

SOIL SURVEY OF TATTNALL COUNTY, GEORGIA.

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DESCRIPTION OF THE AREA.

Tattnall County is situated in the southeastern part of Georgia, lying about 50 miles west of Savannah, 60 miles northwest of Brunswick, and 200 miles southeast of Atlanta. Its extreme length and width are approximately 40 and 28 miles, respectively, and it embraces an area of 597 square miles, or 382,080 acres. The county is separated from Bulloch and Bryan Counties on the northeast by the Canoochee River, and from Appling and Wayne Counties on the southwest by the Altamaha River. It is bounded on the west by Toombs County, on the north by Candler County, and on the southeast by Liberty County.

Topographically, Tattnall County is a plain, usually gently undulating to moderately rolling, but including extensive level or flat areas, known as "upland flatwoods," occupying the highest elevations in the county, and the broad Altamaha bottoms, or "lowland flatwoods," which lie at the lowest elevations.

The extensive "upland flatwoods" appear as interstream flats where drainage has not yet become established. The Altamaha bottoms occur as a strip ranging from about 2 to 5 miles in width in the southern part of the county. The present flood plain of the Altamaha River and two well-marked terraces are represented in this belt, with remnants of a third, higher terrace. A well-defined terrace escarpment marks, in most places, the junction between the upland and the Altamaha bottoms. This escarpment, which is gently to moderately sloping and ranges from 10 to 75 feet in height, begins on the southeast county line 2 miles above Lumber Bridge on Beards Creek and extends to a point west and a little north of Dukes Pond, where it turns almost due north, reaching Battle Creek about $1\frac{1}{2}$ miles from its junction with the Ochoopee River. It again appears on the west side of the Ochoopee River along Four Acre Creek,

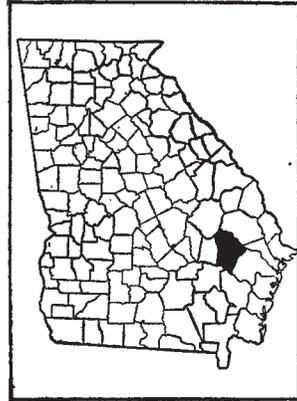


FIG. 16.—Sketch map showing location of the Tattnall County area, Georgia.

which it follows in a northwesterly direction for about a mile and then takes a westerly course for about 2 miles. Here erosion has largely obliterated the escarpment for a mile, but it again appears north of Pearson Church and continues in a westerly direction to the Toombs County line, which it crosses $2\frac{1}{2}$ miles north of the Altamaha River.

Another very interesting topographic feature is a conspicuous belt of deep sand ("Ohoopce River Sand Belt") occurring on the northeast side of the Ohoopce River. This belt extends from south of Cow Ford Bridge to the north county line and ranges from about 1 mile to 5 miles in width. Between Cow Ford Bridge and Battle Creek it is underlain by stratified material belonging to the terraces of the Altamaha River, while north of Battle Creek it is mainly underlain by upland material. Exposed sections show no distinct stratification, and this, together with the irregularities of the surface, which is hummocky and dunelike in places, indicates eolian deposition or at least surface influence by the wind.

The topography of Tattnall County, exclusive of the broad stream bottoms and the "Ohoopce River Sand Belt," owes much of its present character to erosion. The rivers and creeks flow in a southeasterly and easterly direction, and the small, imperfectly developed branches and drainage ways extend out from these, leaving comparatively small areas of "flatwoods" and "bays" undrained. The valleys of the creeks and larger branches are well developed, but the flow of water is sluggish, and swampy conditions ordinarily mark the locations of the flood plains, where there is a very heavy growth of cypress, gum, magnolia, bay, and slash and longleaf pine, and an almost impenetrable undergrowth. The smaller branches and drainage-way heads have poorly defined valleys, but they almost invariably support a swampy growth immediately along their courses, which stands out conspicuously from the prevailing pine forests of the uplands.

The drainage of Tattnall County is about equally divided between the Canoochee River on the northeast and the Altamaha River and its principal tributary, the Ohoopce River, on the southeast and west.

The tree growth of the "flatwoods" and of the better drained sandy loam sections of both upland and bottoms consists principally of longleaf pine, with oak, maple, sycamore, and persimmon. Wire grass is the common grass. Gallberry bushes are especially abundant in the "flatwoods." In the bottoms along stream courses are found magnolia; cypress; bay; sweet, black, and tupelo gums; ironwood; dogwood; white, red, live, and water oaks; poplar; sycamore; slash pine; longleaf pine; maple; and other tree species. In swamps the titi, gallberry (*Ilex glabra*), the evergreens (*Ilex lucida* and *Pieris nitida*),¹ pitcher plant, sphagnum moss, cypress, bay, smilax, and other water-loving trees and plants are found.

¹ These plants were identified in the Bureau of Plant Industry.

The settlement of the region now comprising Tattnall County, which began late in the eighteenth century, was at first confined to favorable localities near the Canoochee, Ohoopee, and Altamaha Rivers, whence it extended inland. The majority of the early settlers came from the Carolinas, Virginia, and the longer settled sections of Georgia. The present population is largely native born.

Tattnall County was formed from a portion of Montgomery County in 1802. The first county seat was located near the center of the county, on the Ohoopee River, about 4 miles west of the present county seat, Reidsville, which was established in 1832. In 1905 a portion of the county lying west of the Ohoopee River was made a part of Toombs County, and later a part was cut off in forming Candler County to the north.

According to the Federal census the population of the county in 1880 was 6,988; in 1890, 10,253; in 1900, 20,419; and in 1910, 18,569. The natural increase in population between 1900 and 1910 was overbalanced by the loss of the territory incorporated in Toombs County in 1905. The population is widely distributed, the most densely peopled sections being in the vicinity of Claxton and Glennville, and the most sparsely settled being the more or less extensive areas of "flatwoods" in the central part of the county, the "Ohoopee River Sand Belt," and the wide second bottoms of the Altamaha River in the southern part of the county. Less than one-fifth of the people in the county reside in incorporated towns, and even many of these derive income from agricultural pursuits. The colored population is about one-third of the total. The decrease in the colored population in the last ten years is due in a large measure to a decline in the turpentine and lumbering industries.

According to the 1910 census, Reidsville, the county seat, had a population of 454. It is locally an important distributing, marketing, and banking point. Claxton, with a population of 1,008, is the largest town, and it and Hagan, population 784, are commercial centers for the eastern part of the county. Glennville, with a population of 640, Collins, and Cobbtown are local distributing points. Daisy, Manassas, and Bellville are villages of lesser importance.

The county is fairly well supplied with transportation facilities, no point being more than 12 miles from a railroad station. The Savannah and Montgomery Division of the Seaboard Air Line Railway crosses the central part of the county from east to west, affording an outlet to Savannah on the east and to western Georgia and Alabama points on the west, and giving connections with Atlanta and other points in northern Georgia. The Georgia Coast & Piedmont Railroad extends south across the county from Collins, its northern terminus, to connecting points on the main lines of the

Atlantic Coast Line Railroad and the Seaboard Air Line Railway and to water transportation at Brunswick and Darien. The Wadley Southern Railroad extends north from Collins to connecting points on the Central of Georgia Railway. The Register & Glennville Railway extends from Glennville through Claxton and Hagan, where it connects with the Seaboard Air Line, to Register, on the Central of Georgia Railway, in Bulloch County. This railroad, although an unchartered line, handles a large freight business.

The Altamaha River affords water transportation at all seasons, but at present only a comparatively small percentage of the farm products and of incoming freight is transported in this way. Commercial fertilizer is the principal article of freight. Water transportation is used to a considerable extent in the portion of the county lying west of the Ochopee River. Rafts of timber are floated down the Ochopee and Altamaha Rivers to Darien, at the head of deep-water navigation, but lumbering, once an extensive and important industry, has declined rapidly in the last few years. The Canoochee River formerly afforded a means of transportation for vast quantities of lumber, but it is used very little at present.

The road system of the county is quite extensive, all sections, with the exception of the "flatwoods," being fairly well supplied with county and settlement roads. A large mileage has been clayed and improved in the last few years. Only a few of the streams are bridged, and the transportation of farm products is still impeded by imperfect roads.

Cotton, the chief money crop, is sold largely to Savannah commission houses through local merchants and buyers, and practically all of the crop is shipped to that city. The excess production of other crops over home consumption finds a ready market in near-by towns.

Rural mail routes and telephone lines reach nearly all parts of the county. Churches are quite numerous. The schools are in many places far apart and inadequate to meet the requirements.

CLIMATE.

No climatological observations have been recorded within Tattnall County, but the following table, giving the normal monthly, seasonal, and annual temperature and precipitation and the occurrence of killing frosts, compiled from the records of the Weather Bureau station at Jesup, which is in Wayne County, within 12 miles of the southern boundary of Tattnall County, represents approximately the conditions in the latter.

Normal monthly, seasonal, and annual temperature and precipitation at Jesup, Wayne County.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	50	80	16	2.8	1.7	2.5	Trace.
January.....	50	80	15	2.8	3.7	1.0	.....
February.....	52	83	1	5.4	7.0	12.4	0.4
Winter.....	51	.....	.....	11.0	12.4	15.9	.4
March.....	61	91	20	4.6	2.2	4.3	.....
April.....	64	91	30	2.7	1.8	4.7	.....
May.....	74	102	47	3.3	2.8	1.7	.....
Spring.....	66	.....	.....	10.6	6.8	10.7	.....
June.....	79	101	49	5.7	1.5	8.2	.....
July.....	82	104	60	5.5	4.2	3.0	.....
August.....	82	102	62	8.8	4.6	6.5	.....
Summer.....	81	.....	.....	20.0	10.3	17.7	.....
September.....	76	102	42	4.2	1.2	9.6	.....
October.....	68	95	34	4.4	2.1	5.4	.....
November.....	58	86	18	2.8	.8	.8	.....
Fall.....	67	.....	.....	11.4	4.1	15.8	.....
Year.....	66	104	1	53.0	33.6	60.1	.4

Average date of first killing frost in fall, Nov. 20; of last in spring, Mar. 17. Earliest date of killing frost in fall, Nov. 4; latest in spring, Apr. 11.

Tattnall County has a mild and pleasant climate. The winters are short and moderate. Usually there are two or three days of cool, bracing weather, when thin ice forms during the nights but quickly disappears in the sunshine, followed by several warm days, usually ending with rain. Occasionally snow flurries occur. Violets and roses are in bloom nearly the entire winter, and lettuce, beets, and spinach can be grown with very slight protection from frost.

The summers are long and warm, but are moderated by breezes which make the nights pleasant. June, July, and August, the warmest months, have a mean temperature of about 80° F. The average rainfall is generally sufficient for the crops grown and is well distributed, although corn, sugar cane, and watermelons sometimes suffer from droughts in May, June, and July. Cotton is seldom injured by drought, but is sometimes damaged by too much rain. The greatest precipitation occurs in June, July, and August. The mean annual precipitation is 53 inches, but there is a variation from 33.6 inches to 60.1 inches between the driest and wettest years. The average

length of the growing season is eight months, which is sufficient for the production of a wide range of crops.

AGRICULTURE.

