

Issued December 15, 1916.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE,  
ANDREW M. SOULE, PRESIDENT; DAVID D. LONG,  
IN CHARGE SOIL SURVEY.

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SOIL SURVEY OF WASHINGTON COUNTY,  
GEORGIA.

BY

R. A. WINSTON, IN CHARGE, J. H. AGEE, J. A. KERR,  
AND M. EARL CARR.

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W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]



WASHINGTON:  
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1916.

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., April 5, 1916.*

SIR: Under the cooperative agreement with the Georgia State College of Agriculture a soil survey of Washington County was carried to completion during the field season of 1915.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as authorized by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau*

Hon. D. F. HOUSTON,  
*Secretary of Agriculture.*

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### FIGURE.

Fig. 1. Sketch map showing location of the Washington County area, Georgia..... Page.  
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### MAP.

Soil map, Washington County sheet, Georgia.



# SOIL SURVEY OF WASHINGTON COUNTY, GEORGIA.

By R. A. WINSTON, In Charge, J. H. AGEE, J. A. KERR, and M. EARL CARR.—Area Inspected by W. EDWARD HEARN.

## DESCRIPTION OF THE AREA.

Washington County is situated in the east-central part of the State of Georgia. It is bounded on the east by Jefferson and Glascock Counties, on the south by Johnson County, on the west and southwest by Baldwin and Wilkinson Counties, and on the northwest by Hancock County. The Ogeechee River separates it from Glascock County and in part from Jefferson County, and the Oconee River forms the boundary with Wilkinson County. The county is irregular in outline, but measures approximately 30 miles north and south and 30 miles east and west. It contains 669 square miles, or 428,160 acres.

The general physiographic appearance is that of a relatively low plain having a gentle southward slope. The county includes the upland or watershed between the Oconee River on the west and the Ogeechee River on the east, and there is a more or less gentle slope from a central divide to each of these principal drainage ways.

There is no such extensive development of marked topographic relief as is true of the older Piedmont country to the north, where mature erosion has taken place. The surface features are predominantly gently rolling to rolling, with level interstream areas. There are some rather broken and hilly areas in the northern and western parts of the county, where erosion has dissected the plain most thoroughly. They are particularly noticeable in the territory contiguous to the Ogeechee River in the northeast and to the Oconee River and its principal tributary, Buffalo Creek, in the west. These streams have worn rather broad valleys, 100 to 150 feet below the general upland level, and their long valley slopes have been further dissected by numerous tributaries. The lack of pronounced topographic relief generally is due to the absence of resistant rock formations such as

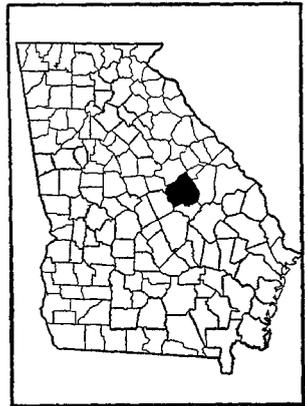


FIG. 1.—Sketch map, showing location of the Washington County area, Georgia.

characterize the Piedmont region. The formations comprising the superficial structure of the county are marine sediments, consisting mainly of unconsolidated sands, clays, and marls of simple structure.

The elevation of the county ranges from 225 feet above sea level in the southern part to 475 feet in the northern part. Data available show <sup>1</sup> the altitudes at several places as follows: Sandersville, 470 feet; <sup>2</sup> Tennille, 469 feet; Davisboro, 302 feet; Harrison, 245 feet; and Oconee, 223 feet.

The entire upland area of the county has well-established natural drainage. An intricate system of small streams with shallow valleys ramifies the uplands, affording a ready outlet for the run-off. Every farm is connected directly or indirectly with one or more natural drainage ways. The rolling country contiguous to the principal drainage lines is subjected to rather excessive run-off and surface washing becomes severe unless the lands are protected by terracing.

The drainage waters of the eastern part of the county flow into the Ogeechee River, Williamson Swamp Creek being the chief tributary. The western part is drained by Buffalo Creek and other tributaries of the Oconee River, while the southern part is drained by the headwaters of the Ohoopee River. All the streams are sluggish, meandering through relatively broad, swampy bottoms. The Oconee River "swamp" is 2 to 4 miles wide, that of the Ogeechee 1 to 2 miles wide, and that of Buffalo Creek one-half to 1 mile wide. These areas of alluvial deposits along the larger streams, as well as the wash accumulations along the small streams, are low and flat and poorly drained. In many places artificial drainage can be effected, though much of the first-bottom land along the larger streams is so frequently flooded that its utilization for crop production is accompanied with more or less risk even when drainage ditches are employed.

The section of the State embracing Washington County was first settled in the early part of the eighteenth century by colonists of English, Irish, and Scotch extraction. Later many homeseekers came in from Virginia and the Carolinas. No marked influx of settlers has taken place in recent years. Settlement is fairly uniform over the entire county.

Washington County was established in 1784. The original area has been reduced a number of times in the formation of other counties. The population of the county is given in the 1910 census as 28,174, of which 90.6 per cent is rural, averaging 38.2 persons to the square mile.

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<sup>1</sup> Bul. No. 26, Geological Survey of Georgia.

<sup>2</sup> Estimated.

Sandersville, in the central part of the county, was made the county seat in 1796. It has a population of 2,681, and is the commercial center of the county. Tennille, 3 miles south of the county seat, has a population of 1,622 and is a commercial town and railroad point of local importance. Chalker and Warthen, in the northern part of the county, Davisboro in the eastern, Harrison in the south-eastern, and Oconee in the southwestern part, are small towns on the railroads. Deepstep, in the extreme west, and Riddleville, in the southeast, are rural towns.

Four systems of railroads operate in the county. The Central of Georgia from Savannah to Macon crosses the county from east to west, passing through Davisboro, Tennille, and Oconee. The Augusta Southern extends from Tennille to Augusta, passing through Sandersville, Warthen, and Chalker. The Wrightsville & Tennille extends from Tennille to Hawkinsville, passing through Harrison, and the Sandersville Railroad operates between Sandersville and Tennille. These railroads afford convenient transportation facilities for the greater part of the county, giving good connection with outside markets. Savannah, 135 miles southeast; Macon, 50 miles west; Augusta, 75 miles north; and Hawkinsville, 75 miles south, are the principal markets.

The principal roads are improved and better highway construction is being extended over the entire public-road system. Public schools and churches are distributed throughout the county. Drinking water of good quality is obtained in all sections from surface wells and deep wells.

#### CLIMATE.

The climate of Washington County is mild. The winters are short and comparatively moderate. Freezing temperatures are common, though very cold spells are rare. A light fall of snow occasionally occurs in midwinter. The summers are long, though not oppressively hot. The mean winter temperature is 46.8° F., with extremes of -2° and 82° F. The summer months have a mean temperature of 79.8° F., the absolute extremes recorded ranging from 52° to 103° F. The mean annual temperature is 64° F. Uniform weather conditions usually prevail over the entire county, as there are no marked topographic features to cause local variations.

The average annual precipitation is 47.68 inches, with variations from year to year ranging from 35 inches for the driest to 56 inches for the wettest year. The distribution of rainfall throughout the year is fairly uniform, and is favorable for agriculture. The lowest monthly means are those of September, October, and November.

The average date of the last killing frost in the spring is March 23 and that of the first in the fall November 10. Killing frost has

occurred as late in the spring as April 17 and as early in the fall as October 11. The normal growing season is 232 days.

A broadly diversified system of agriculture is possible in the county. Farming operations can be carried on throughout the year, except for some brief interruptions during the cold rainy periods of winter. In addition to the staples, many special crops, such as fruits and early, medium, and late truck crops, can be grown. While the distribution of rainfall is quite even, crops occasionally suffer from short periods of drought in the course of the growing season, but the ill effects can be lessened by preparing a deep, mellow seed bed and giving frequent shallow cultivations to conserve moisture.

The following table, compiled from the records of the Weather Bureau station at Harrison, located in the southern part of the county at an altitude of 245 feet above sea level, shows the normal monthly, seasonal, and annual temperature and precipitation for the county. These records cover a period of 10 years.

*Normal monthly, seasonal, and annual temperature and precipitation at Harrison.*

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	<i>°F.</i>	<i>°F.</i>	<i>°F.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
December.....	47.3	75	10	4.10	3.84	2.00
January.....	46.5	78	9	3.24	2.39	4.20
February.....	46.5	82	-2	5.67	4.92	5.65
Winter.....	46.8	82	-2	13.01	11.15	11.85
March.....	58.6	93	18	4.44	2.25	6.28
April.....	62.3	92	26	3.72	1.05	3.51
May.....	72.7	98	36	3.16	3.97	5.44
Spring.....	64.5	98	18	11.32	7.27	15.23
June.....	78.2	102	52	4.63	2.92	10.20
July.....	80.8	103	56	4.52	1.75	3.56
August.....	80.4	101	60	6.61	7.24	4.88
Summer.....	79.8	103	52	15.76	11.91	18.64
September.....	75.6	96	40	2.58	1.18	4.21
October.....	64.2	90	29	2.24	.24	2.87
November.....	54.9	83	23	2.77	3.56	3.61
Fall.....	64.9	96	23	7.59	4.98	10.69
Year.....	64.0	103	-2	47.68	35.31	56.41

## AGRICULTURE.

The agricultural history of Washington County dates from the early settlement of the region. About the middle of the eighteenth century a small number of pioneer homeseekers settled in the level to gently rolling uplands in the central part of the county and began a system of farming that included the cultivation of a number of subsistence crops, such as corn, wheat, oats, potatoes, and vegetables. Later, in the period of more general settlement and farm development, cotton, cowpeas, and tobacco were added to the list of farm crops, and some attention was given to the raising of live stock. The introduction of the cotton gin gave an impetus to cotton growing and materially hastened the settlement of idle lands. General farming, with cotton as the chief income product and the other crops grown for subsistence, has always been the prevailing type of agriculture.

