

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.

SOIL SURVEY OF LOWNDES COUNTY
GEORGIA.

BY

DAVID D. LONG, OF THE GEORGIA STATE COLLEGE OF AGRICULTURE,
IN CHARGE, AND N. M. KIRK, OF THE U. S
DEPARTMENT OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1917.]



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., September 9, 1919.

SIR: I have the honor to transmit herewith the manuscript report and map covering the soil survey of Lowndes County, Ga., and to recommend that they be published as advance sheets of Field Operations of the Bureau of Soils for 1917, as authorized by law. This work was carried on in cooperation with the Georgia State College of Agriculture.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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SOIL SURVEY OF LOWNDES COUNTY, GA.

By DAVID D. LONG, of the Georgia State College of Agriculture, In Charge, and N. M. KIRK, of the U. S. Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Lowndes County is situated in the extreme southern part of the State of Georgia, about midway between the eastern and western State boundaries. It is about 110 miles northwest of Jacksonville, Fla., and 150 miles south of Macon, Ga. The county is bounded on the south by the Florida State line. It is separated from Clinch County on the east by the Alapaha River, from Echols County on the east for about 5 miles by Grand Bay Creek, and from Brooks County on the west by the Little and Withlacoochee Rivers. The county is very irregular in outline. Its maximum length from north to south is 27 miles and its greatest width from east to west, 26 miles. Its area is 520 square miles, or 332,800 acres.¹

Lowndes County lies within the Coastal Plain, which extends from New Jersey southward in a broad belt along the Atlantic seaboard and the Gulf coast. It occurs within the smoothest part of the Coastal Plain. The surface configuration is not so broken or rolling as in sections near the Piedmont, nor so low and wet as some of the sections nearer the coast. The county includes sections of undulating to gently rolling upland; broad, flat regions known as "flatwoods"; an undulating to strongly rolling section characterized by lakes and ponds and known as the "lime sink" region; and large swamp areas and alluvial belts. The boundaries between these topographic divisions are generally clearly defined, but in some places there is a gradual merging of one into another.

The upland is characteristic of the general region known as Wiregrass Georgia. It is composed of broad, undulating to gently rolling



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

¹ Several land lots belonging to Lowndes County are not shown on the map, as they are completely isolated from the general territory of the county and are totally surrounded by Berrien County.

ridges with long gentle slopes to the stream courses. Locally, a few billowy to choppy areas are encountered. These occur mainly along the slopes to the streams in the northern part of the county. The streams through the uplands have narrow, wet, or swampy areas along their courses and in a few places expand into broad, swamplike areas. The upland region lies in the northern and western parts of the county and adjoins the flatwoods section. The boundary between the two begins in the northeastern part of the county and passes near Good Hope School, southwestward near Knight Academy, then southward to the Atlantic Coast Line Railroad and Knights Creek, along this stream to Mud Creek, thence westward a short distance and south to Dees. From this point it extends southeastward, passing approximately through Dasher, Corinth Church, and Strickland Church, and then southward to the Florida line, roughly following Enoch Creek.

In the flatwoods region there is little topographic relief, with no distinct ridges or other elevations. The section as a whole consists of a broad, flat, featureless plain with numerous small, circular cypress ponds. The region has but few stream courses, and the low seepage areas that carry most of the water to the streams lie but a few feet below the surrounding land. There are practically no breaks or slopes in this region, but a very gradual gradation from the well drained to the poorly drained sections.

In addition to this general area of flatwoods, there is a large similar area in the north-central part of the county between Little and Withlacoochee Rivers beginning south of Mineola and extending northward along Withlacoochee River to Twin Creek on the west side, with a small development on the east side of the river in the vicinity of Cat Creek. This area of flatwoods is a broad marine terrace of the same age as that in the southern part of the county.

The lime sink region occupies about 40 square miles in the southern part of the county, extending southwestward from the vicinity of Lake Park to the Florida line. It includes many clear-water ponds and lakes, varying in size from 1 acre to about 800 acres, which is the approximate size of Ocean Pond, the largest of the group. The lakes consist of open, clear water and are locally referred to as "mirror lakes." The water in these lakes rises and fall, according to the season, and at times is low enough to expose a heavy, coarse growth of grass, this being especially noticeable in Big Grassy Pond. The source of the water is chiefly subterranean. The topography of this section varies in general from level to gently rolling, and around the edges of some of the lakes it is distinctly hilly and broken. The uneven topography is due more to the solution of the underlying limestone formation with a consequent sinking of the surface than to erosion. There are few surface streams,

as the drainage is chiefly through underground channels. Small, steep-sided, circular sink holes are characteristic of this region.

The broad alluvial belts found along all the rivers are flat and level, with a number of old sloughs and depressions across the surface, and are subject to overflow. Large areas of low, swampy land with smaller similar areas occur within the county. These are locally called "bays" and consist of flat upland areas that largely remain inundated because of imperfect drainage conditions. They are covered by a dense growth of water-loving plants, chiefly bay, magnolia, and cypress. The growth in some of the smaller areas consists entirely of cypress. The largest of these swamp areas are Grand Bay, in the northeastern part of the county, and Mud Swamp, in the central part, southwest of Valdosta.

The entire county is less than 300 feet above sea level. The northern part is distinctly higher than the flatwoods section to the south. Hahira has an elevation of 230 feet and Valdosta an elevation of 215 feet. From Valdosta there is a decline to the east, south, and west. Naylor is 192 feet, Lake Park 160 feet, and Ousley 148 feet above sea level.

Lowndes County lies in the drainage basin of the Suwannee River, of which the Withlacoochee and Alapaha are tributaries. The former flows through the north-central part and along the southwestern boundary of the county, and the latter along a part of the eastern boundary. The northwestern part of the county is drained by Little River, its chief tributary in this county being Franks Creek. The north-central part is drained by the Withlacoochee River and its main tributaries, Cat and Cherry Creeks. Grand Bay Creek receives a large part of the drainage of the northeastern and eastern sections through Knights and Otter Creeks. The Alapaha River with its short tributaries drains a small area along the eastern edge of the county. Mud Creek is the chief drainage way for the south-central section, while Bevel and Clyatt Mill Creeks are important streams in the southern part of the county. With the exception of the rivers, all the streams have their sources in bays. Their waters are dark colored with organic matter accumulated from their sources, and the creeks and branches flow through moderately wide areas of swamp where the water spreads out through the trees until there is little semblance of a definite stream channel. The rivers are generally swift flowing; the creeks and branches are more or less sluggish.

Lowndes County was organized in 1825, but since that date parts of the original territory have been taken in the formation of Berrien, Clinch, Colquitt, and Thomas Counties. The first settlements were made about the time of the Revolutionary War, largely in the southern part of the county. The early settlers came from the coast

country, and the later population mainly from northern Georgia and near-by counties.

In the 1910 census the total population of the county is given as 24,436, of which about 69 per cent is reported as rural. The majority of the rural population is found in the northern and western sections. Valdosta is the county seat, with a population in 1910 of 7,656. This is a railroad center and main business point for the county, and the largest inland Sea Island cotton market of the South. Rural towns and important trading points for their respective sections are Hahira, with a population of 650; Naylor, with 538; Lake Park, with 285; and Ousley, with 157. Milltown, Berrien County, with a population of 1,247, lies just across the county line, and is an important trading point for the northeastern section of Lowndes County.

The railroad facilities of Lowndes County are fully adequate for its needs. Railroad lines radiate from Valdosta in eight directions. Naylor and Ousley are on the Atlantic Coast Line Railway between Savannah and Montgomery, which passes through the county from northeast to southwest. The Georgia Southern & Florida Railway from Macon extends through Hahira and to Valdosta, from which point one branch line extends to Palatka, Fla., and another to Jacksonville. Lake Park is on the former branch and Blanton on the latter. The Georgia & Florida line between Augusta and Madison, Fla., affords transportation facilities for the southwestern and north-central sections of the county. Clyattville, Bemiss, and Barretts are on this line. The Valdosta, Moultrie & Western Railroad connects Valdosta and Moultrie. The Milltown Air Line Railway extends from Naylor to Milltown.

The public roads of the county are being rebuilt in accordance with the modern standards. There are now about 100 miles of improved highways, but most of the public roads are heavy from deep sand. Rural telephone lines reach all parts of the county.

CLIMATE.