The early settlers in Tattnall County made slow progress in developing its agricultural resources. The lack of markets and transportation facilities discouraged efforts to increase production beyond the immediate needs of the settlers. Small clearings were made in the pine woods, in which corn, wheat, and vegetables were grown for home use. With the exception of these clearings, all of the land was open range, and stock raising was an important means of livelihood. At that time the pasturage was much better than now, as the grasses that covered the open pine woods furnished grazing for the cattle, and the swamps produced abundant mast upon which the hogs were fattened. Animals kept in this manner were naturally inferior, but the cost of raising them was almost nothing. With increase of population the open range gave way to clearings, and farming became the principal industry. With the establishment of more rapid communication with outside markets cotton was introduced, and soon after 1850 it became the principal money crop, a position that it has since maintained.

The development of the turpentine and lumber industries, which began about 1885, retarded for many years the agricultural development of the county by absorbing the attention of labor and capital. This condition was not felt at the time, however, as the lack of farming was more than offset by the rapid increase in land values and by the large sums realized from the sale of forest products, but the recent decline of profits from these sources has shown that in the future agriculture must be the main dependence of the county and that it must be of a more intensive type than that hitherto practiced.

Both the climate and the soils of Tattnall County favor a wide range of crops. At the present time the principal crops are cotton, corn, peanuts, velvet beans, sugar cane for sirup, oats, cowpeas, sweet potatoes, and watermelons. A variety of vegetables and small fruits are grown for home use. The fruits and nuts consist chiefly of the pear, fig, plum, and pecan.

The production of cotton has increased greatly within the last five years, but not at the expense of other crops. In 1905 the production passed the total of 10,000 bales for the first time. In 1911 the total was 21,338 bales, but it fell behind this in the very unfavorable season of 1912. In 1913, however, the crop was the largest on record, and with the unusually high prices the income was far in excess of that of any previous year.

Both the short and long staple (Sea Island or "black seed") varieties are grown. For many years long-staple cotton was considered

the more profitable, and until the last few years it constituted more than two-thirds of the crop. Last year (1913) more than half of the cotton grown in the northern and central parts of the county was of the short-staple variety, and in some communities this variety was grown almost exclusively. A number of factors have contributed to this change, the principal one being the decline in the price of the long-staple variety and the rise in the price of the short-staple. While Sea Island cotton a few years ago brought almost three times as much as the short-staple, it now brings less than twice as much. Taking into consideration the smaller yield of the former, the comparison is still less favorable.

The Tifton sandy loam is the best cotton soil of the county. The soils of the Norfolk series are fair cotton soils, and portions of the Norfolk sandy loam are almost equal to the Tifton sandy loam, but the more sandy members are droughty and the flatwoods areas are poorly drained. The flatwoods and alluvial soils, although naturally productive, are so poorly drained that cotton yields are reduced, even in normal years, by the wet condition of the soil, while in unusually rainy seasons the crop is almost a failure. By draining these wet soils the area of good cotton-growing land could be largely increased.

Little attention has been given to seed selection, although there is no cotton-growing section where the breeding of good seed is more important. In former years seed was imported from the Sea Islands, as it was considered that the plant would deteriorate when grown for several generations from seed produced on the upland, but the difficulty of obtaining seed from the Sea Islands has led to the use of home-grown seed, and although systematic selection has not been practiced the results have been satisfactory. Some farmers report that seed grown in the county for many generations shows no sign of deterioration.

Corn, which has a total acreage in most years slightly in excess of that of cotton, is produced to feed the work animals, fatten hogs, and supply meal for home use. The production for the entire county is about equal to the consumption in normal years. Only in years of partial failure of the crop is corn imported. The average yields for the entire county under the existing methods of cultivation and over much poorly drained land have been very low. While good farmers on well-drained soils now obtain 30 to 50 bushels to the acre, the average for the entire county is probably not in excess of 15 bushels. There has been a decided improvement in the methods of cultivation within the last few years, however, and the less progressive farmers are gradually adopting better methods.

In growing corn the furrow method is usually employed. Corn is planted in the deep furrow and cultivation is delayed until the stalks

are large enough to cultivate without being covered up. The crop is then "forced" by good cultivation and fertilization. Corn is nearly everywhere planted in rows 5 to 7 feet apart, and peanuts or velvet beans are commonly grown between. It is said that this practice does not materially reduce the yield of corn, and the other crops not only furnish food for stock but improve the condition of the soil.

Velvet beans interplanted with corn are not harvested, but after the corn is gathered cattle and hogs are turned into the field. The velvet bean fruits heavily, but the beans often fail to mature, and little effort is made in this section to harvest them, even for seed. The vines make a rank growth and overrun the corn, so that they are difficult to handle, and the small quantity of velvet-bean hay made is harvested only where the crop is sowed in separate fields. The velvet bean is growing in favor with the farmers.

Peanuts are a popular crop in all parts of the county, particularly on the Tifton sandy loam. They are usually grown with corn and are not harvested, hogs being turned upon them after the corn is gathered. Only a small quantity of peanuts is saved for home use and for seed. The Spanish and North Carolina are the most common varieties.

According to the census, 3,034 acres of oats were grown in the county in 1909. A common method of handling this crop is to sow it in the fall, pasture it during the early spring, and cut it later for grain. The crop is not thrashed, but fed in the sheaf. The Texas Rustproof is a favorite variety.

The cowpea, though grown rather extensively as a forage plant, has not attained the popularity of the velvet bean. This is principally because it is subject to the root knot, which also attacks cotton and some other plants. For this reason only the Iron or the Brabham varieties, which are more resistant to the root knot, are safely grown.¹ Cowpeas, like velvet beans, are planted between the corn rows, being sowed broadcast or planted in the middles at the last cultivation of the corn.

A small patch of sugar cane is grown on nearly every farm, and sufficient sirup is made for home use and for local markets. The sirup is generally of very fine quality, but sirup manufacture can not be extended until outside markets are found for the product.

Watermelons of very fine quality are grown easily in this section, but so far the crop is grown only for the local market.

Owing to the lack of good pasture grasses efforts are being made to obtain stands of Bermuda grass in various parts of the county for summer pasturage and hay.

The practice of crop rotation has been neglected by most of the farmers. Cotton and corn have been alternated to some extent, and

¹ See Farmers' Bul. No. 333, U. S. Dept. of Agriculture, on Cotton Wilt.

the better class of farmers plant the latter with peanuts and velvet beans. The farmers generally recognize the necessity of growing a leguminous crop to supply nitrogen and humus, but many do not practice this system, and there is often no break in the continuous planting of cotton and corn. The clean cultivation required by these crops tends to deplete the supply of organic matter where no green-manuring crop is introduced.

The use of commercial fertilizers has steadily increased since their introduction about 1880, and in 1909, according to the census, the total expenditure for fertilizers amounted to \$195,646. The most widely used brands are those having the formula of 8-1.65-2¹ and 9-2-3. Nearly all crops are fertilized to some extent, and cotton is usually given applications of 300 to 400 pounds per acre and corn 250 to 300 pounds. Good use is made of available stable manure and in some cases compost is prepared.

The importance of the live-stock industry is much less than it was when large numbers of horses, mules, cattle, sheep, and hogs were raised upon the open range by the early settlers. The decline in the stock industry took place with the low prices that prevailed about 1870. The present high values have called attention to the desirability of home production of work stock, and high-grade Percheron mares and good stallions have been brought into the county. Prevalence of the cattle tick has tended to retard improvement of cattle.

There is a tendency toward the improvement of the hogs, though most of the hogs are still of scrub stock. As a rule they run on the open range and shift for themselves until the corn is harvested, when they forage upon the interplanted velvet beans or cowpeas. They fatten rapidly on this feed, but it makes an oily flesh of rather poor flavor, so that to obtain a better price on the market they are fed corn for two or three weeks before sale or slaughter.

According to the census of 1910, 79.3 per cent of the total area of the county was in farms, of an average size of 137.2 acres. The average amount of improved land in each farm was 35 acres. A comparison of the census figures since 1880 shows a steady decrease in the size of farms, with an increase in the value of the land and the farm equipment. There has been a decrease in the proportion of farms operated by owners from 91 per cent in 1880 to 51.5 per cent in 1910. This does not indicate a decrease in the total number of landowners, but means that many farmers are now renting their surplus land. Several systems of renting are practiced. Under one system the landowner furnishes the land, stock, and implements, and the tenant the labor, each taking one-half the crop. Laborers are paid \$15 to \$20 per month without board. There are several landholdings in Tatt-

¹ 8 per cent of phosphoric acid, 1.65 per cent nitrogen, and 2 per cent potash.

nall County ranging up to 10,000 acres in size. There are large tracts of cut-over lands, usually in the swamps or flatwoods.

SOILS.

The soils of Tattnall County may be divided according to mode of origin into sedimentary and alluvial soils. To the former belong the upland soils and to the latter the first-bottom and terrace soils.

Both the sedimentary, or upland, soils and the alluvial soils are divided into series, according to color, structure, topography, drainage conditions, and derivation, and these series into types, according to texture or the relative percentages of the different grades of sand, silt, and clay.

The Coastal Plain or upland series are the Norfolk, Tifton, Portsmouth, Scranton, Hoffman, and Plummer; the terrace series are the Kalmia, Leaf, and Okenee, while on the first bottoms are found the Johnston, Thompson, and Chastain soils.

The upland soils have been formed for the most part from beds of sand and sandy clay of sedimentary or transported origin—that is, from Coastal Plain material. These beds are unconsolidated, with the exception of some sandstone of local occurrence and very little importance. There are some beds of heavy clay which give rise to the Susquehanna soils, but the areas of these are too small to be shown on a map of the scale used in this survey.

The ferruginous accretions or concretions which are so common in the soils and subsoils are absent in the underlying beds from which at least some soils containing such pebbles have been derived, so that it would seem these have formed during the processes of weathering. These pebbles consist of sandy or clayey materials cemented together by iron oxide. The presence of coarse sand and coarse sandy loam so often encountered in the beds on lower slopes is due, in places at least, to modifications brought about by erosional processes, such as the transportation of the material from higher levels and the working out of the finer particles, rather than to a difference in the texture of the underlying or parent formation, as is true generally of the upland soils.

Drainage has been a potent factor in determining the condition of the soil. Where it has been well established the better oxidation seems to have produced the more uniform colors of the Norfolk and Tifton subsoils, and where poor drainage conditions exist only a partial oxidation has been possible, as is the case with the Portsmouth soils. This poor drainage and consequent inhibited aeration have permitted the accumulation of dark-colored organic matter in the surface soil of the Portsmouth and prevented the development of a uniform yellow color in the subsoil such as characterizes the subsoils of the Norfolk and Tifton series.

The first-bottom alluvial soils are predominantly sandy, except over a portion of the flood plain along the Altamaha River. The materials of which these soils are composed represent sediments left by overflows. These sediments have been transported from the various soils found in the drainage basin, principally from the Norfolk, Tifton, Orangeburg, and Ruston soils, in the case of the smaller streams. The character of the soil of the Altamaha River bottoms shows that at least a considerable part of this material has been brought down from the Piedmont Plateau.

The older alluvial soils, those of the second bottoms, or stream terraces, differ materially from the upland soils in having scarcely any ferruginous pebbles.

The productiveness of the soils of Tattnall County varies greatly with conditions of drainage, depth to clay, texture, and content of organic matter. The staple crops of the county can not be grown satisfactorily on the poorly drained areas. Land where the clay is within 8 to 12 inches of the surface is most easily maintained in a high state of cultivation. The fine-grained soils are preferable, other things being equal.

