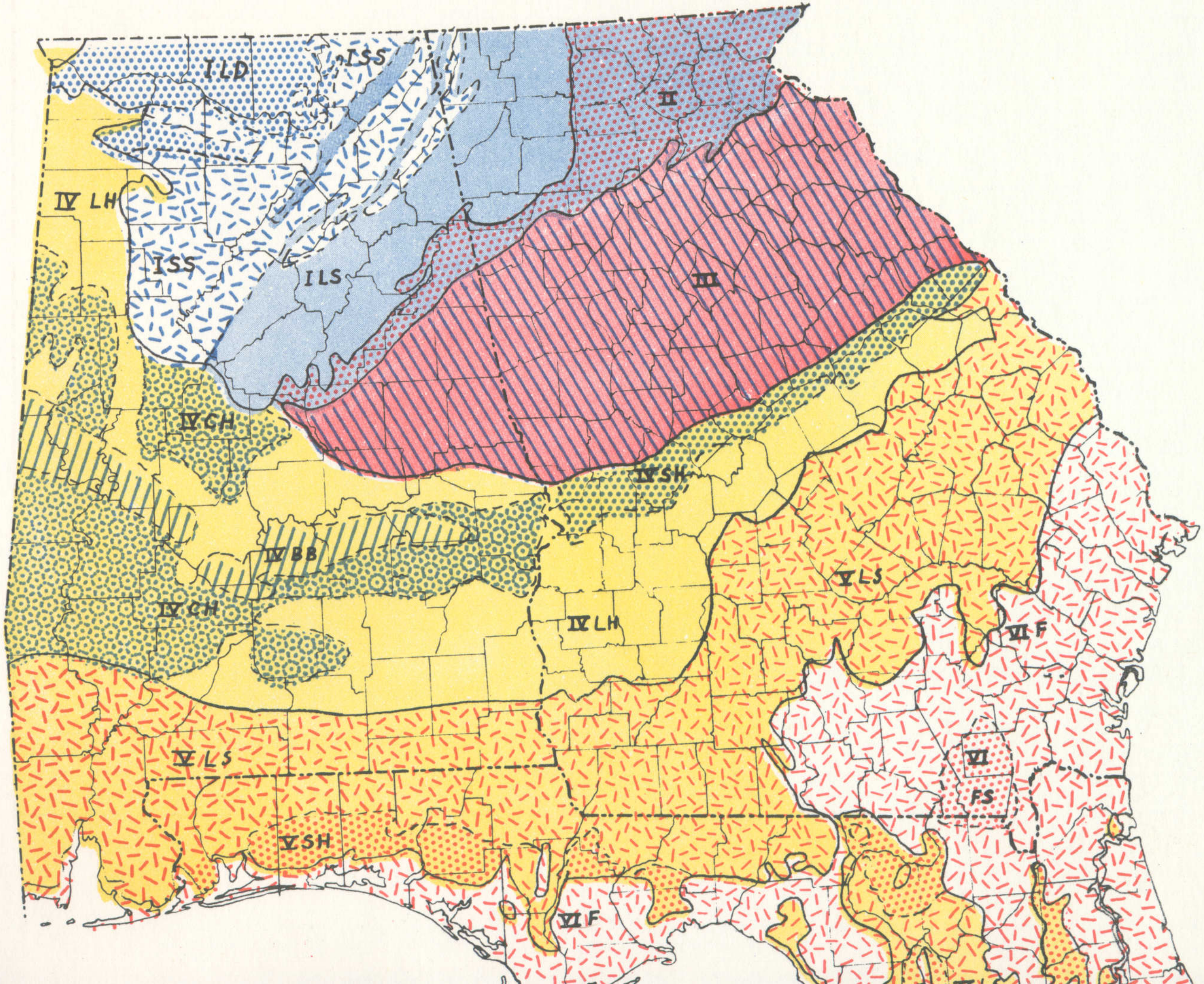
2. *Acid clay soils (Mayhew, Wilcox) of the "interior flatwoods" or "grey post oak prairies."* An extensive area of the flatwoods lies just south of and parallel to the western segment of the Black Belt Region. Subsoils are sticky or plastic. In relatively undisturbed forests of loblolly pine and oaks, clay topsoils may be easily penetrated by roots to depths of 16 inches or more. In old fields or pastures, easy root penetration is often limited to 1 or 2 inches.