Lowndes County lies within a climatic belt characterized by long, hot summers and short winters. There is no Weather Bureau station within the county, but the records of the station at Quitman, Brooks County, are representative of climatic conditions in Lowndes County. According to these records the average temperature for the summer months is about 81° F., while the maximum temperature is reported as 108°. The winters are open and mild. The average temperature for the months of December, January, and February is about 52° F. For both the spring and the fall months the temperature averages

about 68°. Cold periods of 2 to 3 days duration occur in the winter, especially after rains, but there are comparatively few days in which outdoor work must be suspended on account of the cold. Plowing and preparation for spring planting continue from the first of the year. Some vegetables are grown throughout the winter. Orange trees were killed in 1917 for the first time in 20 years.

The rainfall is abundant, and is well distributed. The greater part occurs in the summer months. The rainfall is lightest in the fall, at the time of harvesting the main crops. In the summer thunderstorms are of frequent occurrence.

The average date of the last killing frost in the spring is March 14, and of the first in the fall, November 11, which gives a growing season of 8 months. The date of the latest frost in the spring recorded at the Quitman station is April 16, and of the earliest in the fall October 21. Cotton, corn, and peanuts are planted from March 10 to April 15. Oats are seeded in the fall.

Normal monthly, seasonal, and annual temperature and precipitation at Quitman, Brooks County.

[Elevation, 173 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1899).	Total amount for the wettest year (1912).
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	52.2	84	12	4.47	2.22	2.15
January.....	51.3	87	13	3.56	5.29	6.07
February.....	53.4	83	2	4.43	5.04	5.83
Winter.....	52.3	87	2	12.46	12.55	14.05
March.....	61.4	92	21	3.98	4.00	6.02
April.....	67.2	94	32	3.13	1.10	11.90
May.....	74.6	103	41	3.23	1.19	5.01
Spring.....	67.7	103	21	10.34	6.29	22.93
June.....	79.9	108	51	6.44	1.99	9.62
July.....	81.5	105	60	7.86	7.21	2.10
August.....	80.9	108	59	6.41	6.73	6.36
Summer.....	80.8	108	51	20.71	15.93	18.08
September.....	77.6	101	42	4.43	.79	8.56
October.....	67.8	96	30	2.08	2.06	-2.70
November.....	59.4	92	23	1.99	.49	2.52
Fall.....	68.3	101	23	8.50	3.34	13.78
Year.....	67.3	108	2	52.01	38.11	68.84

AGRICULTURE.

Agriculture in Lowndes County has developed along the same lines as in the other inland counties of this part of the State. The early settlers raised cattle and produced subsistence crops. Live stock and live-stock products were marketed in Savannah. The county was covered with a heavy growth of longleaf pine, and an important turpentine industry was developed, followed by extensive lumbering operations. These industries are now in their last stages, and the removal of the timber has left large areas open for further agricultural development. The country is practically new in agriculture, and most of the fields are filled with stumps and deadened timber. Sea Island cotton was one of the first crops grown commercially, and it has steadily increased in acreage. Corn and oats have been grown and hogs and cattle raised to an important extent, but, excepting hogs, the total production has never been sufficient to meet the local demand.

At present the agriculture is in a somewhat unsettled condition. Up to the present time cotton production has been of first importance and the basis of the agriculture of the county. Cotton is the chief money crop. But the county has become infested with the boll weevil, and the question whether cotton production will continue as the chief agricultural industry will depend upon the success of the farmers in combating this pest. Crop diversification is being advocated, and the soils of two-thirds of the county are well suited to the establishment of a well-balanced system of farming as well as the growing of special crops.

Practically 90 per cent of the cotton produced has consisted of sea-island varieties and the remaining 10 per cent of upland short staple. According to the 1910 census there were 27,777 acres, or 26 per cent of the improved farm land in the county, in cotton in 1909, with a total production of 10,087 bales. The yields¹ range from one-fifth bale to as much as 1 bale per acre, and show a relation to the soil type. From 1909 to 1916 the acreage materially increased, but the present year (1917) there was a considerable decrease in the area planted, on account of the presence of the boll weevil.² The leading varieties of Sea Island cotton are the Gordon, Bunch, Little White Bunch, and Canova No. 50. Of the upland cotton the Cleveland, Russell, and King are the most important varieties.

¹ Yields of cotton given in this report are based on conditions existing before the advent of the boll weevil.

² Since 1917, the year in which this report was written, an Upland long-staple variety called Meade, with lint of Sea Island quality, has been bred and introduced by the Bureau of Plant Industry to replace Sea Island cotton. The Meade variety is as early and as productive as short-staple varieties, and under weevil conditions yields two or three times as much fiber as Sea Island cotton. Numerous plantings of Meade cotton have been made in south Georgia, including Lowndes County and the neighboring counties of Worth and Thomas.

Corn is the crop of second importance, although the acreage exceeds that of cotton. According to the 1910 census, 28,467 acres, or 28 per cent of the improved farm land, were devoted to this crop, with a total production of 354,933 bushels. Since 1909, the census year, the acreage has gradually increased, and the present year it was far greater than any previous planting. A few farmers using efficient methods of soil management and applying manures and liberal amounts of commercial fertilizer produce from 40 to 60 bushels per acre on such soils as the Norfolk, Tifton, and Ruston fine sandy loams. In Boys' Corn Club contests yields as high as 100 bushels per acre have been numerous, and a maximum yield of 136 bushels is reported. This crop is utilized locally and it is becoming more important with the development of the live-stock industry. The leading varieties grown are the Little Cob, Golden Dent, Florida, Flint, and Shoe Peg, and of the prolific varieties the most popular are the Whatley, Hastings, Marlborough, and Batts.

Peanuts are the third crop in importance in the county. Prior to 1917 they were grown chiefly for hog feed and to a small extent for seed, but at the present time a large acreage is under cultivation for the market, especially for the making of oil. It is the purpose to use the oil-cake to feed hogs, and the vines for hay. Some of the peanut crop, especially that planted in the corn, is left in the fields to be gathered by hogs. The 1910 census gives the area in peanuts in 1909 as 7,717 acres, and the production as 89,251 bushels. It is estimated that the acreage in 1917 is three times as great. Yields of 20 to 100 bushels per acre are obtained. The old vine peanut is used for feeding hogs, while the Silver Skin Spanish variety is grown for market.

Velvet beans are important in the county, being grown for oil, seed, and as feed for hogs and cows. The crop has been used more extensively for feed since the establishing of the feed mills at Valdosta and Hahira; it formerly was pastured, and only sufficient seed gathered for replanting. From 10 to 20 bushels of seed per acre is obtained. The crop is valued by some of the farmers as a green manure crop.

Oats are reported in 1910 on 4,282 acres with a total production of 54,543 bushels. Observations show that the acreage has gradually increased since that time, and it is estimated that more than twice the acreage was sown in 1917. The crop is used for feeding stock. It is sometimes used for pasturage and in a few instances is cut green for hay. The Appller, Texas Rustproof, Red Rustproof, Fulghum, and Burt are the chief varieties.

Cowpeas are widely grown in the county. When planted after oats they are used for forage and secondarily as a soil renovator. Where grown in the corn field they are pastured with hogs.

In addition to the above crops, which form the basis of the general agricultural system, there are several secondary crops of economic importance. Sugar cane is grown in small patches on practically all the farms, for the making of sirup for home use, and a few farmers produce sirup for the Valdosta market. Sweet potatoes are grown for home use and outside markets. While utilized chiefly for food, in a few cases the crop is grown as feed for hogs. It is estimated that 1,500 acres are planted to this crop at the present time. The yields vary from 50 to 300 bushels per acre. Cantaloupes are grown to a small extent for shipment, but this industry has decreased during the last few years. Vegetables are produced on all the farms. Pecans are gathered for local use.

Lowndes County is becoming important in the production of hogs. In the 1910 census the total number sold or slaughtered is reported as 17,448, but this number has been materially increased. The local demand for pork is fully supplied, and this year (1917) several carloads of hogs were sold. The hogs over a large part of the county graze in the woods and swamps and are only fed to a small extent. A large number of the more progressive farmers are making a business of pork production, growing crops primarily for hog feed. There are a few registered herds in the county and many pure-bred sires. The registered hogs are of the Duroc-Jersey, Poland-China, Berkshire, Hampshire, Tamworth, and Essex breeds.

Beef cattle are being improved by sires of the Hereford, Angus, and Shorthorn breeds. Several local dairies, which barely supply the local demand, are located near Valdosta. The Jersey breed of cattle predominates in the dairy herds.

The productive value of the different soil types is clearly recognized. The Norfolk, Tifton, and Ruston fine sandy loams are generally considered the most productive for all crops, while the Norfolk loamy sand is valued for trucking, and the Norfolk loamy fine sand and the deep areas of the Norfolk fine sandy loam especially for cantaloupes. The best-flavored and brightest-colored sirup is obtained from cane grown on the deep sandy lands of the southern part of the county. Cotton produces a whiter lint on the Blanton and Norfolk sands and fine sands than on the Norfolk, Tifton, and Ruston fine sandy loams.