The character of the various soil types mapped and their agricultural value are discussed in the following chapters.¹ Their distribution is shown on the accompanying soil map.

In the following table the acreage and proportional extent of each of the soil types mapped are given:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Tifton sandy loam.....	87,232	34.0	Portsmouth sand.....	5,824	1.5
Rolling phase.....	42,688		Scranton sandy loam.....	5,376	1.4
Norfolk sandy loam.....	2,368	15.5	Kalmia fine sandy loam.....	3,968	1.0
Rolling phase.....	6,912		Thompson sand.....	3,520	.9
Deep rolling phase.....	9,216		Okenee fine sandy loam.....	2,816	.7
Deep phase.....	29,888		Okenee sand.....	2,304	.6
Flat phase.....	10,944		Leaf fine sandy loam.....	1,984	.5
Norfolk sand.....	41,536	10.9	Chastain fine sandy loam.....	1,408	.4
Portsmouth sandy loam.....	26,752	7.0	Norfolk coarse sand.....	1,280	.3
Swamp.....	19,072	5.0	Peat.....	1,216	.3
Kalmia sandy loam.....	12,544	3.3	Norfolk coarse sandy loam.....	1,152	.3
Leaf very fine sandy loam.....	12,160	3.2	Scranton sand.....	768	.2
Okenee sandy loam.....	9,344	2.4	Kalmia fine sand.....	640	.2
Tifton fine sandy loam.....	9,152	2.4	Norfolk fine sandy loam.....	576	.2
Johnston sandy loam.....	8,832	2.3	Portsmouth loam.....	576	.2
Kalmia sand.....	1,920	1.8	Hoffman coarse sandy loam..	64	.1
Light-gray phase.....	4,928		Total.....	382,080	.....
Thompson sandy loam.....	6,848	1.8			
Plummer sandy loam.....	6,272	1.6			

¹ The soils of Tattnall County have been previously discussed in a general way in the Reconnaissance Soil Survey of Tattnall County, Field Operations of the Bureau of Soils, 1912.

TIFTON SERIES.

The soils of the Tifton series are gray to grayish brown in color, and are underlain by bright-yellow, friable sandy clay subsoils. Small iron concretions occur on the surface and throughout the soil section, giving rise to the local names "pimply land" and "pebbly land." The topography varies from flat to gently rolling and the drainage is always good. These soils are most extensively and typically developed in the central part of the Coastal Plain region, extending through southern South Carolina, over parts of Georgia, and into Alabama. In Tattnall County the sandy loam and fine sandy loam types are mapped.

TIFTON SANDY LOAM.

The typical areas of the Tifton sandy loam consist of a gray or brownish-gray loamy sand, underlain at about 6 or 8 inches by a brownish-yellow loamy sand, which grades at any point from about 10 to 20 inches into friable sandy clay of a bright greenish yellow color. At 30 to 36 inches the yellow sandy clay often becomes somewhat compact and mottled with red. Both soil and subsoil contain varying quantities of brownish ferruginous pebbles, concretions, or accretions. Where the sandy clay subsoil has been turned to the surface by deep plowing, the soil takes on a yellowish-brown or brownish-yellow color and the texture may be changed to that of a sandy loam. On the other hand, when this land has been under cultivation for some time without restoring the organic matter, the color of the surface becomes distinctly lighter gray than in the virgin state. The substratum of the Tifton sandy loam is usually a compact sandy clay of a mottled reddish, yellowish, and grayish or drab color. There are included patches too small to map of Ruston sandy loam, which have a reddish-yellow subsoil.

The Tifton sandy loam differs from the Norfolk sandy loam chiefly in having a high content of ferruginous pebbles, and more mottling of reddish in the lower subsoil.

This type is the most extensive soil of the county and is found in all parts of the uplands. It occurs as level to undulating, and in some places moderately steep to gently rolling, areas. It is well drained, except in some of the very flat places, where associated with the Portsmouth or Scranton soils. Harrowing the surface as soon as possible after rains destroys the thin crust which usually forms following soaking rains and causes undue evaporation.

Longleaf pine constitutes the principal tree growth on this type, and broom sedge and wire grass are the chief native grasses.

The Tifton sandy loam, and the closely related Tifton fine sandy loam are the most valuable soils of Tattnall County. Cotton and corn are the principal crops grown. The sandy loam produces from one-third to three-fourths bale of Sea Island cotton and from

one-half to 1 bale of short-staple cotton per acre with the common methods of culture, and moderate fertilization or manuring. When a high-grade fertilizer is used in addition to green manuring or liberal additions of some form of vegetable matter or barnyard manure a bale of Sea Island cotton or $1\frac{1}{2}$ bales of short-staple cotton is not an uncommon acreage yield. Corn ordinarily yields 25 to 30 bushels per acre, and sugar cane from 200 to 250 gallons of sirup. Oats, peanuts, cowpeas, velvet beans, sorghum, Irish potatoes, sweet potatoes, onions, watermelons, cantaloupes, cucumbers, strawberries, and raspberries do well. Bermuda, crowfoot, and crab grasses succeed, and with proper liming and inoculation alfalfa can be grown. Pecans as a cultivated nut do well.

A fertilizer that has given good results on this soil is a 10-2-5 mixture applied at the rate of 400 or 500 pounds to the acre.

Farm lands on this type range in value from about \$35 to \$60 an acre.

A deep phase of the Tifton sandy loam is found, which has not been separately mapped. It consists of a gray or grayish-brown sand or loamy sand, underlain at about 6 to 8 inches by brownish-yellow sand or loamy sand, which passes at about 15 to 18 inches into yellow sandy loam, and this into bright-yellow or reddish-yellow, friable sandy clay at a depth of about 20 to 30 inches. The pebbles are not so plentiful as in the typical soil.

This phase is very limited in extent and occurs as small areas within tracts of the typical Tifton sandy loam. The topography is level to gently rolling and the drainage is good.

The crops grown on this soil are the same as on the other Tifton sandy loam areas, but the yields are somewhat lower. The organic matter is more rapidly exhausted under cultivation and more liberal additions of fertilizer or manure are required to produce as good yields. When the organic-matter content is allowed to run low crops suffer from drought.

Tifton sandy loam, rolling phase.—The chief difference between the rolling phase of the Tifton sandy loam and the typical soil is the more rolling topography and shallower soil depths of the former. The soil is a gray or grayish-brown loamy sand or sandy loam, underlain at about 6 inches by brownish-yellow sandy loam, which passes into a bright-yellow or reddish-yellow friable sandy clay at any point from about 8 to 15 inches. Along the crests of narrow ridges and upon steep slopes the sandy subsoil has been locally exposed at the surface by erosion. Included with this phase are a number of small areas of Orangeburg sandy loam and Ruston sandy loam and gravelly sandy loam too small to map. The former has a grayish to reddish-brown surface soil underlain at 4 to 8 inches by a red, friable sandy clay.

The Ruston sandy loam is a gray to yellowish loamy sand, underlain by friable yellowish-red clay.

The rolling phase of the Tifton sandy loam is found in almost all parts of Tattnall County, but is most extensively developed in the northern part.

The topography is gently rolling, except in a few places where there are sharp ridges and steep slopes. The natural drainage is good.

The crops grown and the agricultural methods used are the same as on the typical development of the Tifton sandy loam. Cultivation of the steeper slopes is more likely to be followed by erosion than in case of the typical soil, and accordingly good agricultural usage necessitates terracing or seeding to soil-binding crops such as Bermuda grass in order to prevent erosion.

Land of this phase sells for about \$25 to \$45 an acre, depending on the lay of the land and the distance from a shipping point.

TIFTON FINE SANDY LOAM.

The Tifton fine sandy loam to a depth of 3 or 4 inches is a grayish-brown loamy fine sand, which runs fairly high in organic matter. Below this is a gray loamy fine sand, which at about 8 inches changes into yellow or brownish-yellow loamy fine sand or fine sandy loam. This passes into yellow fine sandy loam and at about 15 to 20 inches into bright-yellow, friable fine sandy clay. This clay often becomes mottled with red and is a little more compact toward the bottom of the 3-foot section. A distinguishing characteristic of both soil and subsoil is the abundance of ferruginous pebbles. The pebbles are most abundant on the crests of ridges and gradually disappear with descent of slope until the type passes into the Norfolk fine sandy loam.

This type, with the exception of very small areas along the larger valley slopes, lies on level to undulating surfaces. It occurs west of the Ochoopee River.

The drainage is fair, but in places where the surface is very flat or slightly depressed ditching is needed.

The principal tree growth on this type is longleaf pine. Wire grass is abundant.

The Tifton fine sandy loam, on the whole, is not surpassed by any soil in Tattnall County in crop-producing value. The best results have been obtained where crops are rotated with a legume and where a high-grade fertilizer is applied with either barnyard manure or the turning under of legumes. Land treated in this manner gives yields of 1 to 1½ bales of short-staple cotton per acre, three-fourths to 1 bale of Sea Island cotton, 250 to 350 gallons of sirup, and very good yields of Irish potatoes, sweet potatoes, velvet beans, cow-peas, oats, peanuts, string beans, cantaloupes, watermelons, cucumbers, onions, and strawberries. Pecan-nut trees do well. Land values range from about \$35 to \$60 an acre.

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

Mechanical analyses of Tifton fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
253517.....	Soil.....	0.8	6.2	8.6	61.9	10.9	7.9	3.5
253518.....	Subsoil.....	1.2	6.0	7.0	50.2	9.2	7.2	19.3

NORFOLK SERIES.

The soils of the Norfolk series are characterized by the light-gray to grayish-yellow color of the surface soils and by the yellow color and friable structure of the subsoil. They occupy nearly level to rolling uplands throughout the Coastal Plain and have been derived from unconsolidated deposits of sand and clay. In Tattnall County five types of this series are mapped—the sandy loam, fine sandy loam, coarse sandy loam, sand, and coarse sand.

NORFOLK SANDY LOAM.

The Norfolk sandy loam is a gray sand or slightly loamy sand underlain at a depth of 6 or 8 inches by grayish-yellow or pale-yellow sand or loamy sand, which, at about 14 to 20 inches, passes into a mealy, friable yellow sandy clay. This sometimes is slightly mottled with brown and red in the lower part of the 3-foot section. Where the plowing has been deep enough to turn up the yellowish sub-surface or subsoil material the color at the surface is a pale yellow, and again where the vegetation has been burned off or continuous cultivation has been carried on for several years without the incorporation of organic matter the soil becomes distinctly lighter in color than in the virgin state. Brown ferruginous pebbles are present in varying quantities in both the soil and subsoil of many areas, sometimes making it difficult to draw a definite boundary between this soil and the Tifton sandy loam. The subsoil is often underlain within 4 or 5 feet of the surface by a substratum which varies from a compact loamy sand to very friable sandy clay mottled white, gray, pink, red, yellow, and drab.

This type is found in flat to undulating areas occupying minor stream divides. The flatter areas would be benefited by artificial drainage, since there is a tendency toward soggy in wet seasons and caking or hardening during dry weather. Shallow cultivation in such places as soon as possible after rains tends to destroy any surface crust or compact condition.

The principal timber growth on this type is longleaf pine. Wire grass is abundant.