3. *Calcareous clay soils (Houston, Sumter).* These are Black Belt soils that occur in scattered patches south of the Black Belt Region proper. They support cedar-hardwood forests and prairie vegetation.

IV LH. The Loam Hills Region of the Hilly Coastal Plain. The soils of this region in texture are between those of the Sandhills and the Clayhills. The topography is rolling to very hilly. The topsoil texture is loamy sand to fine sandy loam, and the subsoil is normally a friable sandy clay loam or sandy clay at moderate depths. Some deep sands are interspersed. There are many soil series. Representing the coarser textured soils are Norfolk, Ruston, and Orangeburg, and representing the finer textured soils are Atwood, Greenville, and Shubuta.

IV BB. The Black Belt Region. The soils of this region developed from Mesozoic chalk deposits. Topsoils are normally clay, although occasionally topsoils can be as light as sandy loam in texture. Subsoils are normally sticky or plastic clays at shallow depths. Alkaline soils, such as Houston or Sumter, support cedar-hardwood forest or prairie vegetation. Acid soils, such as the Eutaw, support pine-oak vegetation. Interspersed in the southern half of the Black Belt Region are hilly islands of Clayhill soils of the Vaiden and Oktibbeha series.

IV C. Soils of Colluvial Material in and along the Branches and around the Edges of the Floodplains (unmapped category). These "branch-bottom" soils are normally gley soils of varying wetness. The wettest may even be "mucky" at the surface, whereas the driest may have gley zones only at considerable depth. They are deep soils and usually sandy, and are often quite productive.



I LD
I SS
IV LH
I SS
I LS
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IV CH
V LS
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VI F
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V LS
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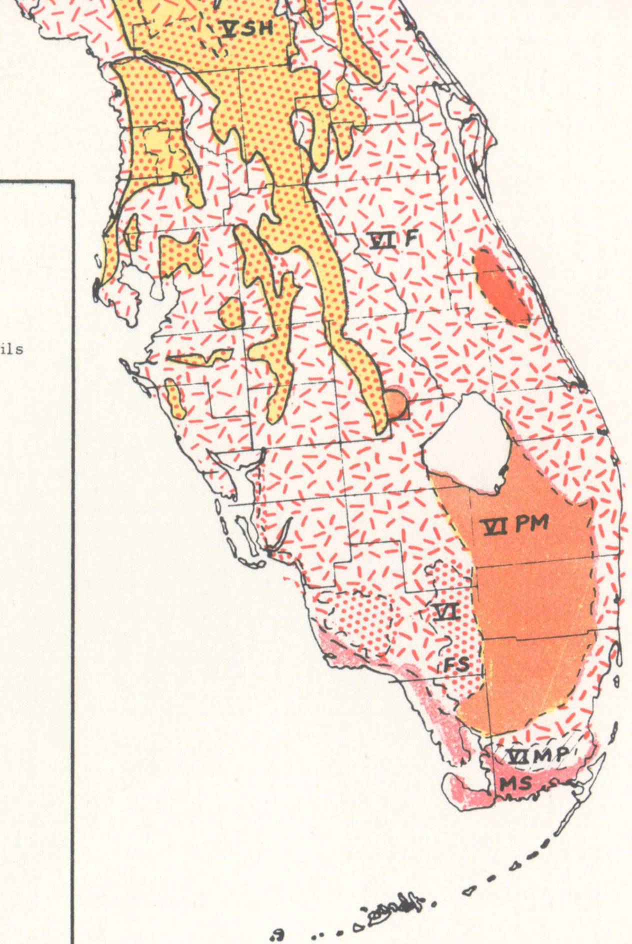
FOREST HABITAT PROVINCES AND REGIONS