Mules are used almost exclusively as work stock. The equipment on the farms is variable. Some farms have only a one-horse plow, sweeps, and a wagon and use the cradle for harvesting grain, while others are fully equipped with two-horse plows or riding plows, disk, spike-tooth and section harrows, riding and diverse cultivators, and weeders, binders, mowers, and rakes. There are a few corn harvesters in the county. All the cultivated land is well fenced. Good houses and small barns and sheds are the general rule.

The land is prepared for crops with varying degrees of thoroughness. For cotton about 10 per cent of the farmers plow the land in the fall. About 30 per cent break the land broadcast with two-horse plows and harrows; the remainder lay off the rows and turn up a bed on which the cotton is planted. Corn and peanut land is prepared in about the same manner, but the corn and peanuts are planted on a level surface or sometimes in a furrow. About 40 per cent of the land sown to oats is well prepared, being thoroughly plowed and harrowed. In such case the seed is drilled in. In other cases the seed is sown broadcast and plowed under. Cotton receives an average of six cultivations, corn three or four, and peanuts three to five.

No definite rotation is generally followed. A few farmers rotate corn and peanuts, cotton, and oats, followed the same year by cow-peas, which gives a five-crop system in a three-year-rotation. Other farmers change the crop as often as possible. Cotton has been grown too extensively for a definite well-balanced rotation.

According to the census, \$131,251 was expended for fertilizers in 1909. The farms reporting numbered 1,757, so that the average expenditure per farm was \$56.52. Ordinarily, the greater part of the fertilizer consists of ready-mixed goods, varying in composition from 8-2-2¹ to 10-5-5. These grades are used for corn, cotton, and oats. The application for cotton is 250 to 300 pounds per acre. Where the higher grades are used, larger quantities are applied, ranging from 500 to 800 pounds per acre, two applications being made. Corn and oats receive smaller quantities than cotton. An application of 100 pounds of nitrate of soda is made on oats in the early spring. Peanuts receive from 400 to 1,000 pounds of lime and 200 to 500 pounds of acid phosphate per acre.

Negro labor is plentiful. Day laborers receive from 75 cents to \$1 per day for general farm work. Where hired for longer periods, \$20 a month is the usual wage. Cotton picking is paid for at standard rates. The 1910 census reports a total expenditure of \$124,463 for labor on 1,004 farms.

The census of 1910 reports a total of 2,322 farms in the county, about 92 per cent of the county being in farm land. The average size of farms is given as 122.4 acres, of which 35.4 per cent, or an average of 43.3 acres per farm, is reported improved. Individual holdings range as high as 14,000 acres.

The 1910 census reports 52.9 per cent of the farms operated by tenants and practically all the remainder by the owners. The prevailing system of renting is the share-crop system, under which the landlord and tenant share all products equally, the tenant furnishing

¹ Per cent of nitrogen, phosphoric acid, and potash, respectively.

the labor and one-half the fertilizer and the landlord the implements, stock, and one-half the fertilizer. Some farms are rented for cash, the ordinary rent being about \$4 per acre. The tenant farmers are both white and colored, the proportion being about two colored to one white.

Land values depend upon the soil type, improvements, and location. In the flatwoods the average price is \$5 or \$6 per acre, in the lime-sink region \$10 to \$20, in the southwestern part of the county \$20 to \$30, and in the northern part from \$40 to \$50. The 1910 census gives the average assessed value of farm land as \$12.22 per acre.

SOILS.

In Lowndes County 18 soil types are mapped, in addition to one miscellaneous class of material mapped as Swamp. These types are classed with nine soil series. The county includes both soils that are characteristic of the region to the north and west and soils typical of the flat country to the south and east. All the types except the alluvial strips are derived from the underlying unconsolidated sands and clays of the Coastal Plain section of the State. Geologically the parent material is classed with two formations, the Altamaha and Alum Bluff.¹ The Altamaha is described as consisting of deposits of terrestrial origin, produced as flood plain and delta accumulations which probably merged into littoral deposits. The Alum Bluff formation consists of various claystones, argillaceous sandstones, fuller's earth, etc., which lie concealed, except along the rivers, and do not contribute materially to the soils in the region under which they lie. Limestones undoubtedly underlie part of the southern half of the county and have influenced the formation of the large lakes and ponds of that section. They may possibly affect the Ruston and Norfolk loamy sand types, as small particles of chert are sometimes found in these soils, and they also contribute fine-earth material to the soil in a few small low areas occurring in these types. Exposures of limestone, noted as the Chattahoochee formation,² occur at several points along the Withlacoochee River, notably at Stony Lake, near Olympia, and at Horn Bridge. It is said that phosphatic sands immediately overlie the limestones and that these may prove to be of economic importance.

The distribution of the various soils is in close accordance with the four general physiographic regions of the county. In the region of gently rolling uplands the fine sandy loam types of the Norfolk, Tifton, and Ruston series are found, together with the Norfolk sand, fine sand, and loamy fine sand. The Leon and Blanton soils are

¹ Veatch. Geology of the Coastal Plain of Georgia.

² *Ibid.*

found exclusively in the flatwoods section. The Plummer and Portsmouth soils are most common in this region, although they are also found in the upland section. In the lime sink region there occur the Norfolk and Ruston loamy sand types, and in the alluvial belts the Kalmia and Thompson soils.

The soils of the Norfolk series are characterized by light yellowish gray to brownish-gray surface soils and yellow, friable subsoils. All the types are well drained, occupying undulating and gently rolling positions. This series is the most extensive in the county, where it is represented by the sand, loamy sand, fine sand, loamy fine sand, and fine sandy loam types.

The Ruston soils have brownish-gray to grayish-brown surface soils, underlain by reddish-yellow to yellowish-red subsoils. They are distinguished from the Norfolk soils by the reddish color of the subsoil, and comprise what is locally called the "red lands." Two types of this series are mapped, the loamy sand and fine sandy loam.

The Tifton series is represented in the county by one type, the fine sandy loam. The surface soil typically is grayish brown and the subsoil bright yellow. This series is distinguished from the Norfolk by the presence of small, rounded iron concretions or ferruginous pebbles.

The Leon series has light-gray soils and white subsoils, sometimes stained with brown. The series is distinguished by a brown or coffee-brown hardpan layer lying from 12 to 15 inches below the surface. The sand and fine sand types are mapped.

The surface soils of the Plummer series have a bluish or drabish gray and the subsoils a bluish or mottled drab, white, and gray color. Two types are mapped, the Plummer sand and fine sand.

The Portsmouth series is represented by a single type, the fine sand. It is found in the small flatwoods ponds and is characterized by a black soil and gray to whitish subsoil.

The types included in the Blanton series have a light gray "salt and pepper" soil and a very light gray to white subsoil. Two types of the series, the sand and fine sand, are mapped.

The Kalmia series includes types similar to the Norfolk in color, the surface soil being grayish and the subsoil yellowish. It differs from the Norfolk soils in position, however, occupying old alluvial terraces. The Kalmia fine sand is mapped in this county.

The types included in the Thompson series are characterized by gray to yellowish-gray soils and yellow friable subsoils which become plastic and mottled with red and gray in the lower part. These are first bottom alluvial soils subject to overflow. The fine sand and fine sandy loam types are encountered in Lowndes County.

Swamp is first bottom alluvial material of variable color and texture characteristics. It is poorly drained, and includes mucky areas consisting largely of decomposed vegetable matter.

The following table gives the name and actual and relative extent of each soil type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk fine sandy loam.....	62,464	18.8	Norfolk loamy sand.....	7,104	2.7
Swamp.....	25,216	13.2	Level phase.....	1,920	
Mucky phase.....	18,688		Leon sand.....	7,424	2.2
Leon fine sand.....	38,272	11.5	Norfolk loamy fine sand.....	6,144	1.8
Plummer fine sand.....	29,312	8.8	Ruston fine sandy loam.....	5,376	1.6
Norfolk sand.....	23,808	7.2	Plummer sand.....	3,904	1.2
Blanton fine sand.....	22,336	6.7	Ruston loamy sand.....	3,456	1.0
Tifton fine sandy loam.....	21,504	6.5	Thompson fine sand.....	3,008	0.9
Norfolk fine sand.....	19,392	5.8	Kalmia fine sand.....	576	0.2
Blanton sand.....	11,968	3.6			
Thompson fine sandy loam...	11,904	3.6	Total.....	332,800
Portsmouth fine sand.....	9,024	2.7			

NORFOLK SAND.