In the early history of the county the wealthy settlers and the more thrifty of the poorer farmers acquired large landholdings, and an extensive plantation system of farming was built up. Each plantation produced the various necessities of life in addition to certain income crops, chiefly cotton. No fertilizers were used in the production of cotton. Land was cheap and plentiful and when continuous cropping to cotton resulted in a low state of productiveness new areas were cleared and brought into use. The prevailing system of agriculture was disrupted by the Civil War, which changed both economic and social conditions. During the period of readjustment following the war farming was resumed and extended on a new basis. A large number of owners resumed operations of their own lands with hired labor, while others leased their lands in parcels to white and negro tenants. Thus the tenant system of farming came into favor. It has prevailed ever since, 81 per cent of the farms being operated at present in this way.

Under this tenant system cotton became even more prominent in the cropping system than before, and it is dominant to-day. Cotton was grown regularly from year to year as extensively as possible at a minimum of expense, and to the neglect of other crops. In the absence of "new" lands that could be brought into use commercial fertilizers were resorted to in order to maintain yields under the one-crop system. Little attention was paid to methods of management looking to soil improvement, and only slight attention was given to crop rotation or diversification.

The present form of agriculture consists in growing cotton as the chief income crop, with corn and oats as supplementary products and various other crops grown to a small extent. Flour, meal, pork, and lard are imported in rather large quantities, as the present type

of agriculture does not provide for a sufficient production of these food staples to supply the county.

Of the total area of the county, 80 per cent is in farms, numbering 4,039. Of the aggregate land in farms, 61.5 per cent is improved. Of the improved acreage, 83,878 acres in 1909 was planted to cotton, with a production of 31,874 bales, the yield averaging 0.38 bale to the acre. Cotton is the only distinct income crop of the county. A small part of the production of other crops, such as corn, oats, hay, melons, and vegetables, may be disposed of at local markets, but none of these crops is important as a source of income. All the crops except cotton are either wholly or in part subsistence products, used either for feeding work stock, milch cows, hogs, and poultry, or for consumption in the home.

After cotton, corn is the most important crop in Washington County. Corn was grown in 1909 on 63,033 acres. The average yield was only 9.64 bushels per acre and the production was 608,011 bushels. Oats follow corn in importance among the grain crops, but this cereal occupied only 7,571 acres in 1909, and but 113,204 bushels were produced. The average acreage yield was 14.7 bushels. Wheat and rye are grown to a small extent.

Hay and forage crops are not important in the county. For 1909 the census reports only 263 acres in tame and cultivated grasses, 43 acres of wild grasses cut, 2,445 acres in grains cut green, and 40 acres in coarse forage. The average yield of all these crops is approximately 1 ton per acre. Cowpeas are one of the most extensively grown hay and forage crops.

Miscellaneous crops include beans, peanuts, Irish potatoes, sweet potatoes, sugar cane, and sorghum. Sweet potatoes occupied 1,269 acres in 1909, yielding 104 bushels per acre, and sugar cane 1,194 acres, with a total production of 7,396 tons.

Peaches are the principal fruit produced in Washington County. There were 35,247 peach trees in 1909, according to the census, 9,212 apple trees, 6,088 plum trees, and 369 nut trees, of which pecan trees were most numerous. Grapes and strawberries are grown to some extent.

The live-stock industries are not well developed in this county. The census reports the value of the products from this branch of agriculture in 1909 as \$269,723, of which \$31,053 was derived from the sale of animals, \$113,613 represents the value of animals slaughtered on farms, \$49,862 the value of dairy products, and \$74,347 that of poultry and eggs produced. The revenue from the animal industries is small compared to the total value of crop production, which amounted in the same year to \$3,416,366. Mules are the principal domestic animal in aggregate value. The census reports 4,595 mules,

valued at \$680,087; 7,006 cattle (half the number being dairy cows), valued at \$117,253; 21,416 head of hogs; and 1,185 horses.

A large number of the farmers recognize differences in the adaptation of soils to certain crops and varieties of crops and a few are guided in a measure by such knowledge, but in general practice little attention is given to soil selection and crops are planted indiscriminately on all the different types. The light, sandy soils are frequently selected for melons, peanuts, and sweet potatoes; moist land for sugar cane; low ground for corn; and the uplands for cotton, wheat, oats, rye, peas, and beans. The widespread disregard of soil selection in relation to classes of crops and varieties is due to the fact that practically all the common crops can be grown with varying degrees of success upon every soil type in the county, and that the range of crops grown is so limited as to offer little opportunity for choosing the best crops for certain soils.

The agricultural practices are of a uniform character throughout the county as to classes of crops, soil management, and methods of farming. Land is plowed in the spring as early as weather conditions permit, usually after lying idle during the winter and subject to the ill effects of leaching, packing, and erosion. Plowing is usually done with a 1-horse plow, but quite often with a 2-horse plow, and occasionally with 3-horse or 4-horse disk plows. After plowing the land is allowed to stand, usually without harrowing, until near the time for planting, when the rows are laid off with a turn plow that further pulverizes the seed bed and acts as a guide for the fertilizer and seed distributor. The crops are generally planted on a level seed bed.

Farm equipment in general is inadequate for the thorough preparation or cultivation of the land. There is a scarcity of work stock and farm implements. Heavy plows for deep plowing in the fall, disk harrows, smoothing harrows, and other efficient labor-saving implements are not in general use.

Cotton, the principal crop, is planted with a seed distributor, immediately after the acreage application of about 200 pounds of commercial fertilizer, drilled into the seed furrow. The first attention the crop receives after planting is thinning, or "chopping out," with hoes. In preparation for this work the rows are barred off with a plow that is run on both sides of the row in order to leave the young cotton on a narrow strip of ground, or ridge. During the process of chopping this narrow ridge is practically leveled and the plants are left 10 to 15 inches apart in a shallow, furrowlike depression. Furrows are again run alongside the row with shovels or sweeps that throw the earth toward the plants. Harrows, weeders or sweeps are employed at intervals of about 10 days in a system of shallow cultiva-

tion between the rows until the crop is "laid by." Hoeing is necessary to remove the weeds and grass between the plants, and usually the crop must be gone over two or three times during the growing season. The crop is harvested in the fall by hand as rapidly as the staple matures. The land receives no further attention until the following year, when the spring treatment is repeated. Yields of cotton range from one-fourth to 1 bale to the acre, according to the type of soil, degree of improvement, seed-bed preparation, and cultivation and fertilization given.

Corn is ordinarily grown in the same manner as cotton, so far as the preparation of the land is concerned, though with less expense and effort in cultivation. The seed is usually dropped by hand into a furrow and covered with a 2-shovel cultivator. The fertilizer is applied at planting time. Harrows, weeders, and sweeps are employed in the cultivation of the crop. At the close of the growing season the soil has been worked toward the plants until they stand on a ridge, or bed. In many instances the fodder is pulled and used as forage for work stock. Corn yields are in general low, averaging about 10 bushels to the acre.

A large number of tenant farmers do not plow the land broadcast in the spring for either cotton or corn, merely running one or two furrows for the seed in the water furrow between the rows of the previous planting.

The land for wheat, oats, and rye is plowed broadcast immediately prior to seeding, and again after harvest in preparation for some summer crop, such as cowpeas. The acreage in small-grain crops is relatively small and the yields are low.

The special crops, such as Irish potatoes, sweet potatoes, other vegetables, peanuts, and sugar cane, are planted in small patches and usually receive more care and attention than is accorded the more extensively grown farm crops.

The practice of rotating crops is followed by a number of the more progressive landowners, but is neglected by the great majority of the tenants. The growing of cotton and corn, with patches of sugar cane, cowpeas, potatoes, and other vegetables, constitutes the usual system of tenant cropping. Cotton succeeds itself quite regularly as the principal crop, and the tenant customarily buys his provisions and household necessities from month to month under a lien on the prospective cotton crop. Usually enough land is devoted to corn to feed the work stock. Some hogs are usually raised and a small flock of chickens.

Commercial fertilizers are used throughout the county. In the absence of enough live stock to produce sufficient barnyard manure, and on account of the small acreage of green manuring crops, the use of commercial preparations is a necessity. Fertilizers are ap-

plied at the rate of 200 to 500 pounds per acre, usually at planting time. Some farmers make a small application at planting time and give one or two top dressings during the growing season for cotton and corn. Oats and wheat customarily receive an application of nitrate of soda. Land devoted to special crops usually receives applications of barnyard manure in addition to some commercial preparation.

The use of commercial fertilizers has been found most profitable on the upland and terrace soils. A complete formula is generally purchased. High-grade mixtures are used by a few farmers, and yields are correspondingly increased. The individual soil types vary in the kind and quantity of fertilizer mixture required.

The more progressive farmers, who improve the soil by crop rotations, raising live stock, and judicious fertilization that combines barnyard and compost manures, green manuring crops, and commercial fertilizers, obtain yields of crops that are indicative of the possible productiveness of the soils of the county. Under favorable conditions cotton has yielded 1 to 2 bales to the acre, while under ordinary methods the average is only 0.38 bale. Likewise corn, although the average yield is about 10 bushels per acre, has produced as much as 40 to 70 bushels.

The farm labor available is chiefly colored, as is a large percentage of the tenants. The supply of labor is usually sufficient, except for a possible scarcity during the press of work incidental to the cotton-chopping and cotton-picking seasons. The average wage is \$12 a month, with house and board. Day labor is paid 50 to 75 cents, with board.