On A Physiographic Basis

Southeastern States

I	RIDGE AND VALLEY PROVINCE
I LD	Region of Limestone and Dolomite Soils
I SS	Region of Sandstone Plateaus, and of Shale and Sandstone Ridges
I LS	Region of Closely Intermixed Limestone, Dolomite, Sandstone and Shale Soils
II	MOUNTAIN PROVINCE
III	PIEDMONT PROVINCE
IV	HILLY COASTAL PLAIN PROVINCE
IV SH	Sandhills Region
IV CH	Clayhills Region
IV BB	Blackbelt Region
IV LH	Loam Hills Region
V	UNDULATING COASTAL PLAIN PROVINCE
V LS	Loamy Soils Region
V SH	Sandhills Region
VI	FLATLANDS COASTAL PLAIN PROVINCE
VI F	Flatwoods Region
VI FS	Extensive Forest Swamp
VI MS	Extensive Mangrove Swamp
VI PM	Extensive Peat-Muck Swamp
VI MP	Marl Prairie Region



V. THE UNDULATING COASTAL PLAIN PROVINCE

This province is characterized by flat to rolling topography and generally coarse-textured soils. Soils have developed from Cenozoic marine deposits of gravel, sand, and clay. Both the north and south boundaries are often indistinct – the Undulating Coastal Plain can be quite properly looked upon as a transition zone between the Hilly Coastal Plain and the Flatlands Coastal Plain. This viewpoint helps one to characterize the Undulating Coastal Plain if he remembers that the Hilly Coastal Plain is characterized by finer textures, strong topography, and good surface drainage, whereas the Flatlands Coastal Plain is characterized by coarser textures, flat topography, and poor surface drainage.

V LS. The Loamy Soils Region of the Undulating Coastal Plain. This region is similar to the Loam Hills Region of the Hilly Coastal Plain, but the soils will average a little coarser in texture and the topography is flatter. The topography is usually flat to gently rolling. There are some moderately rolling to hilly areas, with several hilly areas in southwestern Georgia, southern Alabama, and northern Florida that could be classified as isolated segments of the Hilly Coastal Plain Province. Topsoils are sand to fine sandy loam. Subsoils, of friable sandy clay loam to sandy clay, are less than 3 feet from the surface. Typical soil series are Norfolk, Orangeburg, Tifton, Greenville, and Hernando. Interspersed in small segments are the following unmapped categories.

1. *Deep sands (Lakeland, Eustis).* These typically support longleaf pine-scrub oaks.

2. *Sandy loam topsoils with heavy clay subsoils (Susquehanna, Boswell, Fellowship).* These are normally on moist slopes and support a heavy gallberry understory and a longleaf or slash pine overstory. Fellowship soils, extensive in central Florida, are flat to undulating and support loblolly pine, hardwoods, and cabbage palmetto.

3. *Poorly drained depressions including "ponds" and the like.* These depressions contain half-bog soils, or at least very wet mineral gley soils. The depth of peat, muck, or moss at the top will be from 0 to approximately 2 feet, and the mineral material may be anything from sand to clay in texture. The principal tree species are pondcypress, swamp tupelo, and slash pine.

4. *Hillside savannas.* These are wet seep areas supporting grasses and sedges. Any trees, typically wet site species such as pondcypress, are stunted and scattered.

V SH. The Sandhills Region of the Undulating Coastal Plain. This region is characterized by deep sand or loamy sand on rolling topography. Finer textures, if present, are more than 3 feet beneath the surface. Undulating Coastal Plain Sandhills are mapped only in Florida, although they are present also in Alabama and Georgia. They are not extensive enough in Alabama, however, to be mapped. They are extensive enough in Georgia to be mapped, but existing published information does not show total extent. While the soils with their more or less uniform xerophytic vegetation may appear poor in quality, many sites are of medium to high productivity. A combination of a deep clay zone and favorable topography can result in rapid forest growth even though the overall forest community does appear to be xerophytic. Typical soil series are Eustis, Lakeland, and Lakewood.

V C. Soils of Colluvial Materials in and along the Branches and around the Edges of the Flood Plains (unmapped category). These soils are similar to those described for the Hilly Coastal Plain. Site quality can be good to excellent where the internal drainage is not too poor.

VI. THE FLATLANDS COASTAL PLAIN PROVINCE

This province is characterized by flat to undulating topography, high water table, and generally coarse sandy topsoils, except where broken by areas of extensive swamp land. The soils were developed from late Cenozoic or recent marine deposits near the Gulf and the ocean.