In its natural state the Norfolk sand consists of a grayish-yellow to yellowish-gray loose sand, underlain at an average depth of about 3 inches by a decidedly yellowish, loose, incoherent sand which extends to a depth of 3 feet or more. Where cultivated the immediate surface is very light gray to slightly yellowish gray to a depth of about 7 inches, where the typical subsoil is encountered. In some places the subsoil becomes pale yellow as the depth increases. This is especially noticeable as the type approaches the Blanton sand.

Along both sides of Otter Creek near Grand Bay Creek there are several areas in which the texture is a coarse sand or almost a very coarse sand. As the total extent of these areas is small, they are not shown as a distinct soil on the map. In the northwestern part of the county there are small, scattered bodies of Norfolk sandy loam, which on account of their small extent have been combined with the sand type. The soil differs from the Norfolk sand mainly in that the material below a depth of 20 to 30 inches is a friable sandy clay. These areas have a higher agricultural value and are easier to improve than the sand, and the effects of good treatment are more lasting.

Large areas of Norfolk sand occur in both the flatwoods and upland sections of the county. In the southwestern part one large area is located along the National Highway between Redland Church and Rocky Ford Bridge, and another along the west side of Lanes Mill Creek. A large continuous area extends from a point $2\frac{1}{2}$ miles east of Clyattville to the Florida line. It also is typically developed in areas along the Echols County line from Blanton to County Line School and in several areas near Strickland Church. In the north-

western part of the county it is mapped in large areas along Franks Creek.

The Norfolk sand has a gently undulating to undulating topography. In the flatwoods section it occurs as slight rises and on slopes, and in the upland region on low ridges. Drainage is well established. In some places in the flatwoods the water table rises to within 30 inches of the surface.

The type originally supported an open forest of longleaf pine and a few oaks, but the pine timber has been removed, leaving a scattered growth of scrub oak and some blackjack oak. Turtle oak and scrub live oak are also common. The soil is naturally of low productiveness, and in the upland region, where it is associated with the Norfolk, Tifton, and Ruston fine sandy loams, it is known as "poor sandy land." In the flatwoods section, however, where it is associated with the Blanton and Leon fine sands, it is held in higher esteem. It is practically all cleared in the flatwoods region, while in the uplands only a small acreage is under cultivation.

Sea Island cotton and corn are the chief crops. The average yield of cotton, where fertilized with about 200 pounds of an 8-2-2 or a 9-2-3 mixture, is from one-fifth to two-fifths bale per acre. Corn yields are low, from 8 to 10 bushels per acre. Velvet beans and peanuts give fair yields.

The price of this land ranges from \$5 to \$20 an acre, depending mainly upon the improvements.

This soil is adapted to about the same crops and can be improved by the same methods as the Norfolk fine sand.

NORFOLK LOAMY SAND.

The soil of the Norfolk loamy sand consists of a yellowish-gray to brownish-gray, friable loamy sand, with a depth of 5 to 7 inches. The subsoil is a yellow loamy sand extending to depths of 3 feet or more. In local areas the subsoil contains a smaller proportion of material finer than fine sand and is more like the Norfolk sand subsoil, while in other places it is redder in color, especially on knolls, here approaching in character the Ruston loamy sand.

Three miles southwest of Lake Park small areas of the Gainesville loamy sand are included with this type. These areas lie well below the general level of the surrounding land. The soil is a loamy sand ranging in color from gray to brown and rests on a brownish to reddish-yellow subsoil of similar texture. In a few places a mottled brown, yellow, and gray heavy, plastic clay is found in the lower part of the 3-foot soil section.

The Norfolk loamy sand is mapped mainly in the southeastern part of the county in an area about 2 miles wide extending from south of

Ocean Pond to the Florida line, and along Jumping Gully. Small areas occur 2 miles south of Clyattville, and a large area one-half mile east of Redland Church.

This type is found in undulating areas and on long, gentle slopes. It lies well above the lakes and ponds. The topography is less rolling than that of the Ruston loamy sand and more undulating than that of the level phase. The drainage is good and is chiefly through subterranean channels, only two streams flowing through or near the areas of this type. The run-off reaches some of the numerous lakes.

The Norfolk loamy sand is derived from unconsolidated marine deposits of the Coastal Plain, but possibly may be influenced in some places by material from the underlying limestone, fragments of which are present in a few places.

Practically 90 per cent of this type is cleared and under cultivation. It has been recognized as a productive soil since the early settlement of the region, especially in comparison with the predominant soils of the surrounding flatwoods. Uncleared areas support a thick growth of oak and some hickory and pine. The trees are much larger than those found on the Norfolk sand and fine sand.

This type is used for all the farm crops of the county and to a small extent for trucking. Sea Island cotton ordinarily yields from one-fifth to one-half bale per acre, although yields of 1 bale per acre are common where the land is well cultivated. Corn yields from 5 to 15 bushels, and oats from 10 to 20 bushels per acre. Velvet beans and peanuts give fair returns.

Fertilizers are used on nearly all the crops, but especially on cotton. The quantities and grades vary, even on individual farms, but acreage applications of 200 pounds to 400 pounds of an 8-2-2 to 9-2-3 mixture commonly are made.

The average price of land of this type is \$10 to \$20 an acre, depending upon improvements and location.

This soil is considered one of the best in the county for the production of truck crops either for early market or for storage.

Norfolk loamy sand, level phase.—The Norfolk loamy sand, level phase, prevailing consists of a dark-brown to dark grayish-brown loamy sand 10 to 20 inches deep, underlain by a brownish-yellow loamy sand which becomes yellower as depth increases. In a few places the characteristic yellow color of the typical Norfolk loamy sand is encountered. Both the soil and subsoil have a wide range in texture, considerable coarse sand, fine sand, and silty material being present.

This soil is found in one continuous body, beginning $1\frac{1}{2}$ miles north of Lake Park and extending around Long Pond and Carter Pond southward around Ocean Pond. It occupies a smooth, level area with few rises or undulations. The drainage is adequate and

is chiefly through subterranean channels, with some run-off into surrounding lakes. The level topography and the nature of the soil particles indicate that the material giving this soil is a lacustrine deposit.

This phase is all cleared and under cultivation. Crop yields are slightly higher than on the typical Norfolk loamy sand. The land retains its natural productiveness even after constant cultivation for over 60 years. It is especially adapted to the production of vegetables, tomatoes being successfully grown.

NORFOLK FINE SAND.

The soil of the Norfolk fine sand consists of a slightly yellowish-gray, mellow, fine sand, with an average depth of about 7 inches. The subsoil is a mellow, loose, fine sand of pale to bright yellow color. In places the subsoil is somewhat loamy. Where the type grades into the Blanton fine sand, the color is a very pale yellow.

This type is most extensively developed in the southern half of the county. It occurs in various-sized areas along the Withlacoochee River from a point north of Ousley to the Florida line, and is typically developed in important areas in the vicinity of Knight Bridge and near Olympia. It forms many scattered areas in the southeastern part of the county, the most important lying around Corinth Church and Dasher. It is also found along Mud Creek southeast of Valdosta. Many small areas are scattered through other parts of the county.

The Norfolk fine sand is level to gently undulating. It occupies areas lying slightly above the surrounding soils in the flatwoods region, and in the vicinity of the numerous ponds and lakes, as well as along the rivers and streams, it occurs on smooth ridges with long, gentle slopes. The surface relief and the open, loose structure of the material insure good drainage.

About 75 per cent of the area of this soil is cleared and under cultivation. The type originally supported a scattered growth of long-leaf pine, most of which has been removed. It is covered at present with a heavy, thick growth of oak and some hickory. The oaks are more numerous and larger than those on the Norfolk sand.

All the staple crops of the county are produced. Yields, as a result of differences in cultural methods, have a wide range. Sea Island cotton yields from one-fifth to one-half bale per acre, the average being about one-third bale. The common fertilizer mixture has the formula, 9-2-2, and is applied at the rate of about 200 pounds per acre. Corn yields from 8 to 20 bushels and cowpeas produce an average of one-half ton of hay per acre. Peanuts and velvet beans do well, the former yield 35 to 50 bushels and the latter about 15 bushels of seed per acre. Peanuts, however, usually are hogged

down. Sugar cane grown on this soil produces a light-colored sirup of good flavor.

The price of the Norfolk fine sand ranges from \$5 to \$20 an acre, depending upon location and improvements. A number of well-established farms are found on this soil.

The Norfolk fine sand is not a naturally strong type, but it is capable of producing fair returns if carefully handled. The rotation of crops and the incorporation of vegetable matter or stable manure is essential for increased yields. Owing to its loose structure the type is not retentive of moisture, and in dry seasons crops suffer from drought. The soil is better suited to the production of early vegetables than to general farming. The application of fertilizer at different periods in the early growing season will prevent loss by leaching. Lime is beneficial, especially for legumes.