The Norfolk sandy loam ranks next to the Tifton sandy loam in the production of short-staple and long-staple cotton. One bale of short-staple cotton to the acre has been obtained where the soil is well supplied with organic matter and moderate applications of commercial fertilizer or barnyard manure are made, in conjunction with careful cultivation. Fertilizer mixtures analyzing about 10-2-5 have been found especially efficacious. Corn and oats with ordinary fertilization do very well on this soil. Cowpeas and velvet beans grow luxuriantly. The growing of these plants improves the soil, while the plowing under of any green vegetation adds to the supply of humus.

Bermuda grass does well on the Norfolk sandy loam and its phases and supplies good pasturage. Crowfoot grass and crab grass also succeed. Good yields of hay can be procured from these grasses and also from cowpeas, peanut tops, and velvet beans. Alfalfa has been grown successfully on this soil. To grow this legume it has been found necessary to add lime in liberal quantities, and usually to inoculate the soil, which is done by simply scattering over the surface several hundred pounds to the acre of fresh soil obtained from an established field of alfalfa or sweet clover. In addition, a mellow and highly fertile seed bed free from weeds is generally necessary for good results. Land of this type ranges in value from \$25 to \$40 an acre.

Norfolk sandy loam, rolling phase.—The rolling phase of the Norfolk sandy loam is very similar in color and texture to the typical soil, but differs in that the sandy clay in some places comes near the surface or even outcrops along the crests of ridges and upon steep slopes.

This phase occupies hillsides and ridges. The topography is prevailingly gently rolling to rolling, and in places consists of sharp ridges and steep slopes.

The natural drainage of this phase is always adequate. The run-off is too rapid on many slopes, and it is consequently necessary to terrace or grow soil-binding crops to prevent erosion.

Very good crops have been grown on this soil where manured or fertilized and kept well supplied with organic matter. The price of this land ranges from about \$10 to \$25 an acre.

Norfolk sandy loam, deep phase.—The deep phase of the Norfolk sandy loam is a light-gray to brownish-gray sand, which passes into yellow sand to loamy sand at about 10 inches, and into mealy, bright-yellow sandy clay at about 20 to 30 inches. The soil carries less silt and clay than the typical Norfolk sandy loam, and is less compact and generally more deficient in organic matter. A few iron pebbles are present on the surface and throughout the soil mass.

This phase holds an intermediate position between the typical Norfolk sandy loam and the Norfolk sand, and contains many areas of both which are too small to show on the map. In places the sandy clay is scarcely reached within the 3-foot section.

The Norfolk sandy loam, deep phase, is the most widely distributed of any of the Norfolk soils. It occupies a level or flat surface but is well drained.

This soil is not as productive as the typical soil, but is superior to the Norfolk sand. It is very low in organic matter and moisture-holding capacity.

This phase is used with best results in the production of sugar cane, sweet and Irish potatoes, watermelons, and corn. The sirup produced is of excellent quality, but the yields are somewhat lower than on heavier soils. By using 800 to 1,200 pounds of a 9-4-5 fertilizer in conjunction with barnyard manure or cottonseed meal, yields of 200 gallons of sirup per acre have been obtained. With proper fertilizing and care watermelons yield as high as one-half carload per acre, sweet potatoes 150 to 200 bushels, short-staple cotton one-half to 1 bale, and corn 20 to 30 bushels. The application of 500 pounds per acre of a 10-2-5 brand of fertilizer has been found very effective for cotton.

Farms on this phase range in value from about \$10 to \$25 an acre.

Norfolk sandy loam, deep rolling phase.—The soil of the deep rolling phase is about the same in character of material as that of the deep phase. It consists of gray sand underlain at about 10 inches by yellow sand, which becomes loamy at about 18 or 20 inches and grades into yellow, friable sandy clay at about 20 to 30 inches. A few ferruginous pebbles are found in both soil and subsoil. There are places where the clay is not reached above 30 inches. As mapped, small areas of Norfolk sand are included with this phase.

The surface is generally rolling or sloping. Lower slopes, where wash from above has accumulated, are very characteristic locations for the occurrence of the phase. The natural drainage is always adequate and often excessive.

Most of the Norfolk sandy loam, deep rolling phase, which has been cultivated is in a rather impoverished condition and in need of organic matter. The steeper slopes of this type are not suitable for cultivation because of wash and erosion, but should be seeded to soil-binding crops, such as Bermuda or other grass. Land of this kind is valued at about \$7 to \$15 an acre.

Norfolk sandy loam, flat phase.—The Norfolk sandy loam, flat phase, is a dark-gray or dark grayish brown loamy sand, underlain at about 6 inches by yellowish-gray sand or loamy sand, which, at about 18 to 30 inches, passes into friable grayish-yellow sandy clay, faintly mottled with deeper yellow. The surface soil has a higher

content of organic matter than any of the other Norfolk soils. A substratum of compact sandy clay is encountered at about 6 to 8 feet.

The surface of this phase is almost level. The natural drainage is imperfect and the best results have followed ditching.

The agricultural value of this phase is about the same as that of the Norfolk sandy loam, deep phase, and about the same treatment is given for best results except that ditching is necessary on this land and not on the deep phase.

The principal timber growth on this phase is longleaf pine. Wire grass, broom sedge, and gallberry are abundant. Land of this kind is held at approximately \$10 an acre.

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam is a brownish-gray to dark-gray fine sand or loamy fine sand underlain at about 2 or 3 inches by gray to yellowish-gray fine sand to a depth of about 10 inches, where yellow, loamy fine sand to fine sandy loam is encountered. This passes at about 14 to 20 inches into bright-yellow, friable fine sandy clay, which continues to a depth of 36 inches or more without important change. Ferruginous pebbles may be found in any part of the 3-foot section, but are not so numerous as in the Tifton soils.

The Norfolk fine sandy loam is of small extent, the largest area being that northwest of Ryals Bridge. It is closely associated with the Tifton fine sandy loam and the Norfolk sand.

The topography is level to undulating and the drainage is fair. In places where the type occupies very shallow basins ditching would be helpful.

The crops grown on this type and the yields obtained, as well as the methods of treatment, are about the same as on the Norfolk sandy loam. Farms on this soil range in value from about \$20 to \$40 an acre.

NORFOLK COARSE SANDY LOAM.

The Norfolk coarse sandy loam consists of a gray coarse sand, underlain at about 8 inches by pale-yellow or yellowish-gray coarse sand, which passes into yellow, friable, coarse sandy clay at any point from about 15 to 30 inches. The structure of the soil ranges from loose to rather compact. The lower subsoil is in places mottled with red.

This type is inextensively developed, occurring in small areas along lower slopes. The topography is undulating to gently rolling, and the drainage is always good.

The native vegetation consists mainly of longleaf pine and wire grass.

About the same crops are grown on this soil as on the Norfolk sandy loam. It is not quite so productive, requiring heavier fertilization

to produce as good yields. About the same general methods of management are required.

NORFOLK SAND.

The surface soil of the typical Norfolk sand, to a depth of about 5 or 6 inches, consists of a gray or light-gray incoherent sand, sometimes slightly darkened with organic matter. The subsoil to a depth of 36 inches or more is a yellowish-gray to pale-yellow loose sand. Generally, this sand extends to a depth of about 6 to 20 feet without important change. Some included areas are rather fine in texture. Quartz gravel is present in places.

The Norfolk sand is found in all parts of Tattnall County. The principal development is in a belt about 25 miles long and from 1 to 5 miles wide, lying immediately east of the Ochoopee River.

The surface is that of a level to gently rolling plain, occasionally interrupted by stream valleys and "bays." Almost everywhere there are evidences of wind work, and in some small areas a dune topography has been developed.

The characteristic timber growth on this type is scrub oak, including considerable blackjack oak, with some longleaf pine. There is a sparser growth of wire grass than on the heavier Norfolk soils.

Scarcely any of the typical Norfolk sand is under cultivation. It is a friable, well-drained, and droughty soil. Owing to its "warm" nature early vegetables do especially well on it. For good yields of any crop heavy applications of barnyard manure, compost, or complete mixtures of commercial fertilizer are necessary. This soil has a very low content of organic matter and is greatly benefited by plowing under green manures.

The selling price of the Norfolk sand ranges from about \$1.50 to \$15 an acre.

There are some included areas, not shown on the map, occupying flat situations where the drainage is not so thorough as in the typical undulating, gently rolling, and higher level areas. In these the immediate surface soil has a darker color and the subsoil is more grayish than in the case of the typical development of the type. This phase of the Norfolk sand represents an approach toward the characteristics of the Scranton soils.

Also, some areas, on the whole of small extent, were mapped with the Norfolk sand which represent a rather distinct phase or close approach to the characteristics of the deep phase of the Norfolk sandy loam. These mostly occupy lower slopes and low ridges of rolling country. This soil has a loamy, deep subsoil, loamy sand being reached at a depth of about 30 inches.

The principal timber growth is longleaf pine. Wire grass grows abundantly and broom sedge is common.

A large proportion of the soil having a loamy, deep subsoil is cleared and under cultivation. Where liberally fertilized with an acreage application of about 400 pounds of a 10-2-5 mixture or treated with barnyard manure an acreage yield of three-fourths of a bale of cotton has been realized. The usual application of 200 to 250 pounds of a low-grade fertilizer gives poor results. An application of about 800 to 1,200 pounds of a 10-2-5 fertilizer has proved very satisfactory for sweet potatoes, watermelons, and sugar cane. The cane sirup is of excellent quality. Applications of cottonseed meal have been found very effective for Irish potatoes and sugar cane. Ordinary yields of sweet potatoes range from about 60 to 600 bushels, of Irish potatoes 50 to 150 bushels, and cane sirup 125 to 250 gallons per acre. The ordinary yields of cotton are generally about one-third bale and of corn 10 to 15 bushels per acre.

This soil is especially deficient in organic matter, and is improved by the application of liberal quantities of barnyard manure or by turning under green-manuring crops. This portion of the Norfolk sand sells for about \$10 to \$15 an acre.

NORFOLK COARSE SAND.

The Norfolk coarse sand to a depth of about 10 inches is a loose, gray coarse sand. The subsoil is a yellowish-gray to pale-yellow, loose coarse sand, becoming pale-yellow to medium-yellow at lower depths. Quartz gravel and ferruginous pebbles are commonly present.

Only a small extent of the Norfolk coarse sand is mapped in Tatt-nall County. The largest area occurs south of Jarriel Bridge. The topography of this body is gently rolling, being traversed by numerous small valleys of drainage ways. Throughout the county the type occurs in scattered areas, usually 2 to 8 acres in extent, few of which are sufficiently large to show on the map. They are usually encountered on lower slopes where the Norfolk sand and sandy loam are the predominating types above. The drainage is excessive.

The vegetation consists of scrub blackjack oak, with some longleaf pine, and a scant growth of wire grass.

Very little of this type is under cultivation. Owing to its excessive aeration and drainage, it warms up early and could, on this account, be profitably used for the production of early vegetables, such as cantaloupes, watermelons, cucumbers, sweet and Irish potatoes, and radishes. Heavy applications of manure or fertilizer would be necessary.

The selling price of this soil ranges from about \$2 to \$5 an acre.

PORTSMOUTH SERIES.