VI F. The Flatwoods Region. The soils are predominantly sandy gley soils, except that those of interspersed "ridges" and depressions are frequently otherwise, as described under 2 and 3. Unmapped categories follow:

1. *Mineral gley soils of various degrees of wetness depending on topography and subsoil characteristics.* These are developed from marine sands, clays, soft limestone, or marl. Subsoils may be deep sands, with or without organic hardpans, or may be heavy clay. Soils are driest on ridges and high flats between drainages and on "margins" of streams. They are wettest in the low flats and in some of the small streams ("runs") and ponds. Where the surface soil of flats remains more or less saturated through the growing season, grassland vegetation rather than forest vegetation is predominant. Extensive wet grasslands of this type occur in south Florida. Extensive forested areas are the forester's well known "coastal flatwoods," with slash pine being by far the most important commercial tree species. Typical soil series are Leon, Bladen, and Lynchburg.

2. *Very wet organic soils appearing to have black, mucky surface layers over mineral sandy or clayey material.* These are found in ponds, bays, the wettest runs, and in miscellaneous swamp areas. Baldcypress, bays, and other wetland tree species are typical.

3. *Well-drained sandy "ridges" rising high enough above surrounding flats and depressions to escape the water table influence.* These are mostly deep sands. Typical soil series are Blanton, Lakeland, and Norfolk. Occasionally moisture relations are favorable enough for development of comparatively large hardwoods in place of the usual scrub oak or longleaf-scrub oak types. Such ridges are referred to as "hammocks."

VI PM. Region of Extensive Peat-Muck Lands. The region consists of extensive areas of more or less deep peat and/or muck soils. These are rarely important as forest land. The principal area is the Everglades.

VI FS. Region of Extensive Forest Swamps. The main areas are the Okefenokee Swamp and the south Florida cypress swamps. Data on soils are meager. The region probably includes peat-muck soils, wet mineral gleys, and perhaps some alluvium.

VI MS. Region of Extensive Mangrove Swamps. This region consists of tidal swampland supporting mangrove forest.

VI MP. The Marl Prairie Region. This region consists of highly calcareous soils supporting a growth of grasses and sedges.

VI CS. The Coastal Strand Region (unmapped). This region consists of marshes, beaches, and dunes not included in other regions.

VII. THE ALLUVIAL FLOOD PLAINS PROVINCE (Unmapped Category)

This province consists of all first bottoms and terrace lands (or old bottoms) the soils of which have not matured enough to show zonal or mature profiles. The key environmental feature of flood plains is that they are inundated a few days to as much as several months each year. The reader is referred to Putnam *(11)* for an acceptable classification of habitat in the flood plains of the major streams. It is suggested here that it would be desirable to classify the flood plains of local origin as a distinct and separate major category. These are the flood plains of minor streams that contain alluvial soils derived from local material. The ridges, flats, sloughs, and swamps, so apparent in the large flood plains, are absent or are very difficult to distinguish. The soils can be comparatively well-drained to very poorly drained, but flood waters never stand on any of them for more than a few days. The better drained soils will often support abundant yellow-poplar, rarely found on the major flood plains. The better-drained soils are often of excellent productivity.

USES OF THE CLASSIFICATION

Several uses are visualized for a regional habitat classification as presented in this report. An important use in research should be as a guide in selecting sampling strata wherever site or habitat is considered to be an experimental variable. This type of use should be particularly pertinent for studies in local site productivity, such as the typical soil-site studies, and should be of equal importance for certain tree improvement studies, such as the testing of progenies and of geographic seed sources.

This type of major classification should also serve as a beginning point for local site classification. First, however, climatic differences should be imposed upon this classification in order to derive "climato-physiographic" provinces where such are justified. Local site classifications should be extensions of regional climato-physiographic provinces.

Still another use of regional habitat classifications is in describing experimental areas for research reports based wholly or partly on field work. In the past many otherwise excellent research reports have been badly weakened by failures of the authors to describe ecological environments in which their tests or observations were made. Reference to the appropriate category in a regional habitat classification, such as this one, is easy and convenient, and should be a minimum requirement in any research report.

There are undoubtedly other uses for a classification of this kind that have not been brought out here.