NORFOLK LOAMY FINE SAND.

The Norfolk loamy fine sand consists of a grayish to slightly yellowish gray fine sand, 6 to 8 inches deep, underlain by a pale to bright yellow fine sand, becoming heavier with depth. This passes at about 15 inches into a light-yellow loamy fine sand which continues to about 30 inches, below which the material is a heavy fine sandy loam or light fine sandy clay. This type is intermediate between the Norfolk fine sand and fine sandy loam. In its characteristics it approaches one or the other of these types in many places, and it may include small areas of each.

The type is found in scattered areas chiefly in the southern and eastern sections of the county. It occurs in some cases along the boundary between the upland and flatwoods sections. The largest areas are found in the eastern part of the county in the vicinity of Good Hope Church.

The topography is level to gently undulating. The type occurs on slight elevations or in broad, regularly featured upland areas. There is sufficient relief to give good surface drainage into small ponds scattered through the type, and the underdrainage is thorough. In some of the lower positions the water table in wet seasons rises to levels within 3 feet of the surface.

Practically all the type is cleared of the native growth, which was more like that found on the Norfolk fine sandy loam than that on the Norfolk fine sand, although in small areas it was similar to the latter type.

The type is used for the production of the general farm crops of the county and, in small areas near Valdosta, for trucking. The yields of the various crops are generally good, approaching, and in some cases equaling, those obtained on the Norfolk fine sandy loam.

The price of land of this type ranges from \$5 to \$25 an acre, depending upon its location and improve^{ments}. The type supports a number of well-improved farms.

The Norfolk loamy fine sand is suitable for general farming, but probably better adapted to trucking. The soil is easily prepared and is easily cultivated, and light work stock and implements can be used. To maintain its productiveness the addition of organic matter by turning under cowpeas, velvet beans, or other legumes, is necessary.

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam has a surface soil consisting of yellowish-gray to grayish-brown fine sand to light fine sandy loam about 7 inches deep. The subsoil is a pale-yellow loamy fine sand to about 15 inches where it grades into a fine sandy loam, and passes at 18, to 24 inches into a bright-yellow, heavy, friable fine sandy clay which continues to depths of more than 3 feet.

The type as mapped varies somewhat in the depth at which the clay subsoil is reached. One variation includes a heavy phase in which the surface material is a grayish-brown fine sandy loam. The subsoil begins as a rich-yellow fine sandy loam to fine sandy clay and at 12 to 14 inches passes into the yellow, heavy, friable fine sandy clay. It approaches the Tifton fine sandy loam in color and texture, but contains very few pebbles. Areas of this variation are found north of Valdosta to Hahira for a short distance on both sides of the National Highway, and in the vicinity of Bemiss and Barretts.

In local areas the type grades toward the Norfolk loamy fine sand, the heavy part of the subsoil in some places being 30 inches from the surface. The surface in such places is light yellowish gray. Areas of this description are scattered through the south-central part of the county, and occur a short distance south and southeast of Valdosta. On small knolls and the brows of slopes the subsoil approaches that of the Ruston fine sandy loam. Small areas, all less than five acres in extent, of the Ruston fine sandy loam and Tifton fine sandy loam and the Norfolk loamy fine sand are included with the type.

The Norfolk fine sandy loam is well distributed through the upland region of the county in large, continuous areas. It is the most extensive soil type mapped.

The topography is undulating to very gently rolling, and drainage is well established. The drainage is less thorough in a narrow gradational zone between this type and the areas of the poorly drained Plummer fine sand and Portsmouth fine sand which are scattered through the type. It occupies broad, undulating ridges

which have fair slope to stream courses and many level areas which have just sufficient gradient to cause run-off. In the northern part of the county the ridges are more pronounced, except north and northeast of Hahira, where a number of flat areas occur.

The Norfolk fine sandy loam supports a larger number of farms than any other type in the county. About 85 per cent of the land of this type in the northern part of the county is cleared. In the southwestern part, where there are large holdings of undeveloped land, only about 50 per cent is cleared. The soil originally supported a heavy, thick growth of longleaf pine, but much of this has been removed, and the uncultivated areas consist largely of cut-over land on which there is a scattered second growth of pine. There are a few small areas of hardwood forest.

All the crops common to the county are grown on this type. The yields, which have a wide range, depend largely on methods of fertilization, cultivation, and preparation of the land. Sea Island cotton yields from one-fourth to three-fourths bale, corn 12 to 30 bushels, cowpeas one-third to 1 ton of hay, and peanuts about 30 to 50 bushels per acre. The oat crop is fed in the straw, but the estimated yield of grain is from 15 to 30 bushels per acre. Sweet potatoes and other truck crops give good yields. The type is used in a small way for the production of plants, such as cabbage, tomato, sweet potato, etc., for shipment.

The price of this land ranges from \$20 to \$60 an acre, depending upon location and improvements.

The Norfolk fine sandy loam is a productive soil, well suited to the growing of a wide range of crops. The type is very responsive to the use of fertilizers and to good treatment in general. It is in need of organic matter. The soil is easily tilled. Its subsoil is heavy enough to be retentive of moisture, and crops withstand droughts well. A large part of the farms on this type are well established and well equipped.

RUSTON LOAMY SAND.

The Ruston loamy sand consists of a brownish-gray to grayish-brown loamy sand, underlain at 7 or 8 inches by a bright reddish-yellow loamy sand which continues to a depth of 3 feet or more. Commonly a yellowish-red, heavy, friable loamy sand to light sandy clay is encountered at 30 to 36 inches. This represents the heaviest variation of the type, and occurs on the steeper slopes surrounding lakes and points where the underlying heavier strata outcrop.

This type is confined to the southern part of the county. It occurs in rather large areas along Bevel Creek and in the vicinity of Big Grassy, Brown, and Fly Ponds, and Zeigler Lake.

The presence of small pieces of chert and coarse-grained sandstone would seem to indicate that some of the material has come from the underlying limestone and ferruginous sandstone. The reddish color of the material is due to the state of oxidation which, owing to better drainage, is more advanced than in the case of the surrounding Norfolk loamy sand type, of which small areas are included.

The Ruston loamy sand is found in gently rolling to rolling positions. It occurs chiefly on narrow-crested ridges which slope steeply to the lakes or streams and on the brows of slopes within areas of the Norfolk loamy sand. The type forms the most rolling areas in the county. Both surface drainage and underdrainage are good.

Practically all the Ruston loamy sand is cleared and under cultivation. It originally was hammock land and supported a heavy growth of oak, hickory, dogwood, and other hardwoods, with some longleaf pine. The general crops of the county are grown with cotton as the chief crop. The type is regarded as more productive for corn and peanuts than for cotton. Corn averages about 12 to 15 bushels and cotton about three-fourths bale per acre. Peanuts have not been harvested to any large extent, but the yield is estimated at 30 to 50 bushels per acre. Fertilizers are used on nearly all crops, and especially on cotton, which receives 200 to 400 pounds of low-grade mixtures per acre.

The price of this land varies from \$10 to \$25 an acre, depending mainly upon the improvements.

This type has been farmed under the tenant system, in some cases for 50 years or more, and the organic matter of the soil has largely been depleted. The greatest need of the soil is the restoration of this constituent. The soil is easily tilled and well suited to trucking as well as to general farming.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam has a brown, mellow, fine sandy loam surface soil, which extends to an average depth of about 8 inches. The subsoil usually is a bright yellow to slightly reddish-yellow loamy fine sand to fine sandy loam which becomes heavier with increase in depth and at about 15 inches passes into a heavy, friable fine sandy clay of reddish-yellow to yellowish-red color, the material becoming redder as the depth increases.

In some places the type approaches the Norfolk fine sandy loam. The color of the soil in this case is a more grayish brown and the subsoil is reddish yellow to a depth of about 24 inches, where the typical Ruston subsoil is encountered. Small areas are found in which the surface soil is reddish brown to grayish brown and the subsoil is a red fine sandy clay. Such areas represent the Green-

ville and Orangeburg fine sandy loam types, but can not be shown separately on the map on account of their small extent. Areas of this kind lie along the National Highway about 2 miles north of Valdosta, and about one-half mile south of Cherry Creek Church. Pebbles, identical with those found on the Tifton fine sandy loam, are irregularly distributed over some of the areas of this type, and where plentiful are indicated on the map by gravel symbol. In the northwestern corner of the county there is a small acreage in which the surface material is a fine sandy clay loam, and spots of the same character occur in other places. These can not be mapped satisfactorily on account of their small extent.