Under the tenant system two forms of tenure are practiced, and to about the same extent. Under the "rent" system the tenant pays a stated quantity of cotton, usually 1,000 pounds of lint cotton for 30 to 35 acres of land. Under the "crop" system the tenant furnishes the labor and one-half the fertilizers, while the landowner furnishes the land, all work stock, the seed, and one-half the fertilizer; each takes half the crop returns. Under either arrangement, the landowner customarily retains practical control of operations.

The average size of the farms in the county is 84.7 acres, each tenancy being considered a farm. There are many large holdings in the county ranging in size from 1,000 to 10,000 acres, but these large tracts are invariably divided into small farm units cultivated under the tenant system.

The value of land varies considerably, depending upon the soil, state of improvement, and proximity to towns and railroads. The range is from \$5 to \$50 an acre. The census gives the average value of land in 1910 as \$11.60 an acre.

## SOILS.

Washington County lies wholly within that part of the State included in the broad physiographic division known as the Coastal Plain. The Fall Line, or line of contact with the Piedmont Plateau region, lies about 10 or 15 miles to the north in Hancock County. The soil-forming materials of the county are entirely of sedimentary origin, there being no evidence of any Piedmont contribution in the upland soils. The mantle of marine sediments over the crystalline structure, however, becomes rather thin along the upper course of the Ogeechee River, in the northern part of the county, where an occasional fragment of crystalline rock may be encountered, and the flood plains along the Oconee and Ogeechee Rivers and Buffalo Creek, flowing from the Piedmont region, comprise recent alluvium that has been washed chiefly from the residual soils of the crystalline area. The tributary streams that flow only through areas of Coastal Plain soils contribute small quantities of reworked material of a sandy character.

The upland soils, derived from unconsolidated sedimentary beds of sands, sandy clays, clays, and marls, are included chiefly in two main physiographic divisions of the Coastal Plain of Georgia, viz, the Fall Line Hills and the Altamaha Upland.<sup>1</sup>

The Fall Line Hills division comprises the upper portion of the Coastal Plain, and includes in this county that part lying north of the Central of Georgia Railway. This region comprises the only area of pronounced surface relief in the county, the topography being due entirely to erosion. As this is the highest and oldest part of the Coastal Plain region, the streams have done more work here than elsewhere in the county. The topography is characterized by flat-topped hills and ridges occupying interstream positions. Deep gullies or "washes" are numerous. The substrata are mainly unconsolidated sands and clays of Cretaceous and Eocene age.<sup>2</sup> These hills and ridges are recognized as either "sand hills" or "red hills."

The sand hills present a rolling topography. They occur in the western and northern parts of the county. There is a characteristic covering of gray to yellowish or brownish sand that varies in depth from 3 to 6 feet. This is largely of pure quartz, loose and incoherent, and probably residual from the underlying Cretaceous and Eocene formations. The lower slopes of a hill or ridge may show a considerable depth of sand, washed into position by surface waters. The sandy material here developed gives rise to several sand types of soil, viz, the Norfolk sand, gray in the surface layer and pale yellowish in the subsoil; the Ruston sand, brownish gray in the sur-

<sup>1</sup> *Geology of the Coastal Plain of Georgia*, by Veatch and Stephenson, Bul. No. 28, Geological Survey of Georgia.

<sup>2</sup> *Ibid.*

face layer, with reddish-brown subsoil; and the Orangeburg sand, a grayish-brown to reddish, medium sand or loamy sand, with red subsoil.

The red hills are covered with a shallow mantle of gray to brown sand, though the soil-forming material is chiefly a bright-red sandy loam or friable sandy clay, residual from the underlying formation, chiefly Eocene. The unconsolidated material erodes readily and there are many gullies and washes ranging in depth from 20 to 50 feet. The soil types resulting from the weathering of these formations are the Orangeburg, Greenville, Ruston, and Norfolk sandy loams, and the Greenville clay loam.

The Altamaha Upland<sup>1</sup> comprises the southern portion of the county. There is no definite line of separation between this division and the Fall Line Hills. It is lower in elevation and is broadly characterized by a more gently rolling surface and smoother outlines. The surface soils are usually sandy in texture and are underlain by yellow, brown or reddish subsoils. The Ruston and Norfolk soils predominate here, with smaller occurrences of the Orangeburg, Greenville, and Tifton types. All these series are characterized by subsoils of friable sandy clay.

The soils of the Norfolk series have light-gray to grayish-yellow surface soils, usually light in texture, and yellow subsoils. They occupy level to rolling Coastal Plain uplands, and occur in every section of Washington County, but most extensively in the eastern and southern parts. Three types are mapped, the sand, coarse sandy loam, and sandy loam.

The Orangeburg soils are characterized by gray to reddish-brown surface material, usually light and open, and reddish subsoils. The series is developed extensively in Coastal Plain uplands from North Carolina to central Texas, the topography ranging from undulating to rolling or hilly. The Orangeburg soils are extensive in Washington County. They are found in all localities, but the largest occurrences are in the central and northeastern parts on the undulating crests of ridges and rolling interstream areas. Two types are recognized, the sand and the sandy loam, with a rolling phase.

The Greenville series is characterized by red to reddish-brown surface soils and deep-red subsoils. The topographic features are favorable for agriculture. Drainage is well established. The Greenville soils are closely associated with the Orangeburg in distribution. They occur in the central and northern parts of the county in a number of small, isolated areas. In places the lower subsoils of the Greenville series are influenced to some extent by the underlying limestone formations. The Greenville sandy loam and clay loam types are identified in this survey.

<sup>1</sup> Geology of the Coastal Plain of Georgia, by Veatch and Stephenson, Bul. 26, Geological Survey of Georgia.

The Ruston series is characterized by gray to slightly brownish gray surface soils and reddish-yellow to yellowish-red subsoils. The gray sandy surface soils usually grade into the subsoils through a sub-surface stratum of yellowish sandy loam to sandy clay. The Ruston series holds an intermediate place between the Orangeburg and Norfolk series in the color of its subsoil, and between the Orangeburg and Norfolk soils on the one side and the Susquehanna on the other in point of subsoil structure. Two Ruston types are mapped in Washington County, the sand and the sandy loam.

The surface soils of the Tifton series are gray to slightly brownish, and the subsoils bright yellow. Small brown iron concretions occur on the surface and throughout the soil section, and the soil is often characterized locally as "pimply land" or "pebbly land." The Tifton soils are developed most extensively in the central part of the Coastal Plain region, extending through South Carolina, Georgia, and Alabama. They are considered productive and valuable soils, having in general an adaptation to practically all the common crops. One type, the sandy loam, is developed in this county.

The older Cretaceous formations underlie this entire region, and many of the larger streams have worn their valleys into these formations. Cross-bedded sands with interbedded lenses of light-drab or gray clays characterize many broken exposures that may be seen on stream slopes. This soil-forming material weathers into the Susquehanna series.

The Susquehanna soils are gray to reddish in color and are underlain by heavy, plastic, and impervious clay subsoils, of mottled red and gray, or red, gray, yellow, and brown color. The Susquehanna soils occur most extensively in the higher parts of the Coastal Plain region, from Maryland to Texas. The agricultural value of the series is much below that of the Orangeburg and Norfolk soils. The series is of small extent in this county and is included in one type, the sandy loam.

Small lime sinks are found throughout the county in scattered and irregular occurrence. They occur either as shallow depressions with no outlet or as a series of flat depressions connected by some small drainage line. They are due to the underground solution of soft limestone. The soil material here gives rise to the Grady series.

The Grady series is characterized by dark-gray soils, underlain by mottled yellow and gray, or yellow, gray, and red, plastic, heavy clay subsoils. In places the subsoil may be partly residual from limestone. The sandy loam type is mapped in this county.

There are marginal strips of recent alluvium along the courses of all the larger streams. The Ogeechee and Oconee Rivers and Buffalo Creek have developed well-defined areas of second bottoms, or terraces, in addition to broad present flood plains, or first bottoms. The

alluvial soil-forming material has been transported by stream action and laid down during seasons of overflow. The soil in the first bottoms along the larger streams, where the material is largely washed from the crystalline Piedmont region, is classified with the Congaree series, while the deposits along the smaller streams, where the material is so mixed in character as to render impossible any differentiation into types, are mapped as Meadow (Ochlockonee material).

The Congaree series has brown to reddish-brown surface soils. The subsoils are of essentially the same color, texture, and structure as the surface soils, with occasionally some grayish and yellowish mottling in the poorly drained areas. One type of the series is recognized in this survey, the silty clay loam.

The soils of the terraces, or second bottoms, are included in three series, the Kalmia, Leaf, and Cahaba, the last being represented by one unimportant type, the sandy loam. The Kalmia series includes the types having yellow to mottled gray and yellow, friable sandy clay subsoils, while the Leaf subsoils are mottled gray, brown, yellow, and red, and are heavy, plastic, and impervious.

The Kalmia series is characterized by gray to grayish-yellow surface soils. Extensive developments of the series occur in Georgia, Alabama, and Mississippi. The soils are formed largely of material washed from upland Coastal Plain soils, although along the larger streams issuing from the Appalachian Mountains and Piedmont Plateau more or less material from these regions is mixed with the deposits. The Kalmia soils are closely related to the Cahaba, differing essentially in their poorer drainage and less advanced weathering in the subsoil. The better drained areas of the Kalmia series on the higher terraces show a yellow color in the subsoil that causes the types to resemble the corresponding Norfolk soils. The topography of the series is flat to undulating, and drainage is often inadequate. The Kalmia sand, fine sand, sandy loam, and fine sandy loam are recognized in this county.