SUGGESTIONS FOR REVISION AND REFINEMENT

The Site Classification Committee did not have a formal program for field checking this classification system. This fact imposes limitations, of course, on the completeness and accuracy of the work. A followup revision of the classification and map should be made on the basis of systematic field checking. Eventually, experimental checking should be used to either prove or disprove differences among the classes in environment-growth relationships and in environment-vegetation relationships.

As previously mentioned, climate should be imposed upon this physiographic classification to the ultimate end that "climato-physiographic" provinces are developed where such are justified. For this purpose, vegetation and growth should be compared within physiographic units over maximum ranges of climate.

Revision work as discussed would best be conducted as a regional project under southern Land-Grant Universities concerned. The cooperative approach would be conducive to obtaining either grants or allocated funds. Agencies within the United States Department of Agriculture could formally assist and cooperate. Private companies could lend informal assistance. Personnel would include forest researchers aided by specialists in geology, soil science, and plant ecology. Much of the work would be appropriate for graduate projects. Strength of this approach would be the diversity of special personnel available. A possible weakness might be a lack of uniformity in effort and standards of workmanship.

If a single-agency approach were used in making a revision, the United States Forest Service would be the most logical agency since it comes nearest to having adequate personnel and facilities for the task. The strength of this approach would be uniformity of effort and standards. A major weakness would be a lack of personnel and knowledge in non-forestry specialties.

Pending revisions as recommended, it is hoped that the habitat classification herein presented will serve those foresters in the Southeastern Section who have need of such a classification.

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APPENDIX

Glossary of Terms

Alluvium – Soil material that has been transported and deposited by stream water.

Basic rock – Igneous rock containing a high proportion of dark-colored ferro-magnesian silicate minerals, in contrast to "acidic" rock, which contains a high proportion of light-colored silicate minerals of aluminum, calcium, and potassium.

Biotite – Mica that is black because of its content of iron and magnesium. Like all micas, splits readily into shiny thin sheets. Rock containing much biotite is "biotite schist," a metamorphic rock.

Cambrian – The earliest period of the Paleozoic Era. The soil-forming materials in the Southeast from this period are mainly quartzite, slate, dolomite, and limestone.

Cenozoic – The latest of the great geological eras, spanning from 60 million years ago until recent time. The soil-forming materials are comparatively unmodified marine sediments.

Chalk – A soft rock resulting from the deposition of calcium carbonate in sea water. With enough time, consolidation will cause chalk to become hard, firm "limestone."

Chert – A hard, weather-resistant rock resulting from the deposition of silica in clear sea water. The same process produces "flint." Chert and flint are quartz rocks most commonly found as nodules or lenses in limestone or dolomite. When the matrix rock has decomposed into soil, the more resistant chert and flint cause the soil to be "cherty" or "rocky."

Chlorite – A greenish, usually scaly mineral that is high in iron and magnesium. Rock containing much chlorite is "chlorite schist," a metamorphic rock.

Claystone – A soft rock developing through the consolidation of marine deposits of clay. Further consolidation through mechanical pressure will presumably convert claystone into "shale."

Colluvium – Soil material that has been transported and deposited through creep or local washing on adjoining or nearby higher slopes.

Conglomerate – A sedimentary rock developing through the consolidation of very coarse particles (pebbles, cobbles, boulders).

Diorite – A coarse-grained igneous rock, similar to granite in appearance, and considered to be a granitic rock in this report, but containing less quartz and much more of the dark-colored ferro-magnesian minerals than granite.

Dolomite – Similar in appearance to limestone, but harder and reacting only very weakly to 10 per cent hydrochloric acid. Results from the deposition of calcium-magnesium carbonate in sea water.

Fragipan – A compact subsoil horizon rich in silt, sand, or both, and usually low in clay. Normally it interferes with movement of water and the penetration of roots.

Gley soils – In this report, soils that are influenced by water saturation as evidenced by presence of one or more gley layers or horizons. Gley layers are mineral and characterized by neutral gray colors, or by greenish, bluish, reddish, and gray mottling. No organic layer (peat or muck) is present at the surface (cf. **half bog soils**).