The Ruston fine sandy loam is most extensively developed on the east side of the Withlacoochee River near Remerton, at Double Bridges, along the south side of Cherry Creek, at Skipper Bridge, and near Catcreek. In the southern part of the county a large area extends from a point one-half mile south of Clyattville southeastward to the head of Mutton Branch. Smaller areas are scattered through the northern part of the county.

The type has an undulating to gently rolling topography. It occurs chiefly on pronounced slopes and rises in broad areas where the surface features are more or less irregular and uneven. Its topographic position suggests that the reddish color of the subsoil is the result of a high degree of oxidation due to thorough aeration and drainage.

Practically all this type is cleared of the original timber growth, which consisted chiefly of hardwoods, mainly oak, hickory, etc., with some longleaf and shortleaf pine. It is recognized as a strong soil for general farming and supports some of the best farms in the county.

The common crops of the county are grown with yields about like those obtained on the Tifton fine sandy loam, though the Ruston appears to be the stronger soil. It is easily tilled. The subsoil is capable of storing large quantities of moisture for the use of crops. The type has proved well suited to many crops, but it seems especially adapted to general farming and stock raising. It is a good pecan soil.

TIFTON FINE SANDY LOAM.

The surface soil of the Tifton fine sandy loam is a grayish-brown to brownish-gray loamy fine sand to light fine sandy loam which ranges from 6 to 10 inches in depth, averaging about 8 inches. The subsoil is a yellow fine sandy loam which gradually becomes heavier with depth, passing at 12 to 15 inches into a bright or deep-yellow heavy, friable fine sandy clay. This extends to depths of 3 feet, without change, except that some reddish-yellow mottling appears

in the lower part. Quantities of smooth, rounded reddish-brown "pebbles," or ferruginous accretions, are found on the surface and through the soil mass. These pebbles are irregularly distributed over the various areas, in some places being very abundant and in others comparatively few. In some cases there are more and in others less in the soil than in the subsoil. The pebbles average about one-fifth inch in diameter, which is somewhat smaller than in the pebbly lands of counties to the north. Along the northern edge of the county the type is coarser in texture than typical, and the pebbles are more abundant and of larger size. In a few small areas in the south-central part the surface soil is more grayish in color, the upper part of the subsoil is a light fine sandy loam which extends to 18 or 20 inches where it is underlain by the characteristic subsoil, and the pebbles are not so numerous. Within areas of this soil there are a few knolls and brows of hills where the type has a reddish-yellow subsoil and approaches the pebbly variation of the Ruston fine sandy loam. As the content of pebbles decreases the type grades into the Norfolk fine sandy loam, from which it is arbitrarily separated in some places.

The Tifton fine sandy loam is confined to the upland section of the county. The chief area of its occurrence is in a belt south and east of the Withlacoochee River extending from Valdosta to the Berrien County line. In this general section large areas are mapped near Remerton, Mount Zion Church, Bemiss, Seaford, and Barretts. Important areas are found in the northwestern part of the county around Shiloh and Salem Churches. In the northeastern part of the county areas occur between Good Hope Church and the northeastern corner of the county. Smaller areas lie near Mineola, at Hahira, and northeast of this place.

This type has an undulating to gently rolling topography. It occupies broad, smooth ridges whose slopes, except around the heads of streams, are long and gentle. The drainage is good throughout the area. Practically all the type is cleared and under cultivation. A few small tracts are heavily forested with longleaf pine, and have a good growth of wire grass. A few knolls and slopes originally supported a heavy growth of longleaf pine, with an undergrowth of wire grass, and others a mixed forest of oak, hickory, dogwood, and longleaf pine.

The general agricultural conditions on the Tifton fine sandy loam are above the average. All the staple crops are grown. Sea Island cotton yields from one-fourth to three-fourths bale, and in some cases 1 bale per acre. Corn ordinarily yields from 15 to 40 bushels per acre. As much as 136 bushels per acre has been obtained with special treatment, in corn-club tests; cowpeas yield from one-third to 1 ton of hay per acre, the average being about three-fourths tons;

peanuts yield 40 to 50 bushels; and velvet beans 10 to 20 bushels per acre.

The average price of land of this type is about \$40 an acre, the value ranging from \$25 to \$80 an acre, according to differences in location and in character of improvements.

The Tifton fine sandy loam is one of the strongest soils of south Georgia. It can be utilized successfully for a wide range of crops, including both truck and general farm crops, and for stock raising. Well balanced crop rotations, including legumes to be plowed under, in connection with live-stock production materially improve the soil, where it becomes run down as a result of continuous cotton production.

LEON SAND.

The Leon sand consists of a light to dark gray sand, underlain at a depth of about 6 inches by a white, loose, incoherent sand. At an average depth of 15 inches there is a brown or coffee-brown hardpan stratum, with an average thickness of 3 inches, consisting principally of sand cemented by organic compounds. When dry this stratum is hard, very closely approaching an iron crust in general character. Below the hardpan layer the material is an iron-stained sand which becomes lighter in color as depth increases and grades into a white, loose, incoherent sand which continues to depths of 3 feet or more. In some places the type closely resembles the Plummer sand, and in others the Blanton sand, and in both these variations the hardpan is not so hard as in the typical soil, being nearer a brown loamy sand. North of Lake Park, within a radius of 3 miles, there are a few areas in which the surface material is very dark gray to black which represent the St. Johns sand. They are not shown as a distinct type on account of their small extent. The type also includes about 50 acres of a white sand which extends to a depth of more than 3 feet, located 1 mile south of Weisenbaker School. This represents a development of the St. Lucie sand.

The Leon sand occurs only in the flatwoods section of the county, the largest areas being in the southeastern part between Lake Park and the east and south county line. An area is mapped $2\frac{1}{2}$ miles north of Lake Park, a number of typical areas occur in the vicinity of Boring Pond and in the northern part of the county about 2 miles southwest of Tyler Bridge.

The type occupies broad, flat, featureless areas, in which drainage is poor and also a few low ridges, where the drainage is somewhat better. The hardpan stratum seriously interferes with the internal drainage.

The type supports a growth of scattered longleaf pine, with an occasional scrub oak, and a heavy, thick undergrowth of saw palmetto

and runner oak. The thick mass of palmetto roots makes clearing difficult so that practically none of the type is cleared but is used for open-range pasture.

The average selling value of this land is about \$7 an acre.

This type is very poorly suited to agriculture, as it contains little plant food, is droughty when drained, and requires heavy and frequent fertilizing to produce fair yields.

LEON FINE SAND.

The typical Leon fine sand consists of a pepper and salt gray fine sand very low in organic matter, passing at a depth of 6 or 8 inches into white, incoherent fine sand, which in turn grades abruptly at about 15 inches into a dark-brown hardpan. This hardpan layer is composed of fine sand, organic matter, and some iron, and is from 4 to 8 inches thick. It is underlain by a brownish-white fine sand which becomes whiter with increased depth, and is generally wet, having the characteristics of quicksand.

In a few cases the surface soil is black, especially when wet, but on drying out it assumes a gray color, quite distinct from the black of the surface soil of the Portsmouth fine sand. The brown hardpan layer is sometimes encountered within 6 inches of the surface, and again may lie as deep as 24 inches. Exposures in road cuts show it to be very irregular in occurrence. There are included with this type small, ill-defined areas of the Plummer fine sand, which generally border cypress ponds and drainage ways.

The Leon fine sand occurs throughout the flatwoods region mainly in a large, irregular body in the eastern part of the county, extending in a general way from Indianola toward Blanton, from Blanton to Naylor, and northward toward the Berrien County line. Other areas occur in various parts of the county, chiefly on the west side of the Withlacoochee River and Double Bridges, where Little River empties into this stream, and in the vicinity of Dees. The type occupies broad, level areas and in some cases gentle slopes along drainage ways. It has been cut over, the best timber having been removed, and now supports a scattered growth of longleaf pine, saw palmetto, gallberry, wire grass, and, in the better drained areas, runner oak.

The drainage is poorly established, but the type appears to be better drained than the associated Plummer fine sand. The flat topography retards the run-off after heavy rains, and the hardpan layer interferes with the upward and downward movement of soil moisture. Even when the surface soil is quite dry, the material under the hardpan is generally wet.

This is one of the most extensive soils in the county. It is not favored for crop production, and very little of it is under cultivation.

The occasional cultivated fields are generally closely associated with the Norfolk fine sand or Blanton fine sand. Turpentine is practiced on the type, and much of the land is used for pasture, as it supports a fair growth of wire grass. Where cultivated, it usually is planted to corn or cotton, both of which give very low yields, the growing crops being injured either by excessive rains or long periods of drought.