The surface soils of the Leaf series are of light-gray to gray color. Iron concretions are of common occurrence on the surface. These soils are of rather low agricultural value. One type of the series occurs in this county, the fine sandy loam, with a poorly drained phase.

With a general similarity in the character of the superficial deposits that have weathered under similar conditions and through similar agencies, the various soil series of Washington County are not restricted in distribution to certain localities. The topographic features, though nowhere of great dissimilarity, nevertheless have a decided influence on soil characteristics. Where the relief is more pronounced, as in the western, northern, and central parts of the

county, there is a more general occurrence of bright-red soils. Gray soils, with yellow or brown subsoils, predominate in the southern and extreme western parts of the county, and the gray sands are developed in the northern and northwestern sections.

Including Meadow (Ochlockonee material), 20 different soil types are mapped, ranging in character from loose, incoherent sands to fairly heavy silty clays. The following table gives the name and the actual and relative extent of each type:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sandy loam.....	91,712	21.4	Norfolk coarse sandy loam....	8,448	2.0
Orangeburg sandy loam.....	73,728	17.7	Kalmia sandy loam.....	8,064	1.9
Rolling phase.....	2,304		Kalmia sand.....	7,360	1.7
Norfolk sand.....	57,856	13.5	Tifton sandy loam.....	5,184	1.2
Meadow (Ochlockonee material).....	47,616	11.1	Kalmia fine sandy loam.....	4,608	1.1
Ruston sandy loam.....	43,520	10.2	Grady sandy loam.....	3,648	.9
Susquehanna sandy loam.....	19,072	4.5	Ruston sand.....	3,520	.8
Congaree silty clay loam.....	19,008	4.4	Leaf fine sandy loam.....	1,472	.5
Greenville sandy loam.....	10,944	2.6	Poorly drained phase.....	640	
Greenville clay loam.....	10,752	2.5	Total.....	428,160	.....
Orangeburg sand.....	8,704	2.0			

NORFOLK SAND.

The Norfolk sand to a depth of 36 inches or more consists of a loose and incoherent gray to pale-yellowish sand of medium texture. Occasionally the texture is coarser or finer than typical, and in places quartz pebbles are present. The surficial few inches has a gray to light-gray color, with generally a tendency toward a darker gray in the forested areas and lower situations, where there is an accumulation of organic matter. Below 6 or 8 inches the sand assumes a pale-yellowish color that continues through the 3-foot section. The low-lying or flat areas near stream heads, where drainage is inclined to be sluggish, usually show a light-gray to whitish color throughout the soil and subsoil. Occasionally in small areas, particularly on the upper slopes and crests of ridges, the sand extends to a depth barely exceeding 3 feet, and rests on a yellowish sandy clay subsoil; the texture in the lower part of the 3-foot section is decidedly loamy, ranging even to a light sandy loam. Many small areas equivalent to a deep phase of the sandy loam type are included with the Norfolk sand.

The soil is easily cultivated over a wide range of moisture conditions. Only light farming equipment is necessary. Under certain conditions the surficial few inches may become quite compact, but the subsurface material is always loose and open in structure.

Small areas of the Norfolk sand are encountered in all sections of the county, but its most extensive occurrence is in the northern and northwestern parts, where it is developed in broad, uniform areas. It occurs usually along stream slopes, and the topography ranges from level to rolling and hilly. Drainage is in general well established. The more rolling areas are inclined to suffer from excessive drainage by reason of the open and loose nature of the soil material.

A rather small proportion of the Norfolk sand is under cultivation. Cotton is the chief crop, and yields average about one-third bale to the acre. Corn, the second most important crop, gives low yields. Oats, peanuts, cowpeas, sugar cane, rye, and vegetables are other crops grown. They make fair yields. Heavy fertilization is necessary for good results. The type is invariably low in organic matter, and this deficiency, together with the open character of the soil, permitting a ready leaching of soluble mineral plant foods, accounts in part for the low yields. Land of the Norfolk sand sells for \$5 to \$20 an acre.

The Norfolk sand is suited to special crops rather than to general farm crops. With improvement the soil would apparently be desirable for trucking. The necessity for supplying the soil with vegetable matter in the form of stable or green manures is readily apparent. By this means the moisture-holding capacity of the soil is greatly increased, and it is better enabled to withstand leaching and to nourish crops during the dry periods of summer.

#### NORFOLK COARSE SANDY LOAM.

The Norfolk coarse sandy loam consists of a gray coarse loamy sand 6 to 10 inches deep, grading into a pale-yellow coarse sandy loam that extends to an average depth of 15 inches. The subsoil is a yellow, friable coarse sandy clay, sometimes mottled in the lower part with brown to reddish-brown iron stains. There is a fair percentage of small quartz gravel on the surface and in the soil and occasionally a conspicuous sprinkling of small brown iron concretions. There are a few gravel and iron concretions through the 3-foot section.

The content of gravel is sufficiently high in places to constitute a characteristic gravelly coarse sandy loam, but the small aggregate acreage of soil of this character did not seem to warrant its separate mapping. These areas are indicated by gravel symbols. They occur in the southeastern part of the county, mainly in the vicinity of Harrison. The agricultural value is essentially the same as that of the main type.

The Norfolk coarse sandy loam is developed in the southeastern part of the county in a number of relatively small areas, always closely associated with the sandy loam type. It occupies gently roll-

ing interstream divides, rounded ridges, and slopes. Drainage is generally well established, and the more sloping areas are inclined to droughtiness because of excessive drainage.

This type is not an important one in the agriculture of the county. A fair percentage of the land is under cultivation. Cotton, corn, oats, rye, cowpeas, peanuts, sugar cane, and vegetables are grown. Yields average rather low. The soil is so open that crops often suffer during summer droughts. Commercial fertilizers are used generally on the type and are beneficial.

By reason of its light surface soil the type is easily handled and may be cultivated under a wide range of moisture conditions. It is best suited to special crops. Land of this type is held at prices ranging from \$5 to \$20 an acre.

The addition of large quantities of vegetable matter would increase the water-holding capacity of the soil and result in larger yields of all the crops grown. Peanuts, cowpeas, melons, and various vegetables would apparently do well under good methods of farming.

#### NORFOLK SANDY LOAM.

The soil of the Norfolk sandy loam is a light-gray, light sandy loam or loamy sand, 6 to 8 inches deep, grading into a pale-yellowish sandy loam that gradually becomes heavier with increase of depth until the yellow, friable sandy clay subsoil is reached at 12 to 20 inches. Minor differences in texture are noticeable over small areas. Rounded quartz gravel and small brown iron concretions are often encountered over small areas along stream slopes and on low knolls and low, well-rounded ridges. The forested areas are invariably darker gray in the surficial few inches than the cultivated fields, on account of the larger content of decayed vegetable matter. Constant tillage soon exhausts the organic-matter content.

The subsoil is prevailingly bright yellow, though it may assume a slightly reddish yellow color on the higher ridges and better drained slopes, where this type is not easily distinguished from the Ruston sandy loam. In the more level areas where drainage is poorly established the subsoil is usually more plastic than typical and tends toward a pale-yellow color, often mottled with light gray. In the southeastern part of the county the subsoil is generally fairly sticky and plastic when in a moist condition.

The Norfolk sandy loam is developed in nearly every section of the county, but most extensively in the southeastern part, where it is the predominating soil type. The topography ranges from level to gently rolling, with small areas in places occupying slopes. Drainage is ordinarily well established, though occasionally poor in the level and low-lying areas. There is little evidence of serious

erosion. The open, friable character of both soil and subsoil renders the type absorptive of moisture, and at the same time permits ready percolation and subdrainage.

The Norfolk sandy loam is one of the important soils of the county, and a large proportion of it is under cultivation. The prevailing system of farming is based upon cotton as the principal income crop, with corn as the chief grain product. Oats, rye, wheat, cowpeas, peanuts, and sugar cane, and beans, potatoes, and various other vegetables are grown successfully on a small scale. Yields of all crops vary widely, according to the methods of farming employed. Cotton yields from one-fourth to 1 bale to the acre, and corn from 15 to 50 bushels. The higher yields are obtained by farmers who make liberal use of fertilizers, rotate the crops, and thoroughly prepare the seed bed. Oats are generally cut and fed to stock in the straw. This grain does well, especially when a top dressing of nitrate of soda is made in the spring.

Native grasses afford good summer pasturage. A commercial dairy farm about 2 miles northeast of Warthen is located largely on this type of soil. The herd is maintained principally on silage, concentrates, and supplementary pasture.

Land is prepared in the spring for the summer crops of cotton and corn, and little attention is given the soil until the following spring, when similar preparation is repeated. The more progressive farmers, however, practice some system of crop rotation and soil improvement, and obtain yields considerably above the average. Commercial fertilizers are commonly used, the ordinary application being about 200 pounds to the acre. Larger quantities are applied by the better farmers, who also use barnyard manure and compost.

The Norfolk sandy loam is a desirable soil. By reason of its light, friable tilth, it is easily handled with the usual light farm equipment and, especially in the areas of deeper surface soil, can be tilled soon after rains. It responds readily to treatment and can be made very productive.

The type has a value of \$8 to \$40 an acre, according to the location and state of improvements. The average price is about \$15 or \$20 an acre. Usually the soil is deficient in organic matter, which can be replenished by incorporating barnyard manure or plowing under green cover crops. The use of some system of crop rotation and the seeding of winter cover crops are suggested means of improvement.