The soils of the Portsmouth series are dark gray to black, and are high in organic matter. The subsoils are light gray to mottled gray and yellow, and the heavier members are always plastic, though usually carrying a noticeable quantity of sand. These soils are developed in flat to slightly depressed, poorly drained situations and require ditching before they can be used for agriculture. They are derived from unconsolidated sands and sandy clays. The series is most extensively developed in the flatwoods or the low, seaward portion of the Coastal Plain lying east of the Mississippi River. Scattered areas are frequently found in the poorly drained depressions of the higher Coastal Plain country. In Tattnall County three types are recognized—the sandy loam, sand, and loam.

PORTSMOUTH SANDY LOAM.

The soil of the Portsmouth sandy loam is a dark-gray or black loamy sand with a high percentage of organic matter and ranging from 8 to 16 inches in depth. The subsoil is a gray, drab or very pale yellowish drab sandy loam, which generally passes at about 20 to 36 inches into gray or drab clay mottled with yellow and, in some areas, with reddish or brownish colors. In some instances the subsoil is a sandy loam to a depth of 36 inches or more. The lower subsoil is generally saturated.

The type is closely associated with the Portsmouth sand, Scranton sand, and Scranton sandy loam, and, as mapped, includes small areas of all these types. Generally the Scranton soils are found in narrow belts between the Portsmouth sandy loam and the Norfolk or Tifton soils and in areas slightly elevated above the Portsmouth.

The Portsmouth sandy loam is an extensive type. It is principally developed between Manassas and Glennville. Areas from 10 to 400 acres in size occur throughout the county.

The type occurs at the highest altitudes in the county, occupying rather extensive and level tracts where few streams have developed, and none has cut deeper than 4 or 5 feet below the general level. It is also found in areas of other soils in small depressions or "bays," and as strips along lower slopes paralleling the bottoms of streams.

The timber growth consists principally of longleaf and slash pine. Gallberry bushes and wire grass are common. Pitcher plant and saw palmetto often appear where the subsoil is saturated.

Because of the very poor natural drainage and the lack of ditches, scarcely any of the Portsmouth sandy loam is under cultivation. However, in dry years corn with very little fertilization has given yields of 30 to 40 bushels per acre.

Owing to the fact that the large areas of Portsmouth sandy loam are situated in the more elevated parts of Tattall County, the possibilities of drainage are very favorable, since almost any fall desired can be obtained. When thoroughly drained this soil will probably be equal, if not superior, to the Norfolk sandy loam for corn and oats. Where the sandy clay is not deeper than about 20 inches, the type has been found especially adapted to corn, onions, celery, cabbage, strawberries, and Irish potatoes. Moderate to liberal fertilization has usually been found necessary for good yields on this type of soil, especially after it has been cultivated for a few years. Applications of lime have been found beneficial. Land of this type ranges in selling price from about \$3 to \$10 an acre.

PORTSMOUTH SAND.

The Portsmouth sand consists of a very dark gray to black loamy sand with a high content of organic matter, and underlain at about 8 to 15 inches by gray, drab, or pale yellowish drab sand, frequently mottled with yellowish, brownish, and reddish colors in the lower portion of the subsoil. In other places the subsoil is mottled with pale yellow throughout. The lower subsoil is generally saturated and where exposed has a tendency to flow, causing the filling of open ditches and making drainage difficult.

The Portsmouth sand is almost all confined to the higher portions of the county known as "upland flatwoods." These are flat, poorly drained areas where few streams have intruded. A few narrow strips occur on the lower valley slopes bordering the bottoms of streams.

The timber growth consists mainly of longleaf pine. There is some slash pine. Gallberry, wire grass, saw palmetto, and pitcher plant are common.

None of this type is cleared, and extensive ditching will be necessary before it can be farmed successfully. If thoroughly drained, it can be used for corn and Irish potatoes, and probably such vegetables as onions, celery, and cabbage. At present it is used mainly as an open range for cattle and hogs. Heavy applications of fertilizer or manure will be required for good yields. The selling price of the Portsmouth sand ranges from about \$3 to \$5 an acre.

PORTSMOUTH LOAM.

The Portsmouth loam, to a depth of about 6 to 8 inches, is a black mucky loam or light loam, of a high organic content. This is underlain by dark-brown clay, grading downward into a gray or drab or mottled yellow, gray, brown, and drab tough clay. In places the lower portion of the 3-foot section is a sticky sand.

The type occurs in only a few small areas in Tattnall County, being found for the most part in shallow depressions of small size in the "upland flatwoods," in association with the Portsmouth sand and sandy loam. Some bodies occur in areas of the Tifton and Norfolk soils.

The drainage is very poor and cultivation is impossible without ditching. The type lies 1 or 2 feet lower than the adjacent soils.

The vegetation consists mostly of cypress, longleaf and slash pine, gum, gallberry, and saw palmetto.

Only a few acres of this soil have been drained and put under cultivation, but on these the record corn crops of the county have been grown, a yield of 127 bushels on 1 acre in 1913 having been obtained. Good results would probably be had with onions, celery, and cabbage. Additions of lime are usually beneficial on soils of this character after they have been drained.

PLUMMER SERIES.

The soils of the Plummer series are gray and frequently mottled with dark-brownish colors, and are underlain at a depth varying from 8 to 20 inches by compact light-gray material more or less mottled with streaks of brown and yellow. The lower portion of the subsoil usually consists of sandy clay or sticky sandy material, including pockets or layers of yellowish, plastic sandy clay. The soils are derived from reworked Piedmont-Appalachian material. They are nearly always in a sticky condition, water frequently standing on the surface after heavy rains. This series is typically developed in the flatwoods region of the South Atlantic and Gulf Coastal Plain. In this county only the sandy loam type is mapped.

PLUMMER SANDY LOAM.

The Plummer sandy loam is a gray loamy sand underlain at about 6 inches by light-gray, yellowish-gray, or drab sand, which passes at about 15 inches into either mottled grayish and yellowish plastic sandy clay or mottled drab and orange plastic sandy clay. The sandy clay continues to a depth of 3 feet or more, becoming more plastic at lower depths. The type, as mapped, includes small patches of Plummer clay loam and loam.

This type is inextensive, occurring only in small areas. It is found at the heads of streams and along lower valley slopes immediately adjacent to the bottom-land types.

This type supports a growth of longleaf and slash pine, pitcher plant, gallberry, wire grass, and broom sedge. In many places the subsoil is saturated and has a tendency to flow.

The Plummer sandy loam has not been utilized for agriculture, but with the establishment of good drainage similar crops to those grown

on the Portsmouth sandy loam could probably be produced, although the soil is probably less productive, and liberal fertilization would be required for good yields.

In the following table appear the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Plummer sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
253503.....	Soil.....	2.5	14.0	9.8	47.7	16.0	6.9	2.6
253504.....	Subsoil.....	4.3	14.7	10.2	40.0	15.0	6.6	9.1

SCRANTON SERIES.

The soils of the Scranton series are dark gray to black, with yellow friable subsoils. The surface soils have the characteristics of the Portsmouth series, while the subsoils resemble those of the Norfolk series. In the more poorly drained situations grayish mottling is frequently noticeable in the lower portion of the subsoils. The topography is flat and the soils are generally in need of better drainage, such as can usually be obtained by ditching. The Scranton soils are most extensively and typically developed in the flatwoods country near the coast of the South Atlantic States, in the lower flat lands near the Gulf of Mexico, and to the east of the Mississippi River. In Tattall County the series is represented by the sandy loam and sand members.

SCRANTON SANDY LOAM.

The Scranton sandy loam to a depth of about 8 to 12 inches is a dark-gray to black loamy sand, with a high content of organic material. The subsoil is a pale-yellow or yellowish-gray sand or loamy sand, which passes into a sticky sandy loam at about 15 inches. This continues to about 20 to 36 inches, where yellow sandy clay is encountered, which is often slightly mottled with reddish and grayish colors. In some cases the sandy loam continues to a depth of 36 inches or more.

Only a small total area of the Scranton sandy loam is mapped. It occurs in flat areas of imperfect drainage associated with the Portsmouth types, and as narrow strips between the Norfolk and Portsmouth soils. This type is better drained than the Portsmouth, but is not so well drained as the Norfolk. In all cases it is in need of ditching.

The vegetation consists largely of longleaf pine, gallberry, broom sedge, and wire grass.

Scarcely any attempt has been made to farm this soil. With proper drainage fair crops of corn, cotton, sugar cane, onions, sweet

and Irish potatoes, celery, and strawberries can be grown. Rice also has been successfully produced. The type is low in humus and applications of manure or fertilizer are essential for good yields.

SCRANTON SAND.

The surface soil of the Scranton sand consists of about 8 or 10 inches of dark-gray to black loamy sand, underlain by yellow sand, which at about 30 to 36 inches is sometimes slightly sticky.

This type is associated with the Norfolk and Portsmouth soils, generally occurring as a gradational soil between these series. It is also found as isolated tracts in areas of Portsmouth soils, standing slightly above the latter. It is very limited in extent and supports a growth of longleaf pine with wire grass, broom sedge, and gallberry bushes.

None of this type is cleared except where it occurs as small depressions in fields of Norfolk soils. With ditching it will produce corn, cotton, onions, celery, strawberries, cabbage, and Irish potatoes.

HOFFMAN SERIES.

The Hoffman series consists of gray surface soils and pink or mottled pink, gray, and reddish, compact subsoils. The subsoil material is partially cemented in places with iron salts, and carries white, floury material, consisting probably of decomposed feldspar. Fragments of cemented sandstone and iron concretions occur on the surface. These soils are developed mainly as small, scattered areas in the Sand Hill region along the line of contact of the Coastal Plain and the Piedmont. The topography is marked by low, rounded hills and smooth, winding ridges. The timber growth consists principally of longleaf pine and scrub oak. In Tattnall County the Hoffman coarse sandy loam is encountered.

HOFFMAN COARSE SANDY LOAM.

The soil of the Hoffman coarse sandy loam to a depth of about 15 to 20 inches is a gray to dark-gray coarse sand carrying a considerable quantity of fine to coarse gravel and a small percentage of ferruginous pebbles similar to those found in the soils of the Tifton series. The gravel, consisting mostly of quartz, occurs mainly near the surface, often covering the ground, giving fields a whitish appearance. The subsoil consists of yellow coarse sandy loam extending to a depth of about 24 to 30 inches, where it passes into mottled grayish, yellowish, and reddish coarse sandy clay of a rather compact structure. The mottled subsoil, with deep shades of red and yellow intermingled with the gray, giving a checkered appearance, is characteristic of the type.

Only one area of the Hoffman coarse sandy loam of sufficient size to indicate on the soil map was found. This lies 1 mile northwest of Daisy. Numerous small developments of this soil were found in this part of the county. The principal area occurs upon a rolling divide between two drainage channels and upon the general slope toward a small stream. The surface is gently rolling, and drainage is fairly good. The type occupies a topographic position between the Tifton sandy loam and the bottom soils of the streams.

The Hoffman coarse sandy loam, for some reason not apparent, is not very productive. A considerable part of the area mapped has been under cultivation in the past, but is now nearly all abandoned. Cotton and corn were the crops grown, but both seem to have made very poor yields. Where the land has been left out of cultivation, vegetation does not readily take hold and much of the surface is bare. The type, although it has a heavy sandy clay subsoil, seems to be droughty and is low in organic matter.