This type sells for \$5 to \$8 an acre.

PLUMMER SAND.

The Plummer sand has a bluish-gray to drabish-gray sand surface soil, with an average depth of 7 inches. The subsoil usually is a light bluish gray sand extending to a depth of 3 feet or more, though in some places it has a mottled gray, brown, and white color, and in other places a dingy-gray color. It varies in color like other wet and soggy soils.

The largest areas of this soil are mapped in the north-central part of the county, west of the Withlacoochee River between Twin Creek and Bay Branch. Other areas are found along Franks Creek and in the southeastern corner of the county.

The type occupies low, flat, poorly drained positions in the flatwoods section and low areas along stream courses in gently rolling parts of the county, and is uniformly poorly drained. It supports a growth of longleaf pine with an undergrowth of gallberry, broom sedge, wire grass, and pitcher plant. The land is burned over annually to improve the pasturage. The type is chiefly used for pasture. An area which was included in a pecan grove is the only area cleared. The pecan trees, however, did not survive.

No definite value can be given for this type as it is generally held in connection with other soils. Its poor drainage and generally low productiveness renders it undesirable for farming.

PLUMMER FINE SAND.

The Plummer fine sand has a bluish or drabish gray fine sand surface soil extending to an average depth of about 7 inches. The subsoil is also a fine sand, but the color is a few shades lighter than that of the surface material. In places the subsoil is mottled with white and yellow, and is sometimes very light in color. In local areas a mottled yellow and gray, light fine sandy clay is encountered at depths of 30 to 36 inches. Such areas represent the Plummer fine sandy loam, but can not be separated satisfactorily on account of their small extent and irregular occurrence.

The Plummer fine sand is most extensive in the gently rolling upland section of the county north of Valdosta. It occupies areas along

drainage ways, where seepage waters, following along an underlying impervious substratum, which underlies the soils of the northern part of the county, lies so near the surface that a large part of the soil is saturated except in unusually dry seasons. This stratum lies nearer the surface on the long, gentle slopes and in some level areas. The topography is generally low and flat, although the type occurs far up on long, gentle slopes. The land is "crawfishy" as the result of its poor drainage. Areas of this type are also mapped in the flatwoods section of the county, where they are the result of poor drainage around small ponds and along seepage ways.

The type is not cultivated except in small strips which lie along the edges of fields on better drained land. It supports a scattered growth of longleaf pine, with an undergrowth of broom sedge and some wire grass, which, when burned over, affords a succulent growth of pasturage. The main use of the type is for grazing. The pitcher, or trumpet plant, is a conspicuous growth on this soil.

No separate value can be given for this type as it is sold only in conjunction with better land. The presence of areas of this soil in a tract of land reduces its valuation.

The type is so poorly drained that it has little value except for grazing. With good drainage it could probably be used for forage crops, corn, and certain truck crops. Where drained the type should be protected from the accumulation of seepage waters from the upland. The drained areas would be improved by the application of lime.

PORTSMOUTH FINE SAND.

The Portsmouth fine sand is more or less variable, but the prevailing surface soil consists of about 10 inches of very dark gray to black loamy fine sand to loam, containing a large percentage of organic matter. In places the surface soil to a depth of a few inches consists of mucky or peaty material. The subsoil usually is a dark-stained fine sand which becomes white with increase in depth. It is loose and, being wet, runs from the soil augur like quicksand.

The Portsmouth fine sand occupies irregular-shaped depressions or cypress ponds of varying size scattered throughout the flatwoods section of the county. These average about 2 or 3 acres in extent, and occur mainly in the eastern and southeastern section of the county. The areas are generally covered with water, except in unusually dry seasons, and have no agricultural value in their present condition. They support a growth of cypress, with a few bay trees and other water-loving plants.

No definite value can be given for this type on account of the small areas in which it is found. It requires thorough drainage before it can be used for agriculture, and this would necessitate a

large amount of ditching in a generally flat country. With the establishing of good drainage conditions the soil probably would prove suitable for the production of onions, celery, and lettuce.

BLANTON SAND.

The Blanton sand, to an average depth of about 7 inches, consists of a very light gray sand. The upper subsoil is a nearly white sand, bearing a faint trace of yellow and the lower subsoil, below 18 to 20 inches, a pure white sand. A part of the type has about 2 inches of brownish-gray sand just below the surface soil, underlain by a dingy gray sand with a faint trace of yellow, which gives way to the typical white sand at an average depth of about 24 inches. As in the Blanton fine sand this brownish-gray stratum suggests an undeveloped hardpan, such as is characteristic of the Leon sand. A few small areas, each less than 5 acres in extent, of a poor grade of Norfolk sand and of the Plummer and Leon sands are included in the general areas of the type.

The Blanton sand is found in areas of varying size within a belt about 3 miles wide extending along the eastern edge of the county from near Blanton to the Florida State line. Large areas are found near Mud Creek and in the southeastern corner of the county in the vicinities of Zeigler Pond and Melrose. The type occurs also in the north-central part of the county near the Withlacoochee River in the vicinity of Skipper and Tyler Bridges and a few scattered areas lie south and west of Mineola.

The type occupies generally flat and featureless areas in the flatwoods section of the county. The drainage is only fair, and in wet seasons the water table rises to within 18 inches of the surface.

About 60 per cent of the Blanton sand is cleared and under cultivation. The uncleared areas, like the Blanton fine sand, have a characteristic growth of pine and an undergrowth of gallberry.

The crops grown on this type, the yields, and land values are about the same as on the Blanton fine sand.

BLANTON FINE SAND.

In somewhat over one-half its area the Blanton fine sand consists of a very light pepper-and-salt gray fine sand, with an average depth of about 7 inches, underlain to 18 or 20 inches by fine sand which is nearly white or very light gray with a faint tint of yellow, where it changes to a white incoherent fine sand to extending 36 inches or more. In the rest of the type a stratum of brownish or grayish-brown fine sand about 2 inches thick lies between the soil and the subsoil, which is not as white as the typical, but shows a yellowish or brownish tint to a depth of about 24 inches where the characteristic white, loose fine

sand is reached. The brownish stratum is suggestive of the hardpan of the Leon types. Its occurrence is very irregular. In a small part of the type, chiefly in low seepage areas or around the many small flatwoods cypress ponds, the surface soil of this type resembles that of the Plummer fine sand. The Blanton grades imperceptibly into the Leon, Plummer, and Norfolk fine sand types. Small patches of each of these soils are included.

The Blanton fine sand occurs in the southeastern part of the county, with important developments on each side of the National Highway from Valdosta to near Lake Park. Large, typical areas are mapped in the vicinity of Dasher, and important areas at Naylor and within a 3-mile radius of this point. Several large areas lie in the central part of the county near the junction of Little River with the Withlacoochee River and in the flat sections on the east side of Withlacoochee River near Catcreek.

The Blanton fine sand is confined to the flatwoods section of the county. The surface is for the most part level, flat, and featureless, but there are a few slight undulations and rises, which are more noticeable where the Blanton is surrounded by large areas of the Leon fine sand. The drainage is only fair, the water being removed by seepage. The water table often rises to within 2 feet of the surface. Nevertheless, in dry seasons, crops sometimes suffer from lack of moisture. About 70 per cent of the type is cleared and under cultivation. The native vegetation is distinct from that of closely associated soils, consisting of a moderately thick growth of longleaf pine with an undergrowth of gallberry and an occasional clump of saw palmetto. The staple crops of the country are grown. Sea Island cotton is the chief crop, and it is said that the cotton is of a higher grade than that produced in the heavier soil types. Yields of one-fifth to one-half bale per acre are reported, where about 200 pounds of an 8-2-2 or a 9-2-3 fertilizer is applied. Corn yields from 5 to 20 bushels per acre, depending upon the fertilizer treatment. Velvet beans grow luxuriantly, and sweet potatoes and peanuts give fair yields. The sirup from sugar cane grown on this soil has good color and flavor.

Land of this type ranges in price from \$10 to \$20 an acre, depending upon the location and improvements.

The Blanton fine sand is not a soil of high natural productiveness. It is especially deficient in organic matter, which is effectively added by turning under green vegetable matter. Owing to the leachiness of the soil, organic matter must be incorporated frequently, if the supply is to be maintained. Fertilizers are more effective where they are added in several applications. Lime has proved beneficial on several farms where it has been used for several years. A heavy

growth of sorrel covering many of the fields indicates that the soil is acid.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Blanton fine sand:

Mechanical analyses of Blanton fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
255007.....	Soil.....	0.2	2.4	2.7	72.3	17.2	3.6	1.2
255008.....	Subsoil.....	.2	2.6	2.3	62.7	26.1	4.2	1.0

KALMIA FINE SAND.