#### ORANGEBURG SAND.

The Orangeburg sand consists of a gray to brownish-gray medium sand, 6 to 10 inches deep, grading into a reddish medium sand that

extends to a depth of 3 feet or more. The texture is quite uniform throughout the type, there being only a very small acreage where variation is noticeable. The type, however, includes some small patches of a deep phase of the Orangeburg sandy loam type too small to separate on the map. In places the type shows a loamy texture, particularly at the lower depths. Here the type consists usually of a brownish-gray sand, 6 to 10 inches deep, underlain by a reddish-brown loamy sand. This passes at about 18 inches into a reddish loamy sand that becomes appreciably sticky at 30 inches, approaching closely the characteristics of a light sandy loam.

The Orangeburg sand occurs most extensively in the southwestern part of the county. It is developed to a less extent in association with the sandy loam type in other sections of the county, usually along stream slopes. The topography varies from sloping to rolling or hilly. The hills and ridges are either flat topped or rounded. Drainage is well established, and the open, loose structure of the soil permits excessive internal drainage over the more sloping areas.

A large proportion of the Orangeburg sand is uncleared, supporting a forest growth of scrub blackjack oak, with a sprinkling of other oak and pine. The type is devoted to the general type of farming prevailing in the county, consisting of the growing of cotton, corn, oats, rye, cowpeas, and vegetables. Yields are fair, those of cotton ranging from one-fourth to three-fourths bale per acre and of corn from 8 to 25 bushels, according to the degree of fertilization. Wheat, oats, rye, cowpeas, and beans do well under good methods of cultivation. The soil is suited to special-crop production rather than to general farming. Liberal fertilization is necessary. The type is slightly more productive than the Norfolk sand. The land has a value of \$5 to \$20 an acre.

The open, loose structure of the soil, permitting a ready loss of soil moisture, makes the incorporation of organic matter necessary. In the absence of adequate quantities of barnyard manure, green manuring is advisable. Plowing under cowpeas and other legumes is very beneficial.

#### ORANGEBURG SANDY LOAM.

The surface soil of the Orangeburg sandy loam is a gray to brownish-gray loamy sand to light sandy loam, passing at 5 to 8 inches into a reddish-yellow light sandy loam that extends to a depth of 10 to 12 inches. The subsoil is a bright-red, friable sandy clay of rather stiff and compact structure. In places the soil is coarser or finer than typical, and the depth of the light upper material is variable, ranging from 5 to 20 inches. The areas of deeper soil show a solid-gray color and are of light texture, while the shallow developments having a brown to reddish-brown color

represent areas of Greenville sandy loam. Occasionally there is a sprinkling of quartz pebbles and small, brown iron concretions on the crests and upper slopes of small knolls and low, well-rounded ridges.

In patches on the steeper slopes and knolls the surficial sandy material has been largely removed, exposing the red sandy clay subsoil. These spots are of Greenville clay loam, but their occurrence is so irregular and the individual areas so small that it is deemed impracticable to separate them on the map. In the vicinity of Union Church, about 6 miles northeast of Sandersville, there are several small areas, aggregating about 600 acres, where the finer texture is so pronounced as almost to justify the establishment of a fine sandy loam type.

The Orangeburg sandy loam occurs chiefly in a belt extending from the eastern county line westward to near Buffalo Creek and along this stream southward to the Johnson County line. It occupies flat-topped hills and ridges and rolling slopes at the higher elevations. The topography is undulating to rolling, and drainage is well established. The open, porous character of the soil permits ready absorption of normal rainfall and little severe erosion takes place, except on sloping areas that are entirely neglected. On the more pronounced slopes terracing and deep plowing to prevent rapid run-off are necessary. The friable sandy clay subsoil is retentive of moisture.

The Orangeburg sandy loam is largely under cultivation. Probably 75 per cent of it is farmed. The type is held in esteem because of its easy tillage and quick response to fertilization. It is fairly productive. Cotton is the chief crop grown, occupying an acreage about 30 per cent greater than that in corn, the next most important crop. Cowpeas, oats, wheat, rye, and beans, ranking in acreage in the order named, are grown in a small way over the type. Potatoes, sugar cane, peanuts, and various vegetables are grown in small patches on some farms. There are no orchards of importance in the county, but the type supports some peach and a smaller number of apple trees. The fruit is reported to be of high quality.

Cotton yields on this type average about one-third to one-half bale to the acre, under tenant management. Higher yields are obtained by individual farmers who employ better methods of cropping and fertilization. Where the soil is well tilled and well supplied with vegetable matter, and applications of 300 to 500 pounds per acre of a high-grade fertilizer are made, from 1 to 1½ bales of cotton or 50 to 75 bushels of corn to the acre can be produced. Corn averages about 15 to 20 bushels per acre, with yields reaching 40 or 50 bushels on the best-farmed land. The yield of oats is about the same as that of corn. The oat crop is usually cut and fed in the sheaf. Wheat

yields only about 10 to 15 bushels per acre, and a very small acreage is seeded. The other crops mentioned give good results.

Hairy vetch and some of the clovers would apparently do well on the type, as these crops are grown profitably on similar soils elsewhere in the South. Tobacco of certain grades would probably succeed.

The type is handled in cultivation according to the practices prevailing over the county. Crops are produced at a minimum of labor and expense, as the soil is mellow and easily tilled, requires only a relatively light farm equipment, and can be tilled under a rather wide range of moisture conditions. Cotton is grown as the income crop, with grain, vegetables, and root crops for subsistence. Cow-peas, peanuts, and beans are planted for soil improvement, as well as for food and forage.

Fertilizers are used generally on this type. A complete formula is usually employed, the mixture analyzing 8-2-2, 8-3-4 or 10-2-2. About 200 pounds per acre is distributed in the seed furrow immediately prior to planting. In some instances top dressings of nitrate of soda are given cotton and corn. Oats and wheat may also receive a dressing of nitrate of soda in the spring.

Land of the Orangeburg sandy loam has a value ranging from \$10 to \$40 an acre, according to reports gathered from owners and residents. The price varies with location and degree of improvement, and probably averages about \$20 an acre.

The Orangeburg sandy loam is easily improved. The soil is open and porous, and generally deficient in organic matter. Yields of the common crops could be increased by working up a better tilth through the agency of heavy applications of barnyard manure, or in the absence of this, of green manuring crops plowed under. The practice of systematic crop rotations to meet individual needs is especially advisable, the rotation to include frequently some leguminous crop to be plowed under. Winter cover crops of rye, wheat or oats could be seeded to advantage.

*Orangeburg sandy loam, rolling phase.*—The soil material of the rolling phase is essentially the same as that of the typical Orangeburg sandy loam, the distinguishing feature of the phase being its generally greater surface slope. The degree of slope varies from 10 to 30 per cent. The phase is readily subject to erosion, and care is necessary to prevent destructive washing. Farming is naturally more expensive and laborious than on the more level land, and terracing must be resorted to in many places. In crop adaptations, farm practices, and fertilizer requirements the phase is essentially similar to the main type. Yields are ordinarily lower, owing to the rapid leaching of soluble mineral salts. Peanuts, melons, canta-

loupes, potatoes, cabbage, onions, tomatoes, cucumbers, and sugar cane are apparently well suited to the phase, as are peaches, berries, and grapes.

GREENVILLE SANDY LOAM.

The soil of the Greenville sandy loam is a brown to reddish-brown sandy loam, 6 to 10 inches deep, quite loose in the surficial few inches. The subsoil is a deep-red, friable sandy clay, rather heavy and compact, and inclined to be sticky when wet. Uncultivated areas often show gray at the surface, by reason of the accumulation of gray sand grains.

The Greenville sandy loam is closely associated with the Greenville clay loam, as well as with the Orangeburg sandy loam. It occurs chiefly in the central part of the county over the gently rolling to rolling interstream uplands. Drainage is well established. The soil is open and porous and readily absorptive of normal rainfall. Both the soil and subsoil are structurally favorable for the retention of moisture.

The Greenville sandy loam is one of the most desirable soils of the county, on account of its ease of tillage under a wide range of moisture conditions, its ready response to methods of improvement, and its wide range of crop adaptation. A large proportion of the type is under cultivation.

All the common farm crops of the region do well on this soil. Cotton is grown as the principal income crop. Yields range from one-third to over 1 bale to the acre, with an average yield of perhaps one-half bale. Corn, the second staple crop in importance, yields 20 to 50 bushels to the acre, with ordinary yields of about 25 to 30 bushels. Wheat, oats, rye, beans, sugar cane, peanuts, and garden truck give excellent returns, but the acreage of these crops is small. Vetches and clovers should do well on this type, and would be advantageous as winter cover crops. It is probable that certain varieties of tobacco would be successful.

Commercial fertilizers give good results on this type, especially mixtures high in nitrogen. A top dressing of nitrate of soda increases yields of the staple crops.

Land of the Greenville sandy loam has a value of \$25 to \$50 an acre, according to the location and state of improvement.

This type can be made highly productive. Means of improvement include deep plowing in the fall and the seeding of some winter cover crop, such as oats, rye, vetch or clover; liming and liberal applications of barnyard manures or composts; the rotation of crops, to include frequently a leguminous cover crop to be plowed under; and the judicious use of commercial fertilizers.

## GREENVILLE CLAY LOAM.

The Greenville clay loam is generally a reddish-brown, heavy sandy loam, 2 to 5 inches deep, passing into a sandy clay loam of similar color that extends to a depth of 7 to 10 inches. The subsoil is a deep-red, friable sandy clay that becomes heavier and more compact with increasing depth. When wet it becomes sticky. The shallow sandy loam covering is absent over portions of the type, where typically a reddish-brown clay loam extends from the surface to the subsoil. Considerable quantities of small, brown iron concretions are present on the surface of many low knolls and ridges. Occasionally small depressions appear in the type, due to a slight sinking of the land upon solution of underlying limestone. Ditching is resorted to in such places for the necessary drainage. The soil here is quite silty and of a more pronounced brownish color.