In the following table the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of this type are presented:

Mechanical analyses of Hoffman coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
253555.....	Soil.....	8.9	30.0	15.2	31.6	6.1	5.2	2.8
253556.....	Subsoil.....	10.0	29.1	13.6	30.0	6.2	6.1	4.5
253557.....	Lower subsoil...	14.4	24.5	10.8	20.5	2.0	3.9	23.7

KALMIA SERIES.

The surface soils of the types in the Kalmia series are gray to grayish yellow. The subsoils are mottled yellow and gray. The series is developed along streams of the Coastal Plain region on terraces lying largely above overflow. The soils occur typically and most extensively in the Coastal Plain region of Mississippi and Alabama. The materials forming the Kalmia soils are derived largely from the Coastal Plain soils, although on the larger streams issuing from the Appalachian Mountains and Piedmont Plateau more or less soil material from these regions is present. Four members of the Kalmia series are mapped in this survey—the sand, fine sand, sandy loam, and fine sandy loam.

KALMIA SANDY LOAM.

The typical Kalmia sandy loam consists of a gray to dark-gray sand, which grades at about 5 to 8 inches into pale-yellow or grayish-yellow sand or loamy sand, which in turn is underlain at depths rang-

ing from about 15 to 30 inches by yellow, friable sandy clay, often mottled with orange, grayish, and reddish-yellow colors. This continues to a depth of 3 feet or more.

As mapped this type has some variations in color in both soil and subsoil. In places brick-red mottlings occur sparingly in the subsoil. Probably more than one-half of the acreage of this type has a dark-gray soil and a yellow subsoil mottled with gray. The gray mottlings become more conspicuous with increase in depth, and where they are most abundant the texture of the material seems to be heavier. This phase is intermediate between the better drained typical portions of the type on the one hand and the Okenee sandy loam on the other. In the latter case the boundaries between the two are rather arbitrary and some small areas of the latter type have been included, as well as a few small bodies of Kalmia sand and fine sandy loam, the extent of which did not warrant a separation. In color, texture, and structure the type is comparable with the Norfolk and Scranton sandy loams of the uplands.

This type is one of the most extensive and widely distributed terrace or second-bottom soils of the county. It occurs in small to large bodies along the Altamaha, Canoochee, and Ochoopee Rivers and their larger tributaries. North of the Altamaha River this type appears on three different terraces. On the second bottom or lower terraces it is associated with the Leaf soils, but on the higher terrace with the Okenee soils.

The surface of the different areas of this type is either level or very gently sloping. The type lies about 5 to 25 feet above the level of the first bottoms of the streams and is mostly well above overflow. At times the minor streams upon emerging from the uplands overflow small areas for short periods. Although water seldom stands upon the surface for any considerable length of time, the position and topography render both the surface and subsurface drainage slow, and the lower portion of the soil and the subsoil often remain saturated for comparatively long periods. The type in places receives seepage and drainage water from adjacent slopes. Small circular or elliptical areas of cypress swamp occur in the large bodies of this type. The water table is comparatively close to the surface at all seasons. Artificial drainage is necessary for the best agricultural utilization of the type.

The original forest cover, now largely removed, consisted of long-leaf and slash pine, with saw palmetto, gallberry, and wire grass. The present timber stand is scattered and the trees are small. The common practice is to burn over the surface in the spring to improve the pasturage. This results in the destruction of organic matter and also injures or kills the young pines, which tend to make a rapid growth and would, if properly cared for, produce valuable timber.

Only a small acreage of the better drained portion of the type is under cultivation, cotton, corn, and oats being the common crops grown. Sweet potatoes are grown, but only for home use. The soil, when well drained, warms up early and under the same treatment gives in average seasons practically the same yields of crops as the Norfolk sandy loam. In dry seasons the yields are a little higher than on the Norfolk soil, as the soil holds moisture better. Sugar cane produces well and the quality of sirup is good. The methods of planting, cultivation, and fertilization are the same as for the Norfolk sandy loam.

The value of land of this character ranges, with conditions of drainage, location, and improvements, from about \$10 to \$40 an acre.

KALMIA FINE SANDY LOAM.

The soil of the Kalmia fine sandy loam is a gray to dark-gray fine sand which grades at about 6 to 8 inches into pale-yellow fine sand to loamy fine sand, which in turn is underlain at about 15 to 34 inches by pale-yellow, friable fine sandy clay. Frequently the upper portion of the subsoil is a fine sandy loam. The lower subsoil in places is mottled with grayish and reddish colors, especially where the drainage is more imperfect. The soil, though moderately compact in its virgin state, becomes loose upon cultivation. The dark surface of uncultivated areas is due to the presence of organic matter.

The type, as developed on the Altamaha terraces, occupies a position intermediate between the Kalmia sand or sandy loam and the Leaf very fine sandy loam. There are some included patches of Leaf fine sandy loam too small to map. These have a subsoil consisting of mottled yellow, gray, and reddish clay. Also some bodies have a mottled yellow and gray sandy compact clay subsoil passing below into friable yellow sandy clay.

Although the type occurs in various parts of the county, its most typical and extensive development is in the central part of the Dinner Branch Precinct, which includes that part of the county lying immediately east of the confluence of the Altamaha and Ohoopée Rivers. Here its continuity is broken by strips of Swamp along the branches and by areas of Okenee soils.

The surface of the type is that of a nearly level terrace interrupted by moderately shallow drainage ways and depressions in which other soil types occur. Its elevation above the normal level of the streams ranges from about 10 to 20 feet. In places in the Altamaha bottoms a low terrace front marks the boundary between it and the Leaf very fine sandy loam on the river side, while in other cases the one merges gradually into the other. As a rule, no topographic differences in elevation and surface separate it from the other soils of the Kalmia series.

The type lies above overflow. Water stands on the surface for only short periods after heavy rains, and most of the land is fairly well drained.

The original forest growth consisted mainly of longleaf pine. Native grasses now grow abundantly on the cut-over areas. Small to medium-sized second-growth pine is common in places. Gallberry and other small shrubs common to the region are in places abundant. Approximately one-fifth of the type along the Altamaha River is cleared for farming. About an equal acreage is devoted to the production of corn and cotton, the principal crops. Sugar cane, sweet potatoes, and oats rank next. The yields in average seasons compare favorably with those of the other terrace soils and with those of the Norfolk fine sandy loam of the uplands. In seasons of heavy rainfall the yields are slightly lower, but in seasons having less than the average rainfall the yields are higher than for the deeper and sandier soils of the terraces and uplands. Both long and short staple cotton is grown. In recent years, owing to the decline in price of the former variety, there has been an increase in the acreage devoted to the latter. Yields of one-half to three-fourths and even 1 bale to the acre of the short staple are reported, and 2 to 3 acres are required to produce a bale of the long-staple product. Corn yields 10 to 30 bushels per acre, depending upon the treatment, and particularly upon the fertilization. A good quality of sirup is made from sugar cane grown on this type. Fertilizer or manure is necessary for good yields of any crop.

Land of this character may be purchased in tracts of varying size at about \$10 to \$35 an acre.

KALMIA SAND.

The typical Kalmia sand consists of a gray loose sand underlain at a depth of about 8 to 10 inches by grayish-yellow to yellow sand extending to a depth of 3 feet or more without important change. The lower subsoil of poorly drained areas often shows faint mottlings of gray and in places is slightly loamy. The substratum, occurring as a rule at about 4 to 6 feet below the surface, is identical with the subsoil of the Kalmia sandy loam. The virgin soil has a moderately low organic content, which is quickly exhausted under the prevailing methods of farming.

In occurrence this type is closely associated with the sandy loam of the same series and with the Okenee sand. It occupies slightly higher areas than either of these types and may usually be distinguished by the character of its vegetation. The individual bodies range from small to fairly large, and the aggregate area is such that the type will be of considerable importance agriculturally when

developed. It has a wide distribution on the terraces along the Altamaha, Ohoopce, and Canoochee Rivers and some of their larger tributaries.

The type occupies either small level terraces or portions of terraces where it occurs as gentle swells within areas of other soils of the *Kalmia* or *Okenee* series. Because of its structure it is naturally well drained, but its position is such that it often receives surface drainage water and seepage from adjoining upland types. Water seldom stands on the surface after rains.

The type is comparable in agricultural value with the Norfolk sand and in a lesser degree with the Scranton sand of the uplands. Its position renders the drainage less thorough than that of the Norfolk sand, and often necessitates a later planting of crops. On the other hand, more moisture is available for growing crops late in the season, though crops on the deepest portions would suffer during especially dry seasons. The yields on well-drained and well-farmed fields of this type compare favorably with those on the Norfolk sand, being perhaps a little better.

The forest cover originally consisted mainly of longleaf pine, with a scanty growth of underbrush. The deeper, sandier portions have, in addition, a growth of scrub oak. Palmetto is common where the timber stand is not heavy. Wire grass grows abundantly in the open places.

The merchantable timber has been removed, but only a comparatively small percentage of the type has been cleared for farming. With other undeveloped areas it is burned over early in the spring to facilitate early pasturage for cattle and hogs, for which it is used during a large part of the year.

At present the most extensive farming operations on this soil are carried on in Dinner Branch Precinct. Short-staple cotton, corn, and oats are the most important crops. Some sugar cane and sweet potatoes are grown for home use. The yields range from low to medium, averaging slightly lower than those on the *Kalmia* sandy loam and fine sandy loam. Crops are rather heavily fertilized with commercial preparations at planting time and practically no stable or green manures are used. A variety of vegetables succeed.

Tracts in an undeveloped state are held at about \$5 to \$10 an acre, while cleared land is valued at \$15 to \$25.

Kalmia sand, light-gray phase.—The *Kalmia* sand, light-gray phase, is a white or very light gray sand 1 or 2 inches deep, passing into incoherent gray sand, which grades at about 5 inches into pale-yellow, loose sand having a deeper yellow or orange-yellow color in the lower part of the 3-foot section. The surface has almost a snow-like appearance, in places resembling the Leon sand. It is underlain at a depth of about 5 to 15 feet by stratified sandy deposits and at

greater depths by heavy, impervious clay, mottled drab, reddish yellow, and red, and similar to the subsoil of the Leaf very fine sandy loam. In this heavy clay cypress stumps are exposed in cuts along the Ochoopee River. Immediately above the clay is a stratum, a few feet thick, of a brown, compact, carbonaceous sand.

This phase of the Kalmia sand lies to the west and south of the escarpment which marks the line between the uplands and the second bottom of the Altamaha and Ochoopee Rivers. Other isolated areas, ranging in size from a few acres to over a square mile, are found between the mouths of the Ochoopee River and Beards Creek.

The material of this phase is practically identical in color, texture, and structure with that of the Norfolk sand of the uplands. It differs from the latter in that it overlies stratified, water-laid deposits similar in character to those of the second bottoms of the Altamaha and Ochoopee Rivers. It differs from the typical Kalmia sand in having a much lighter color in the surface inch or two.

The topography of the main body of the phase is level to gently undulating and the surface lies about 35 to 50 feet above the first bottoms of the river. The small isolated areas have a hummocky or dunelike surface, and are 35 to 60 feet above the level of the river.

The forest cover consists mainly of medium-sized scrub oak, with some blackjack and longleaf pine. Native grasses grow very sparsely.

The cultivation of this soil is confined to small portions of the large area in the vicinity of Cow Ford School and Oak Grove Church, where it seems to have a larger moisture content than usual. Medium yields of the staple crops are obtained. The phase is commonly regarded as of low value.