The Kalmia fine sand consists of a yellowish-gray, mellow, smooth fine sand to a depth of about 5 inches, underlain by a pale-yellow, smooth, mellow fine sand extending to depths of more than 3 feet.

This type is mapped along the southern edge of the county near Horn Bridge, the area being an extension of a large area occurring along the Withlacoochee River in Hamilton County, Fla. The type occupies terrace or second bottom, the surface of which is level and smooth, except where broken to some extent by sloughs and sink holes. These depressions are filled with water during high stages of the river, although the general surface of the type is well above overflow.

The Kalmia fine sand has an open, or parklike growth of haw, water oak, white oak, post oak, hickory, dogwood, persimmon, and longleaf pine, the hardwoods predominating. It is not under cultivation.

The price of this land is about \$8 an acre. It has about the same crop adaptation and crop-producing power as the Norfolk fine sand.

THOMPSON FINE SAND.

In its typical development the Thompson fine sand consists of a yellowish-gray fine sand, grading at 6 to 8 inches into a pale-yellow fine sand which becomes lighter in color with increasing depth. Where it occurs as narrow strips the soil is generally gray to white and the subsoil lighter yellow in color than in the broader areas. Back from the streams small areas of poorly-drained material, probably soil of the Myatt series, are included. As it is very inaccessible, it is difficult to draw definite boundaries between this type and the Thompson fine sandy loam.

The Thompson fine sand occurs mainly as narrow ridges along the Withlacoochee and Alapaha Rivers and as broad, flat areas in the

river bottoms. The most important areas are south and west of Olympia and about 3 miles southwest of Ousley. The type is subject to floods, but it is well drained between periods of overflow and gives fair yields of corn and cotton. Only about 40 acres are under cultivation, the rest being used as pasture land. The native vegetation consists chiefly of longleaf pine, scrub oak, and palmetto.

Owing to its small extent and the fact that it is subject to overflow this is not an important soil in the agriculture of this county.

THOMPSON FINE SANDY LOAM.

The surface soil of the Thompson fine sandy loam prevaillingly is a yellowish-gray, mellow, friable loamy fine sand to fine sandy loam, of an average depth of 7 inches. The subsoil, to a depth of about 15 inches, is a light-yellow, friable fine sandy clay, to a depth of 24 inches, a heavy, plastic clay, mottled red, yellow, and gray, and to 36 inches a yellow and gray mottled plastic clay. About 15 per cent of this type as mapped is made up of a number of small areas having a bluish-gray surface soil and a mottled yellow and gray subsoil, areas in which the surface is a silt loam, and some narrow strips, lying along the banks of the streams, in which the soil ranges from a yellowish to whitish sand or loamy fine sand. These included areas are so small that they can not be separated satisfactorily on a map of the scale used in this survey.

The Thompson fine sandy loam is developed along the rivers of the county. Broad areas lie at Folsom Bridge and about 2 miles southwest of Mineola along Little River, and extensive areas border the Alapaha River and occur in various places along the Withlacoochee River. It occupies the first bottoms and is subject to overflow. The surface is level, and broken only by sloughs. Normally the drainage is sufficient for crop production, although crops may be injured by high water.

About 1 per cent of the type is under cultivation; the rest supports a forest of longleaf pine, gum, oak, and haw. Sea Island cotton yields about one-third bale per acre, with an application of 200 pounds of a 9-3-3 fertilizer. Corn yields 15 bushels per acre without fertilizer.

The average price of this land is \$5 to \$7 an acre.

The fineness of the surface material causes it to pack and become hard, so that frequent cultivation is necessary to keep the soil in good tilth. The incorporation of organic matter probably would relieve this condition to a large extent. Cotton on this type has a tendency to produce stalk at the expense of fruit.

The following table gives the results of mechanical analysis of samples of the soil and subsoil of the Thompson fine sandy loam :

Mechanical analyses of Thompson fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
255031.....	Soil.....	0.6	2.4	3.4	50.0	21.0	17.2	6.2
255032.....	Subsoil.....	.0	.4	.4	38.8	15.6	11.3	33.0

SWAMP.

The area mapped as Swamp consists of areas of alluvial deposits which are subject to frequent overflow, and which remain in a wet condition most of the time as a result of the frequent floods, the soil characteristics are continually changing, and in few places is it possible to find a uniform development over any considerable area. The soil predominantly is a fine sand in texture varying in color from white to black, the subsoil in most cases is either dark-colored or white fine sand, somewhat like quicksand.

Swamp is found along practically all the stream courses of the county, being most extensive along Grand Bay Creek and Cat and Mud Creeks. The areas vary in width, with a maximum of about one-fourth mile. They support a luxuriant growth of bay, cypress, slash pine, bamboo, and ash, with a few magnolias and some fern and palmetto.

On account of its low-lying position and the fact that it is subject to frequent overflow, Swamp has practically no agricultural value in its present condition and it could be made suitable for crop production only by an extensive system of ditches and levees.

Swamp, mucky phase.—Swamp, mucky phase, generally consists of black material composed of sand with enough organic matter to make it decidedly mucky, the deposit usually extending to a depth of more than 3 feet. Areas of this phase are easily distinguished from those of the Portsmouth loam by the fact that they support a good growth of bay, slash pine, bamboo, and fern, with only a few cypress, while the growth on the Portsmouth loam consists principally of cypress. Several areas of the phase have practically no trees and are grown up with fern, myrtle, and other low-growing water-loving plants. The most conspicuous of these areas are Fern Pond, south of Macville, and an area 3 miles north of Lake Park.

The Swamp, mucky phase, occurs as pondlike depressions in all parts of the county, varying in size from a few acres to several square miles. Mud Swamp, Grand Bay, and Becky Bay, south of Knight

Academy, are typical examples of this development. The basinlike position of the phase renders it wet for long periods of time, and some of the larger areas are continually covered with water, as in the case of Grand Bay, in which, according to local information, there are areas of open water throughout the year.

The areas are not cultivated and are of no importance in the agriculture of the county. Nevertheless, if it were possible to clear and drain some of the areas, good truck crops probably could be produced.

SUMMARY.

Lowndes County is located in the extreme southern part of Georgia. The county has an area of 520 square miles, or 332,800 acres.

The surface features comprise gently rolling uplands, flatwoods, an undulating to strongly rolling section known as the lime sink region, and large swampy alluvial belts. The entire surface lies below 300 feet in elevation.

The drainage is carried by the Withlacooche and Alapaha Rivers, and drainage conditions in the county range from good to very poor. The population of the county is given as 24,436 in 1910. Valdosta is the chief town.

The county has good railroad facilities.

The climate is characterized by long, hot summers and short, mild winters. The rainfall is abundant and well distributed for growing crops.

The agriculture of the county has been centered about cotton production, but owing to the recent invasion of the boll weevil, other crops are being given considerable attention. Corn, peanuts, velvet beans, and oats are important. Pork production is increasing.

The methods of farming are steadily improving, many farmers using the most modern equipment. Fertilizers are largely depended upon to maintain the productiveness of the soils, factory-mixed goods chiefly being used. Eighteen types of soils, exclusive of Swamp, occur in the county. Fifteen of these are upland and the rest alluvial types. They are grouped in nine series.

Heavy soil types, such as fine sandy loam, are found in the northern and western parts of the county, and light sandy soils in the southern and eastern parts.

The Norfolk fine sandy loam is an extensive, strong upland type, well suited to all the crops common to this part of the State. The Norfolk loamy fine sand produces good crops, and is a good truck soil, but is not as durable as the fine sandy loam. The Norfolk loamy sand is one of the best truck soils in the county. The Norfolk fine sand and sand are light, early trucking soils, but produce fair general-farm crops.

The Ruston fine sandy loam is of small extent. It is especially adapted to general farm crops and stock raising. Pecan trees seem to make good growth upon it. The Ruston loamy sand is a good trucking soil and produces fair yields of the general farm crops.

The Tifton fine sandy loam is a strong, productive soil for general farm crops.

The soils of the Leon and Plummer series are cultivated only in small areas.

The Portsmouth fine sand is found in poorly drained situations and is not used for crop production.

The Blanton soils are of low natural productiveness, but where cultivated yield fair returns.

The Kalmia fine sand supports an open timber growth and is not tilled.

The Thompson fine sand and fine sandy loam are subject to overflow. They are used to a very small extent for the production of cotton and corn, with fair results.

Swamp is practically nonagricultural on account of its poor drainage. It supports a heavy forest growth.



[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.]



Areas surveyed in Georgia.

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