The Greenville clay loam occurs most extensively in the central part of the county, in the vicinity of Sandersville, on the higher undulating to rolling interstream areas, though small bodies are developed irregularly in other sections of the county. The topography ranges from level to gently rolling. Drainage is everywhere well established. The structure of both the soil and subsoil is very favorable for the retention of moisture. Little serious erosion is apparent, as the run-off is usually gentle.

This type is probably the strongest of the upland soils for general farming purposes. It apparently is adapted to a wide range of crops and is capable of being worked into a high state of productiveness. A large proportion of the type is under cultivation. Cotton and corn are the principal crops, cotton taking precedence in acreage as the income crop. Wheat, oats, and rye, and beans, potatoes, and other vegetables do well, though these crops are grown only in small quantities to meet in part the farm needs. Cotton yields one-third to 1 bale to the acre, and corn 15 to 50 bushels. The soil is well suited to oats.

Under favorable moisture conditions the soil works up into excellent tilth. When wet it is inclined to be sticky, and rains cause it to puddle easily during the growing season. When dry it breaks into clods that are reduced with difficulty. Moderately heavy equipment is necessary for tillage. The type is handled under the prevailing methods of cultivation. The land is hastily prepared in the spring for the summer crop of cotton or corn. Little attention is given to rotation or diversification of crops.

Land of the Greenville clay loam type has a value of \$25 to \$60 an acre, with an average of about \$35. Values are dependent on the location of the land and the state of improvement.

The yields of the staple crops can be readily increased by proper methods of management, including crop rotation, selection of sound

seed of good varieties, the plowing under of vegetable matter, and careful preparation of a deep, loamy seed bed. The application of high-grade commercial fertilizers, as well as lime at the rate of 2,000 to 4,000 pounds to the acre, is beneficial. Deep plowing in the fall and frequent shallow cultivations during the growing season are advisable. Vetches and certain varieties of clover would apparently do well on the type, affording excellent winter cover for the land and contributing to the winter pasturage. Cowpeas and beans are excellent summer crops and good soil improvers.

#### RUSTON SAND.

The Ruston sand consists of a gray to slightly brownish gray, loose, incoherent sand, 8 to 10 inches deep, grading into a brown to slightly reddish brown loamy sand that extends to a depth of 36 inches or more. The soil is light and warm, and easily tilled with light farm equipment under a wide range of moisture conditions. Often in the lower part of the 3-foot section the material becomes sticky.

The Ruston sand occupies a relatively small aggregate acreage, and it is unimportant in the agriculture of the county. It is found in a number of small, scattered bodies, mainly in the northern part of the county. It usually occurs on stream slopes, where it appears to represent an accumulation of sand washed from higher elevations. Drainage is well established generally, though where the soil is underlain by impervious clays seepage waters may keep it in a moist condition.

A fair percentage of the type is under cultivation, being devoted mostly to the production of cotton and corn. Sugar cane, cowpeas, and peanuts do well on this soil. The crop adaptations of the soil, its fertilizer requirements, and the general farm practices are essentially the same as in the case of the Orangeburg sand and the Norfolk sand.

#### RUSTON SANDY LOAM.

The surface soil of the Ruston sandy loam is a gray to grayish-brown sandy loam, underlain at depths ranging from 5 to 15 inches, but ordinarily 6 to 10 inches, by a dull brownish red or yellowish-red, friable sandy clay subsoil. Almost invariably the light sandy loam surface material grades into the yellowish-red subsoil through a subsurface stratum of yellow sandy loam to sandy clay loam, which may be only a few inches in thickness or may extend to a depth of 15 to 18 inches. The areas of deeper surface soil have a decidedly light gray appearance, while the shallower areas show a tinge of brown by reason of the nearness of the subsoil to the surface.

In local developments on slopes the brown coloring may be very prominent; in fact, the sandy surface covering may be so shallow as

to expose the brownish to reddish-yellow sandy clay subsoil to the plow. In such places the resulting surface material is an admixture of soil and subsoil and is properly a sandy clay loam, but the occurrence of these spots is so irregular and the areas are so small that it is impracticable to show them on the map. Where the type is developed in association with the Norfolk soils it has a tendency toward a more pronounced yellowish tinge, and, similarly, a more reddish shade is apparent near developments of the Orangeburg or Greenville soils.

On lower stream slopes, in slight depressions, and about stream heads, where the Grady and Susquehanna soils are usually found, the subsoil becomes rather sticky and plastic, and is often mottled at the lower depths. In local areas on low knolls and ridges there is a marked mottling of reddish brown and yellowish brown, streaked with light gray and faint pink, the characteristics approaching those of the Hoffman series.

A sprinkling of quartz pebbles is found occasionally, as well as a scattering of small, brown iron concretions over the surface of some small knolls or low ridges. In several minor areas in the north-western part of the county, about 5 miles west of Warthen, aggregating in extent perhaps 100 acres, these small concretions are especially abundant.

The Ruston sandy loam is a light soil, easily tilled and capable of being handled in cultivation over a wide range of moisture conditions with ordinarily light farm equipment. The areas of shallower surface soil, however, where the subsoil is near the surface, have a narrower range under which effective tillage can be performed than the deeper sandy phases.

This type is developed in all parts of the county. The largest occurrence is probably to the south and east of Sandersville. The topography in general ranges from undulating to rolling, but may be rather steeply sloping on stream slopes. Drainage is in general well established. The undulating to gently rolling areas have ample natural drainage without suffering serious erosion. Reasonable precautions against excess run-off, including such means as careful tillage, thorough soil preparation, and occasional terracing, are sufficient to protect these areas. In the more rolling and steeply sloping situations, however, drainage is excessive, and the soil is inclined to wash badly; careful terracing is necessary here to prevent gulying and consequent deterioration in land value. The open nature of the soil permits a ready absorption of light rainfall, particularly where the surface material is 10 to 15 inches in depth, but the subsoil is much less absorptive and after heavy rains the run-off is so rapid as to cause disastrous washing. With adequate terracing the soil disposes of normal rainfall, and excess water is disposed of through percolation and subdrainage.

A large proportion of the Ruston sandy loam, probably 60 to 75 per cent, is under cultivation. The type is fairly productive. Cotton is the principal crop, the yields ranging from one-fourth to 1 bale to the acre. Corn, the second most important crop, yields 8 to 40 bushels per acre, with a probable average yield of 15 bushels. Oats, cowpeas, beans, wheat, rye, sugar cane, melons, potatoes, peanuts, and garden vegetables are successfully grown, though little attention is generally accorded these crops.

The farm practices on this soil are similar to those prevailing in general throughout the county. One crop a year is generally grown the land being prepared in the late spring for the summer crop of cotton or corn. The usual efforts toward upbuilding the soil are feeble; little attention is directed to crop rotation or the seeding of soil-improving crops such as beans, cowpeas, vetches, clover, and peanuts. Yields are maintained largely by the application of commercial fertilizers. A complete mixture is generally used and about 200 pounds applied per acre. Heavier applications are often made by farmers who operate their own lands and in many instances the mixtures are prepared on the farm. Areas of the type under management of the more progressive farmers show greatly increased yields.

Land of the Ruston sandy loam type has a value of \$8 to \$40 an acre, with an average price of about \$20 an acre.

Most of the type can be brought to a rather high state of productivity by the same practices that are effective with the Greenville sandy loam.

#### TIFTON SANDY LOAM.

The Tifton sandy loam consists of a gray to slightly brownish gray, light sandy loam to a depth of 6 to 8 inches, where it passes into a yellow or slightly reddish yellow, light sandy loam that extends to a depth of 10 to 15 inches. The subsoil is prevailingly a deep-yellow, friable sandy clay. Small brown or reddish-brown iron concretions are distributed over the surface and disseminated throughout the soil section, aggregating perhaps 10 to 25 per cent of the soil mass. They are usually present also in the subsoil, though in less abundance than in the surface soil.

The Tifton sandy loam is not extensive in this county, although it occurs in many sections in small bodies. The largest development is about 3 miles east of Riddleville. Smaller areas are found to the north of Warthen and in the vicinity of Tennille. The surface configuration ranges from level to gently rolling. Drainage is usually good.

About 95 per cent of the type is under cultivation. It is considered a highly desirable soil for general farming. The soil is light and friable and easy to work. Cotton and corn are the chief crops,

with oats, rye, peanuts, potatoes, sugar cane, cowpeas, beans, and various vegetables grown as supplementary crops. Cotton yields range from one-third to 1 bale to the acre and those of corn from 15 to 45 bushels. Usual yields of cotton, however, are between one-half and three-fifths bale per acre, and of corn about 28 bushels. All the minor crops, usually grown in small patches, make satisfactory yields.

The type has a land value of \$10 to \$40 an acre, with an average price of about \$20 an acre.

The Tifton sandy loam is essentially similar in agricultural characteristics to the Norfolk sandy loam, and responds to the same methods of improvement that apply to that type.

#### SUSQUEHANNA SANDY LOAM.

The Susquehanna sandy loam to a depth of 6 to 10 inches consists of a gray to slightly brownish yellow sandy loam. This is underlain by a heavy, plastic clay, reddish in color and intensely mottled with gray and yellow. Over small areas the subsoil is a yellowish-red, heavy, tough clay, becoming mottled at the lower depths. The surface soil is rather light and easily tilled.

The Susquehanna sandy loam is found in a number of small areas scattered widely over every section of the county. It occurs usually on stream slopes, around the heads of small streams, and adjacent to swampy tracts. Drainage is rather poorly established. Even though the surface slope be entirely favorable for adequate drainage, the impervious nature of the subsoil may keep the soil in a wet or moist condition from seepage, and the type can not be tilled as soon after rains as either the Orangeburg or Norfolk types.