KALMIA FINE SAND.

The gray, loose fine sand of the surface soil of the Kalmia fine sand grades at about 5 inches into moderately compact pale-yellow or yellow fine sand, which extends to a depth of 3 feet or more without important change. In places there is a faint mottling of gray and yellow in the lower portion of the subsoil.

The Kalmia fine sand is closely associated with the Kalmia fine sandy loam. It is very limited in extent and occurs mainly in the Dinner Branch Precinct in small isolated areas, some of which are too small to show on the soil map.

The surface of the type, though slightly higher than that of the surrounding soils, is practically level. Its position is such that it receives no seepage water and its structure permits good to excessive drainage. In dry seasons crops would probably suffer to some extent from drought.

The native vegetation consists of scrub oak, pine, palmetto, and grasses. None of the soil is under cultivation, except small areas within the Kalmia sandy loam.

The type warms up early in the spring, and while the moisture-holding capacity is not high, it exceeds that of the Norfolk fine sand, which the soil closely resembles in texture and structure. A substratum of sandy clay or of heavier texture underlies the type and assists in preventing excessive leaching. With liberal use of commercial fertilizer or manure, the type should produce fair yields of the staple crops, as well as of sugar cane, forage crops, sweet potatoes, and various other vegetables.

OKENEES SERIES.

The surface soils of the Okenees series are dark gray to black, with subsoils of gray mottled with yellow. They occur as terrace soils along the rivers of the Coastal Plain and have a level topography and poor drainage conditions. In some cases the surface soil has enough organic matter to make it somewhat mucky. The subsoils are usually water-logged. In Tattnall County three members of the Okenees series are mapped, the sandy loam, fine sandy loam, and sand.

OKENEES SANDY LOAM.

The soil of the Okenees sandy loam is a dark-gray to black sand or loamy sand, of a high organic-matter content, underlain at about 6 to 8 inches by gray sand to loamy sand extending to a depth of about 15 to 30 inches, where gray sandy loam to sandy clay showing mottlings of yellow is reached. The material becomes heavier below a depth of about 3 feet, consisting, as a rule, of rather impervious clay. In structure both soil and subsoil are moderately compact.

Variations from the typical are frequent. The type grades on the one hand toward the Kalmia sandy loam, the percentage of yellow increasing in the subsoil as that of the gray decreases, so that in many cases the boundary between the two types is arbitrary. On the other hand it grades into a dark-gray soil with a gray to drab subsoil. In the latter case the lower subsoil is usually a clay loam to silty clay. In depth to clay there is also considerable range, the average being more than 2 feet, which is somewhat more than that of the upland sandy loams.

The greater part of this type is found in the northern part of the wide second bottom of the Altamaha River, where it occurs in close association with the Kalmia sandy loam. The type is also found in smaller bodies on second bottoms along the Ochoopee River and other streams.

The surface of the type is practically level. The type lies 8 to 20 feet above the level of the stream bottoms, or sufficiently high to be above overflow at all seasons.

Both the surface and subsurface drainage are slow and water stands on the surface for long periods after heavy rains. No system of drainage has been developed. Watermelon and Muskmelon Creeks cross part of the Altamaha terraces where most of the type occurs, but they flow in shallow channels and receive practically no tributaries in this part of their course. Short branches from the uplands adjacent to the Okenee soils sink upon reaching the sandy Okenee terraces, thus maintaining wet seepage flats.

The original timber cover of longleaf pine has largely been removed. Small to medium sized pines, gallberry, palmetto, and grasses are now the principal growth.

Practically none of the type is under cultivation, as it is considered too "cold" and wet for the successful production of farm crops. It is burned over in the spring in order to improve the pasturage. Almost all of it is unfenced and is used for open range for cattle and hogs. Reclamation by drainage is essential to its development for farming. It is believed that there is sufficient fall over the areas occupied by this type and the fine sandy loam of the series to enable open ditches and laterals to carry off all excess water. Portions of the same terraces, composed of practically the same materials, but slightly higher and better drained, are producing fair to good yields of general farm crops. The judicious use of limo would probably be found beneficial to crops. Manure or fertilizer would be necessary for good yields. The best use of the type in its present state is for forestry and pasturage. No efforts are being made to promote the growth of young trees. The annual spring burning destroys the small young pines which would in a comparatively short time attain sufficient size for timber and turpentine production.

Corn, oats, sugar cane, sorghum, cotton, and various forage crops have been successfully produced on drained areas of Okenee sandy loam in various portions of the cotton belt.

OKENE E FINE SANDY LOAM.

The Okenee fine sandy loam is a dark-gray to black loamy fine sand underlain at an average depth of about 10 or 12 inches by gray fine sandy loam, which at about 15 to 24 inches rests upon gray to mottled gray and yellow fine sandy loam to fine sandy clay, extending to a depth of 3 feet or more. As a rule the type is underlain at greater depths by a more impervious substratum. Gray is the predominant color of the subsoil, and in places the subsoil is uniformly of this color. In other places yellow mottling is found only in the lower subsoil. Small circular cypress swamps comprising a soil of heavier texture are common. The soil has a moderately high content of organic matter.

The largest area of the type occurs in that portion of the second bottom of the Altamaha River lying just west of Lumber Bridge, on Beards Creek. Small bodies are found in the same bottom between Watermelon and Muskmelon Creeks and in terraces along some of the larger streams in other parts of the county.

The surface of the type is practically level. Water stands upon the surface for long periods after rains and the whole soil section remains saturated during the greater part of the year. Drainage ways have not been developed and the rainfall seeps away slowly through the subsoil and substratum, which are plastic and rather impervious.

The merchantable timber has been removed and the type now supports only scattered young pines, with gallberry and palmetto less common than on the sandier soils. Native grasses are fairly plentiful.

The present use of this type is for pasturage for cattle and hogs. Like other tracts of similar character, it is burned over each spring to remove the old grass. This practice destroys at the same time the seedling trees which would later produce merchantable timber. Drainage is necessary for the development of the type for agricultural purposes. When reclaimed it should, under efficient management, produce fair to good yields of corn, oats, sugar cane, sorghum, cowpeas, lespedeza, and cotton. It has produced these crops elsewhere quite successfully.

The type is held in large tracts and there have been no recent changes in ownership. It may be purchased at a low figure.

OKENEES SAND.

The soil of the Okenees sand is a dark-gray to black sand or loamy compact sand extending to a depth of 6 to 10 inches, where it passes into light gray, which color extends to a depth of 3 feet or more. In some instances the subsoil has a slightly loamy texture, and is of a dark brown to black color. In other places a compact stratum of brownish carbonaceous material, about 6 to 10 inches in thickness, occurs between the dark-gray soil and the light-gray lower subsoil. There are some included areas of Myatt sand, which differs from the Okenees sand in having a gray surface color. The type is usually underlain by a more or less impervious substratum at varying depths.

The Okenees sand is developed most extensively on the second bottoms of the Altamaha River, especially in Dinner Branch Precinct. Small areas occur within bodies of other soils of the same series and still others, too small to map, occur within the Kalmia sand and sandy loam.

The position of the type in "bays" and depressions or other localities of level or slightly sloping character renders both the surface

and subsurface drainage very slow and imperfect. The soil receives seepage and drainage waters from higher lying areas, and its subsoil remains saturated the greater part of the year. Certain portions are swampy and have been so indicated on the soil map. Water stands on the surface for a considerable period after rains.

Pines, palmetto, and gallberry comprise the principal growth. Native grasses grow in the open places. Trees found in the "bays" are water oak, magnolia, titi, and other water-loving shrubs and vines.

None of the type is farmed. Portions of it afford pasturage for cattle and hogs. Until a system of artificial drainage is established it should be devoted to the growth of timber and grass. When drained and reclaimed it will probably prove of rather low agricultural value. Applications of lime likely would prove beneficial. Heavy additions of fertilizer or manure would be necessary for good yields of any crop.

LEAF SERIES.

The soils of the Leaf series are of light-gray to gray color. The subsoils characteristically consist of compact gray or mottled gray and yellow silty clay, which grades downward into mottled red and gray or red and yellow plastic clay, through which moisture and air move slowly. Iron concretions are of common occurrence on the surface. These soils are developed on stream terraces of the Coastal Plain region. In Tattnall County the fine sandy loam and very fine sandy loam types are recognized.

LEAF FINE SANDY LOAM.

To an average depth of about 10 or 12 inches the Leaf fine sandy loam consists of a gray fine sand to loamy fine sand. This is underlain abruptly by mottled red, yellow, and gray plastic clay, which extends to a depth of 3 feet or more. The soil is moderately compact, is low in organic matter, and carries a very small quantity of mica particles. Near the contact with the first bottom the sandy mantle is deeper than elsewhere. The subsoil is stiff and rather impervious to air and water. Pockets of grayish sand may be found in the lower subsoil.

The Leaf fine sandy loam differs from the Leaf very fine sandy loam in that red is more conspicuous in the subsoil. In structure, texture, and color it closely resembles the upland soil, the Susquehanna fine sandy loam, which appears in this county, but only in isolated tracts too small to map separately. Some small areas of Kalmia fine sandy loam are mapped with the Leaf fine sandy loam.

The occurrence of this type is mainly confined to the river side of the extensive terrace or second bottoms of the Altamaha River in

the southern part of the county. In other parts of the county the type is rather inextensive and is confined to small terraces or portions of terraces along some of the larger streams.

The surface is level to gently undulating. Both the surface and subsurface drainage are imperfectly established. A number of poorly defined drainage courses cross the type in places. This land lies about 10 to 25 feet above the normal level of the river and portions of it are overflowed during excessively high water.

The native vegetation consists mainly of longleaf pine and grasses. The latter are utilized for grazing cattle and hogs. Practically none of the type is under cultivation. Land of this character is commonly considered rather unproductive. Well drained and efficiently managed, the same soil is quite successfully used in the production of cotton in various parts of the South.¹ Moderate to liberal use of fertilizers is made in the production of the crop. Sugar cane, oats, peanuts, sorghum, and lespedeza are other crops which have been successfully grown on it.

LEAF VERY FINE SANDY LOAM.

The soil of the Leaf very fine sandy loam is a gray very fine sand to very fine sandy loam to about 5 to 10 inches, where a yellow or mottled yellow and gray plastic clay is abruptly encountered. This quickly passes into mottled yellow, red, and gray impervious clay, which extends to a depth of 3 feet or more. In places the red mottlings appear in the upper part of the subsoil and increase as the gray mottlings decrease. Pockets of gray fine sand occur in the lower subsoil. There is quite a range in depth of soil within short distances. In places the heavy subsoil material is very near the surface or outcrops, while the surface mantle of very fine sand is as much as 18 inches deep in some other spots. Certain small areas having a fine sand or sandy soil are included within the limits of the type as mapped. Streams crossing the type are bordered by very narrow strips of swamp. The soil of this type is very compact and is low in organic matter.