Gneiss – Any metamorphic rock composed of relatively thick bands, ⅛ to ¼ inch in thickness. Most gneisses in the Southeast are formed from granitic rocks.

Granite – A hard, coarse-grained igneous rock of relatively light color consisting principally of quartz and feldspar crystals. The quartz becomes sand grains in the soil; the feldspar weathers to clay minerals.

Half bog soils – Swampy or marshy soils with an organic horizon (peat or muck) overlying gray mineral soil (gley).

Hornblende – The most common black mineral in rocks of igneous origin. Has elongated crystals, but is not "platy" like the equally black biotite. It is not distinguished in this report from the almost identical pyroxene. Both are calcium-magnesium-iron-aluminum silicates.

Igneous Rock — Rock that has solidified from a molten state. In the Southeast, igneous rocks are the oldest rocks, and they are generally crystalline in nature.

Limestone — A hard, firm rock resulting from the deposition of calcium carbonate in sea water followed by consolidation under pressure. In geological time, limestone has a low chemical resistance and is one of the first rocks to decompose.

Lithosol — In this report, any shallow, rocky soil on steeply sloping land. Profile development is absent, poorly expressed, or does not show all horizons of a zonal soil.

Marl — An earthy deposit consisting chiefly of calcium carbonate mixed with clay.

Mesozoic — The geological era following the Paleozoic and preceding the Cenozoic, spanning from 185 million years ago until 60 million years ago (Age of Reptiles). In the Southeast, the soil-forming materials are comparatively unmodified marine sediments.

Metamorphic rock — A rock that has undergone pronounced alteration from its original igneous or sedimentary nature. Generally, combined action of pressure, heat, and water has resulted in a more compact and a more crystalline nature.

Paleozoic — The geological era preceding the Mesozoic and including the earliest known life, spanning from 520 million years to 185 million years ago. The most common soil-forming rocks are the well consolidated limestone, sandstone, and shale.

Phyllite — A platy rock, having lustrous cleavage planes and often bluish in color, that is intermediate in hardness and other properties between slate and mica schist. It is basically micaceous in nature and, like white mica, highly resistant to chemical weathering.

Physiography — (1) Physical geography; (2) the study of land forms (geomorphology).

Pre-Cambrian — Pre-Paleozoic, spanning from more than two billion years to 520 million years ago. Rocks from this earliest of geological eras are generally of igneous origin, many metamorphosed, and crystalline in nature.

Quartzite — A very hard, sugary textured rock composed predominantly of quartz grains, often interlocking. Usually light-colored. It is poor soil-forming material, being highly resistant to weathering and very poor in mineral nutrient elements.

Residual soil — A soil developed in place from the bedrock below.

Sandstone — A rock formed from sand sediments that have become cemented through impregnation with clay, iron oxide, or calcium carbonate, singly or in combination. Cementation with silica produces a form of quartzite.

Schist — A crystalline metamorphic rock having thin bands and easy cleavage. Mica is the most common mineral constituent, although any mineral capable of forming flattened crystals (chlorite, hornblende) can be common.

Sedimentary rock — Rock resulting from the consolidation of materials that have been transported by wind, water, or ice.

Serpentine — A mottled green metamorphic rock that is soft though massive, and rich in magnesium. Highly resistant to decomposition, it produces shallow, fine-textured soils.

Shale — A rock of laminated structure formed by consolidation of water deposits of clay. See "claystone." Sand, silt, and/or calcium carbonate may be present as impurities. Shale is relatively resistant to decomposition.

Siltstone — A rock developing from consolidation of water deposits of silt. A considerable proportion of so-called claystone and shale is actually siltstone.

Slate — A smooth, platy rock that cleaves readily into thin sheets. Normally formed through the physical compression and chemical alteration of shale. The rock is even more resistant to decomposition than shale, and tends to produce very shallow soils.

Xerophytic — Refers to plants that can grow in dry habitats.

Zonal soil profile — A mature soil profile in the sense that enough time has passed to permit development of an A-B-C profile peculiar to the local regional climate and typical of the local Great Soil Group. A soil profile is not zonal if its horizons are weak or indistinct, or if the horizons are other than A-B-C. Examples of non-zonal soils are certain deep sands, gley soils, half bog soils, and lithosols.