A small percentage of the type is under cultivation and yields are only fair. The type is unimportant in the agriculture of the county. Cotton, corn, sugar cane, and sorghum are the principal crops. Cotton yields from one-fourth to one-half bale to the acre and corn from 8 to 25 bushels. Commercial fertilizers are used on this type and show good results. Land of the Susquehanna sandy loam has a value of \$4 to \$10 an acre.

The addition of large quantities of vegetable matter and the preparation of a deep, loamy seed bed are means of improving this soil. For best results the more level areas require ditching to remove excess moisture.

#### GRADY SANDY LOAM.

The soil of the Grady sandy loam consists of a gray to dark-gray sandy loam, 6 to 8 inches deep, passing into a light-gray, heavy, sticky sandy loam that extends to a depth of 8 to 12 inches. The subsoil is a light-gray, plastic, heavy sandy clay mottled with brown and yellow, and occasionally streaked with red in the lower part.

There is usually considerable washed material from the upland soils along the border of areas of the type, which gives a reddish-brown or brownish color to the surficial few inches. Where the type occurs in small, shallow pondlike depressions the surface soil, except along the margin of the depressions, often shows an appreciable content of silt, approaching in texture even a heavy silt loam, although prevailingly the texture is a medium sandy loam.

The Grady sandy loam is developed in depressions, in sinkholes, and about the heads of small streams in nearly every section of the county. The individual areas are usually very small, and in many instances too inextensive to show on the map. The principal development of the type is in the vicinity of Sandersville. Drainage is invariably poorly established, and ditching is resorted to for the purpose of relieving the wet and soggy condition of the soil. The land is usually wet until late in the spring, and cultivation is often difficult.

A very small percentage of the type is under cultivation, comprising only those areas that are large enough to justify the necessary outlay for ditching. Corn and sugar cane are the principal crops grown on the type. Yields range from fair to good, varying with the seasonal rainfall.

#### KALMIA SAND.

The Kalmia sand consists of a gray, loose sand underlain at 6 to 8 inches by a pale-yellow sand that extends to a depth of 36 inches or more. In the lower part of the 3-foot section the material is often quite loamy, though generally it is loose and incoherent when dry. The more poorly drained areas show a light-gray color throughout the 3-foot profile. The soil is easily handled in cultivation with light farm equipment.

The Kalmia sand is not an extensive type. It is found in relatively small bodies at intervals along streams, principally the Oconee and Ogeechee Rivers and Buffalo Creek, where it occupies level to undulating stream-terrace areas that are largely above overflow. The open character of the soil permits a ready movement of soil water and drainage is quite well established, except over the flat, low-lying areas.

The type is a special-crop soil rather than one suited to general farming. It has practically the same crop adaptations as the Norfolk sand. Cotton and corn are the principal crops, and yields are fair or good in favorable seasons, with the aid of liberal fertilization. Peanuts, sugar cane, cowpeas, beans, potatoes, and various vegetables do well in the better drained areas, where the soil is supplied with large quantities of organic matter and treated liberally with commercial fertilizers. Barnyard manures give good results. The type responds to the same methods of improvement as does the Norfolk sand.

## KALMIA FINE SAND.

Areas mapped in Kalmia sand color but marked with inclusion symbols represent the Kalmia fine sand. This type consists of a gray fine sand, underlain by a yellowish-gray or pale-yellow fine sand that extends to a depth of 36 inches or more. Occasionally the lower part of the 3-foot section is quite loamy.

The Kalmia fine sand occupies level to undulating or gently sloping terrace areas, mainly on the west side of Buffalo Creek. A rather large area occurs near the junction of Keg and Little Keg Creeks. The type lies largely above overflow. Drainage is generally fairly well established, although somewhat deficient over the level, low-lying areas.

The type is cultivated with ease, and under any system of good management it gives large yields. Cotton, corn, cowpeas, potatoes, peanuts, melons, and miscellaneous vegetables are grown, with cotton and corn as the principal crops. Yields average about one-half bale per acre for cotton and about 25 bushels for corn. Commercial fertilizers are used on this type and are of decided benefit. As in the case of all the other sandy types that are uninterruptedly cultivated to cotton and corn, there is a lack of organic matter in the soil of this type. This deficiency can be corrected by applying barnyard manures or plowing under green cover crops, such as cowpeas.

## KALMIA FINE SANDY LOAM.

The Kalmia fine sandy loam consists of a gray, light fine sandy loam, 4 to 6 inches deep, underlain by a yellowish fine sandy loam that extends to a depth of 8 to 12 inches. The subsoil is a yellow, friable fine sandy clay that shows considerable gray mottling below 18 inches. The sand grains vary in size from medium to fine, and while the finer textures always predominate there are areas of the type that show a relatively high percentage of medium-sized grains. This variation is developed rather extensively in the forks of Buffalo Creek and the Oconee River, to the south and east of Deepstep.

The Kalmia fine sandy loam is found on the terraces, or second bottoms, of the Oconee River and Buffalo Creek. The topography ranges from flat to undulating. Drainage is fairly well established, except in the low-lying areas.

A fair percentage of the type is cultivated. Yields range from poor to good, depending on the methods employed in handling the land. Cotton and corn are the chief crops, cotton yielding one-third to three-fourths bale and corn 15 to 35 bushels to the acre. Oats, cowpeas, beans, peanuts, sugar cane, melons, and other vegetables are also grown. All these crops do well on this soil.

The methods of cultivation employed on this type are similar to those that prevail in general throughout the county. The type on the whole is rather easily tilled, and heavy farm equipment is not required. Yields are maintained by the use of commercial fertilizers. Land of this type has an average value of about \$10 an acre.

The surface soil of the Kalmia fine sandy loam is generally deficient in organic matter. The practice of growing cotton and corn continually soon exhausts the organic content, and it is necessary to make heavy applications of barnyard manure or to grow green manuring crops, such as cowpeas, to be plowed under. With increase in the organic-matter content, the productiveness of the soil would be increased by practicing frequent shallow cultivation during the growing season and by rotating crops.

#### KALMIA SANDY LOAM.

The Kalmia sandy loam consists of about 5 inches of a gray sand to loamy sand, underlain by a pale-yellow light sandy loam that extends to a depth of 10 to 15 inches, becoming heavier with increase in depth. The subsoil is a yellow, friable sandy loam, occasionally mottled with gray at the lower depths. Where drainage is poorly established the gray mottling is more pronounced and the surface soil has a darker color in the first few inches.

The type is developed along the larger streams of the county. It occupies flat to undulating areas on the terraces. Drainage is fairly well established, except in the low-lying areas, where artificial drainage is necessary for the successful growing of crops.

A fair percentage of the soil is cultivated. Cotton, corn, cowpeas, peanuts, oats, sugar cane, melons, and vegetables are grown. Cotton yields one-third to three-fourths bale to the acre, with an average yield of about one-half bale, and corn from 12 to 35 bushels, with an average of about 20 bushels. Commercial fertilizers are used. The type is deficient in organic matter. The content of organic matter in the virgin surface soil is soon exhausted when the land is brought into cultivation. This can be increased by the addition of barnyard manures or the plowing under of green manuring crops. Land of the Kalmia sandy loam ranges in value from \$8 to \$20 an acre.

#### CAHABA SANDY LOAM.

Small areas mapped in Kalmia sandy loam color, but marked with inclusion symbols, represent the Cahaba sandy loam. The surface soil of the Cahaba sandy loam consists of a grayish-brown or gray loamy sand or light sandy loam which grades at about 6 to 8 inches into a yellow or reddish-yellow light sandy loam. The subsoil, beginning

at any depth between 10 and 15 inches, is a reddish-yellow or yellowish-brown, friable to rather compact sandy clay, having a depth of 3 feet or more.

This soil is developed in only a few small areas in the southwestern part of the county along the outer margins of the Oconee River terraces. It occurs in close association with the Kalmia sandy loam and fine sandy loam. It occupies level to gently sloping situations and has good natural surface drainage. It is better drained and has more advanced aeration and oxidation than any of the associated Kalmia types.

Practically all of the Cahaba sandy loam is under cultivation to corn and cotton, and the yields are satisfactory, being somewhat higher than upon the Kalmia soils under similar methods of cultivation and fertilization. The Cahaba is a desirable soil and is held in high esteem for general farming purposes.

When the land is plowed deeply, efficiently cultivated, and well supplied with organic matter cotton makes a yield of one-half to 1 bale to the acre, corn 25 to 50 bushels, oats 25 to 50 bushels, and forage crops about 1 ton. The addition of organic matter is essential for best results on this soil. This soil constituent can be best supplied by growing leguminous crops, including cowpeas, velvet beans, crimson clover, and the vetches. Under the best farming practices the soil can be improved to a marked degree.

#### LEAF FINE SANDY LOAM.

The Leaf fine sandy loam characteristically consists of a gray fine sandy loam, 4 to 6 inches deep, grading quickly into a yellowish fine sandy loam that extends to a depth of about 8 to 10 inches. The subsoil is a mottled gray, yellow, and red, compact, heavy, plastic clay. The surface soil varies in depth and color, and to some extent in texture. The higher swells of undulating surfaces usually show a deeper soil and a lighter color than do the low depressions, where the soil has a dark-gray color and an appreciable content of silt. Also, the better drained areas show more red mottling in the subsoil. The subsoil in places is a drab, plastic, tough clay, practically free from mottling.

Included with the Leaf fine sandy loam are small areas and spots of a medium to fine sandy loam which would have been mapped as Leaf sandy loam had it occurred in sufficiently large areas. It differs from the fine sandy loam mainly in its slightly coarser texture. It is encountered along the outer limits of some of the terraces of the Ogeechee River and Buffalo Creek.

The Leaf fine sandy loam is developed in small areas principally on the terraces along the Ogeechee River and Buffalo Creek. It occupies flat or slightly undulating situations. The natural drain-

age is supplemented by open ditches. The subsoil, owing to its plastic and compact structure, does not allow free downward passage of rain water and for this reason the flatter areas are frequently poorly drained.

Perhaps one-half the total extent of this type is under cultivation. Corn, cotton, oats, hay, and a little sugar cane are grown. Under favorable conditions and with the liberal use of fertilizers the yields of these crops compare well with those on the associated types. Corn does better in wet years than cotton, while cotton gives better results in normal or dry years.

This land ranges in price from \$5 to \$15 an acre, depending on its local value for agricultural purposes, and the quantity and quality of the standing timber.

The Leaf fine sandy loam requires artificial drainage in the flatter areas in order to be suitable for farming. The soil is somewhat compact in places and is deficient in organic matter. Deeper plowing, together with the incorporation of vegetable matter, would do much to relieve this unfavorable condition. Plowing under an occasional crop of cowpeas is beneficial in supplying needed organic matter and nitrogen. Lime applied in liberal quantities would in all probability give good results.

*Leaf fine sandy loam, poorly drained phase.*—Except in drainage the poorly drained phase differs little from the typical Leaf fine sandy loam. The soil is a gray to dark-gray fine sandy loam, underlain by a drab or gray, heavy, plastic clay, sometimes mottled with yellow. The phase occupies the outer margin of the terraces directly adjoining the uplands, and has a low, depressed position. Water stands on the surface for a long time after rains, although the type is not subject to stream overflow. A portion of it remains in a swampy condition throughout the greater part of the year. The wetter areas support a growth of cypress, while upon the remainder of the phase are found oak, hickory, and pine. None of the land of this phase is under cultivation.

#### CONGAREE SILTY CLAY LOAM.

The soil of the Congaree silty clay loam consists of a heavy silt loam or silty clay loam of a rich-brown to very slightly reddish brown color, and 8 to 10 inches deep. It grades into a brownish silty clay loam subsoil that gradually becomes mottled with gray and streaked with various shades of iron stains. The subsoil occasionally is of an almost solid brownish-gray color. Minute mica flakes are present throughout the 3-foot section. There are many sloughs and depressions in the type that invariably show a silty clay loam surface soil underlain by brown silty clay mottled with gray. Along the banks of the river the soil material is a brown sandy loam 36 inches

deep; such areas would properly be classed as the Congaree sandy loam, but they are merely marginal strips along the stream too narrow to be shown on the map.

The Congaree silty clay loam occurs along the Oconee and Ogeechee Rivers and Buffalo Creek, where it occupies broad first bottoms locally known as "swamps." Drainage is very poor, and only a small acreage of the soil is under cultivation. The late spring rains and the usual overflow keep the soil in a wet condition until late spring or early summer, and cultivation is almost impossible. Even if crops could be planted early enough to permit maturity before cold weather, there would still be considerable danger of loss of crops from overflow. Drainage canals might relieve the wet condition occasioned by rain and seepage waters, but the frequency of overflows renders any utilization of the land for crops of uncertain success.

The type supports a timber growth chiefly of gum, holly, elm, and ironwood. Some areas are utilized for pasturage for stock. Hogs are pastured generally in the "swamps."

#### MEADOW (OCHLOCKONEE MATERIAL).

The classification of Meadow (Ochlockonee material) represents a soil condition rather than a definite soil type. It includes the poorly drained alluvium of all the smaller streams, where the material is so variable in texture and in other physical characteristics that it is impossible to effect type separations. There is usually a good growth of water-loving plants and grasses, and the surface soil invariably has a dark color, derived from the decay of vegetable matter.

Meadow (Ochlockonee material) occurs as narrow marginal strips in the first bottoms. The land remains in a wet or moist condition for long periods, and under existing conditions is unfit for agricultural use other than pasturage. It would be possible to drain some of the land by open ditches; reclamation might also involve straightening and deepening the main stream channels.

#### SUMMARY.

Washington County is located in the east-central part of Georgia. It has an area of 669 square miles, or 428,160 acres.

The topography ranges from undulating to rolling. The general slope is southward.

The Oconee River in the west, the Ogeechee River in the east, and the headwaters of the Ohoopsee River in the south are the principal drainage systems.

Elevations range from 225 feet above sea level in the southern part of the county to 475 feet in the northern part.

The county was established in 1784. Settlement began in the early part of the eighteenth century. The lands are to a considerable extent owned in large tracts and farmed by tenants.

The population of the county is 28,174, of which 90.6 per cent is rural. Sandersville, the county seat, with a population of 2,681, and Tennille, with 1,622 inhabitants, are the principal towns.

Four railroads operate in the county. Transportation facilities are good. The public highways are largely improved.

The climate of Washington County is marked by long, warm summers and short, mild winters. The mean annual temperature is 64° F. The mean annual precipitation is 47.68 inches. The average length of the growing season is 232 days.

There are 4,039 farms in the county, comprising 80 per cent of the total area. The 1910 census reports 61.5 per cent of the farm land as improved. The average size of the farms is 84.7 acres, each tenancy being considered a farm. Four-fifths of the farms are operated by tenants.

Cotton and corn are the principal crops, with oats, wheat, rye, cowpeas, beans, peanuts, hay, sugar cane, potatoes, and various vegetables grown as supplementary food and forage crops.

Farm equipment is light and generally inadequate for thorough land preparation and efficient cultivation. Commercial fertilizers are used generally.

Farm labor is largely colored and the supply is equal to the demand. The usual wage is \$12 to \$15 a month.

Land values range from \$5 to \$50 an acre, with an average of \$11.60 in 1910, according to the census.

The upland soils are derived from unconsolidated sediments of the Coastal Plain region. They vary from loose sands to rather heavy clay loams, though they are predominantly of a light, sandy character. The Norfolk, Orangeburg, Greenville, Ruston, Tifton, Susquehanna, and Grady series are recognized in the upland division of the county.

The alluvial soils include the Leaf and Kalmia series on the terraces or second bottoms, and the Congaree series and Meadow (Ochlockonee material) in the first bottoms. The alluvial soils are not extensive.

The Norfolk sand occurs extensively in the northern part of the county. A rather small proportion of the type is under cultivation. It is devoted to cotton, corn, peanuts, sugar cane, cowpeas, and vegetables. Yields average only fair. The soil is best suited to special crops. Large quantities of vegetable matter and heavy fertilization are required.

The Norfolk coarse sandy loam is not extensive. It is a light soil, and only low or fair yields of cotton are obtained. Peanuts, sugar cane, and vegetables do moderately well.

The Norfolk sandy loam is one of the most extensive types of the county, and is considered a very desirable soil for light general farming. Cotton and corn are the chief crops.

The Orangeburg sand occurs principally in the southwestern part of the county. It is better adapted to special crops than to general farming, although fair yields of cotton and corn are produced. Heavy fertilization is necessary.

The Orangeburg sandy loam is the principal type of this series. General farming is practiced, with cotton and corn as the chief crops. Cowpeas, wheat, rye, beans, oats, sugar cane, and vegetables do well and probably certain varieties of tobacco could be grown. The type can be made very productive. The rolling phase is essentially similar to the main type, except in topography.

The Greenville sandy loam is well adapted to general farming. It is easily handled in cultivation and can be worked into a state of high productiveness. Cotton and corn are the principal crops grown.

The Greenville clay loam is the heaviest of the upland soils. It is well suited to cotton, corn, and small grain. Alfalfa and clover would apparently do well if carefully seeded.

The Ruston sand has a very limited occurrence and is an unimportant soil type. It has a value similar to that of the Norfolk sand.

The Ruston sandy loam is an extensive type. General farming is practiced and yields are fair to good. The type has a wide adaptation and can be made very productive.

The Tifton sandy loam is a desirable soil for light general farming. It is similar to the Norfolk sandy loam in crop adaptations. Cotton and corn are the chief crops and yields are usually good. Drainage is in general well established.

The Susquehanna sandy loam occurs usually on stream slopes. Little of the type is under cultivation, and it is an unimportant soil.

The Grady sandy loam occurs in sinkholes and depressions, and drainage is poor. Little of the type is cultivated. Some areas are drained by open ditches and devoted to sugar cane or corn.

The Kalmia sand is better suited to special crops than to general farming, although fair to good yields of cotton, corn, sugar cane, cowpeas, and beans are made in favorable seasons. The type is similar in its crop adaptations to the Norfolk sand.

The Kalmia fine sand is an inextensive soil of high productiveness, devoted to general farming.

The Kalmia sandy loam and fine sandy loam are terrace soils, of level to undulating surface, and are fairly well drained except in the flat and low-lying areas. Cotton and corn are the principal crops.

The Cahaba sandy loam is a desirable soil, used for corn and cotton. It is of small extent.

The Leaf fine sandy loam occurs on level to undulating stream terraces. The flat or depressed areas have poor drainage. About half the type is cultivated. In favorable seasons it gives fair to good yields of cotton and corn. Native grasses do well and the type is utilized to a considerable extent as pasture land.

The Congaree silty clay loam is developed as first-bottom land along the larger streams of the county. It is poorly drained, and little of the land is under cultivation.

Meadow (Ochlockonee material) occurs along the smaller streams. It is entirely alluvial and represents an intermingling of soil material impossible to separate into types. Drainage is poor and little of the land is cultivated.





[PUBLIC RESOLUTION—No. 9.]

**JOINT RESOLUTION** Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



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