The type is found mainly on the river side of the second bottoms of the Altamaha River. The surface is level to gently sloping or undulating. It lies about 10 to 25 feet above the level of the first bottoms of the river. In depressions and over flat areas water stands on the surface for some time after rains. As a whole, the type does not remain saturated as long as the coarser textured soils farther back from the river bottoms. The type is crossed by Muskmelon Creek, Pearson Mill Creek, and the several forks of Watermelon Creek, which, although they follow well-defined courses, flow in channels only slightly lower than the surface of the type. A

¹ See Soil Survey report, Russell County, Ala., Field Operations of the Bureau of Soils, 1913.

number of small branches afford more or less imperfect surface drainage. The subdrainage is very poor, as the subsoil does not admit of free air and water movement. The low-lying portions adjacent to the river bottoms are overflowed at times of excessively high water.

The original forest cover of longleaf pine has largely been removed. The pine reproduction is very scattered, and native grasses now cover most of the surface.

Practically none of the type is cultivated or fenced. It is used as open range for cattle and hogs. The type has very nearly the same agricultural value as the Leaf fine sandy loam.

The selling value of land of this character is low where the timber has been removed. Large tracts may be purchased at \$5 to \$10 an acre.

The results of mechanical analyses of samples of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Leaf very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
2535421.....	Soil.....	0.6	1.9	1.4	44.4	34.0	13.4	4.2
2535431.....	Subsoil.....	.6	.8	1.0	38.5	18.2	10.4	32.6

THOMPSON SERIES.

The soils of the Thompson series are grayish brown, while the subsoils are predominantly yellow, although they usually show a mottling of gray and shades of brown and yellow. The subsoil of the heavier members is slightly plastic, but not too impervious to admit of good underdrainage where drainage outlets, as ditches, are provided. These soils are developed in the first bottoms of streams in the Coastal Plain region, and they are subject to overflow. They are characteristically poorly drained. The soil material has been washed largely from the Coastal Plain soils. In this survey the sand and sandy loam members of the series are mapped.

THOMPSON SAND.

The Thompson sand consists of a loose, porous, gray or light-gray sand, underlain at a depth of about 10 inches by yellowish loose sand, which at about 30 to 36 inches shows dull-gray mottlings. A substratum of yellowish sandy clay usually underlies the type at about 4 to 10 feet.

This soil has its main development in the flood plains of the Ochopee River, but it also occurs along many of the smaller streams. It is closely associated with the sandy loam of the same series. As mapped, the type includes small undifferentiated areas of other types of the same series as well as soils of the Johnston and Chastain series.

The surface is level or flat, with numerous depressions in which are found small areas of Thompson and Johnston sandy loam. The type lies 5 to 10 feet above the normal level of the river and is subject to frequent overflows.

The principal timber growth consists of longleaf and slash pine, live and water oak, and black, sweet, and tupelo gum. All the type is timbered and is used for pasturage. On account of the topographic position and loose character its agricultural value is low. This soil is probably best suited to corn, oats, sugar cane, sorghum, and other forage crops.

The value of land of this type is based largely upon the stand of timber and ranges from about \$5 to \$10 an acre.

THOMPSON SANDY LOAM.

The Thompson sandy loam is a grayish sand to loamy sand underlain at about 6 to 10 inches by pale-yellow to yellowish-gray loamy sand, which at about 14 to 20 inches grades into a rather friable sandy clay of pale-yellow to yellowish-gray or mottled yellow and gray color. The mottlings become more numerous near the lower part of the 3-foot section. An organic-matter content higher than that of the type as a whole gives the immediate surface of some patches a dark-gray color. Pockets and thin strata or lenses of grayish sand are common in the subsoil. A heavy, plastic substratum underlies portions of the type.

As mapped this type is subject to considerable variation in color and texture within short distances, and includes small areas of Johnston and Chastain sandy types, other soils of the Thompson series, and Swamp. Typical areas of the Thompson sandy loam resemble the Norfolk sandy loam most closely of the upland soils.

The most extensive development of the type is in the first bottom of the Ochoopee River. Smaller areas occur along the Canoochee River and other large streams of the county.

The surface is level to slightly hummocky and is traversed in places by old stream channels and cut-offs. It is subject to frequent inundations lasting several days, and water stands in depressions for some time after the streams have fallen below the general level of the surface. It is crossed by numerous small branches and the portions of the type adjacent to the uplands receive considerable seepage water and remain saturated for long periods.

The forest cover consists of longleaf and slash pine, water and live oak, black, tupelo, and sweet gum, and other trees, with a medium to dense growth of vines and shrubs common to the locality.

None of the type is improved for agriculture. It affords some pasturage for hogs and cattle. In its natural condition it is probably best suited to the production of grasses for hay. When ditched and

protected from overflow it could be utilized for the staple crops of the region, particularly corn, oats, sorghum, sugar cane, lespedeza, and various forage crops. The chief handicap to its development is the fact that overflows may occur after the planting season.

The sale value of land of this type at present is based largely upon the stand of timber and ranges from about \$5 to \$10 an acre.

The following table shows the results of mechanical analyses of samples of the soil and subsoil of the Thompson sandy loam:

Mechanical analyses of Thompson sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
253546.....	Soil.....	8.4	22.0	11.0	37.5	9.6	8.3	3.2
253547.....	Subsoil.....	4.8	16.8	10.2	34.6	8.6	7.4	17.5

JOHNSTON SERIES.

The Johnston series comprises soils of black color and high organic-matter content with gray or mottled gray, yellow, and brownish subsoils. These soils occupy the first bottoms of streams in the Coastal Plain region. They are alluvial in origin and subject to overflow. The material is derived from the Coastal Plain soils, with a varying admixture of material from the soils of other provinces. In Tattnall County only the sandy loam type is mapped.

JOHNSTON SANDY LOAM.

The surface soil of the Johnston sandy loam is a dark-gray to black loamy sand to an average depth of about 8 inches. This is underlain by gray loamy sand or sand, which at a depth of about 14 to 24 inches rests upon gray to mottled gray and yellow sandy loam to sandy clay. Below a depth of about 3 feet the subsoil quickly gives way to a gray, drab or mottled yellow and gray or drab, plastic, impervious clay. As the high organic content, which gives the surface soil its prevailing dark color, decreases, the color of the soil becomes lighter.

Like most of the recent-alluvial soils of the county, this type is subject to variation in texture and structure and to a lesser degree in color. Material grading from fine sand to coarse sand or coarse sandy loam belonging to the same series as well as to the Thompson and Chastain series may be encountered within the limits of the type as mapped. The small extent of these included soils and their irregularity of distribution prevent their satisfactory separation.

This type is confined to the poorly drained first bottoms of the Canoochee and Ohoopee Rivers and a number of creeks. In the river bottoms it commonly occurs along the outer margins, with

more extensive areas of Thompson sandy loam on the river side. The areas are usually long and narrow, and frequently too small to map.

The surface is practically flat. Both surface and subsurface drainage are very poorly established. The land receives considerable quantities of seepage water from the uplands. Water stands on the type for long periods after floods. The soil lies only slightly above the normal stream level and is frequently overflowed. The structure is moderately compact, and the subsoil is naturally saturated most of the time.

The timber cover consists of longleaf and slash pine, willow, maple, ironwood, dogwood, titi, bay, black, tupelo, and sweet gum, water oak, and cypress, with a medium to dense growth of vines and shrubs. Where the timber stand is not too dense native grasses flourish.

None of the type is under cultivation. At present its only use is for pasturage. Artificial drainage is necessary to its development for farming. This may be accomplished by dredging and straightening the river channels and by the construction of open laterals wherever necessary. Reclamation will incidentally include the Thompson sandy loam, with which this type is often associated in the larger bottoms. The drainage of the narrow strips along minor streams will be difficult on account of seepage water. It is probable that along such streams the most profitable use of the type will be for the production of hay and pasturage. The more extensive areas, when reclaimed by ditching and leveeing, will be adapted to the production of staple crops of the section, particularly to corn, oats, sugar cane, and sorghum.

CHASTAIN SERIES.

The Chastain series includes grayish to dark-gray surface soils and gray to mottled gray and yellow subsoils. There is usually a substratum of mottled red and gray, impervious, plastic clay which hinders drainage. These soils occupy first bottoms of streams in the southern Coastal Plain region. The material consists of sediments derived from Coastal Plain soils. In Tattnall County only the fine sandy loam type is mapped.

CHASTAIN FINE SANDY LOAM.

The soil of the greater portion of the Chastain fine sandy loam consists of a gray to dark-gray fine sand, passing at about 12 to 24 inches into fine sandy loam of a light-gray to pale-yellowish or mottled grayish and yellowish color, underlain at about 26 to 30 inches by heavy, stiff, impervious very fine sandy clay having a drab or gray color mottled with red and yellow. The mottled color of the lower subsoil is typical, but the degree of mottling varies somewhat

with the conditions of drainage. On the higher land the red and yellow colors predominate, while in the poorly drained areas the color approaches a solid gray. There are included patches, too small to map, of coarse sandy loam and silt loam.

The type everywhere has a flat surface, broken only by sloughs, by stream channels, and by occasional depressions and inequalities due to erosion by overflow water. All of the areas are subject to inundation, but the higher areas along the Canoochee bottoms is covered only at rare intervals. The drainage is naturally poor, but the elevation of the greater portion of the type is such that artificial drainage would present no great difficulties.

At the present time very little of the type is under cultivation, as it is not very highly valued as farming land. Inadequate drainage rather than fear of overflow has kept the land out of cultivation. Much of the type could be improved at a moderate cost by ditching, and made to produce fair crops of corn, grasses, and forage, but as yet little attempt has been made to do this, as there is abundant well-drained land available at a low price. The agricultural value is about the same as that of the Leaf fine sandy loam. This land is usually sparsely covered with pine, sweet gum, oak, and in the depressions with cypress, titi, and other water-loving trees.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of this type:

Mechanical analyses of Chastain fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
253548.....	Soil.....	0.6	2.2	2.2	53.9	18.3	14.0	8.4
253549.....	Subsoil.....	.2	2.1	2.0	53.6	21.0	13.6	7.3
253550.....	Lower subsoil...	.1	.8	.8	36.0	20.0	8.5	33.7

MISCELLANEOUS MATERIAL.

PEAT.

The material mapped as Peat consists of dark-brown vegetable matter in varying stages of decomposition. The immediate surface soil is usually black. The beds vary from about 2 to 8 feet or more in depth and are so full of partially decomposed logs, stumps, limbs, and roots that it is often difficult to bore into them with the soil auger. In the more open portions of the Peat swamps there are large quantities of sphagnum moss.

Only two important beds of Peat occur in the county, the larger lying 2 miles west of Reidsville and the other forming a narrow belt in the Ochopee flood plain between Ryals and Shepards Bridges.

Many small patches are mapped with Swamp in the flood plains of sluggish branches throughout the county.

The Peat beds occupy low, flat areas, and on account of their position and the high water table the natural drainage is very poor.

The Peat has been formed through the partial decomposition in the presence of water of a rank vegetation, consisting of sphagnum moss, grasses, reeds, titi, gallberry, cypress, and other water-loving trees and plants.

Until drained these Peat areas have no value for agriculture. The soils are rich in nitrogen but deficient in potassium and phosphorus. When reclaimed, they will be found adapted to such vegetables as onions, celery, and Irish potatoes.

SWAMP.

Swamp has been separated into two classes, the one comprised largely of Congaree material and the other of Johnston material. The former is found in the flood plains of the Altamaha River. While this area as mapped is not exclusively Swamp, it is so interspersed with bayous, sloughs, and bays that a swampy condition almost everywhere prevails and during high-water stages it is entirely inundated.

The material varies in texture from a coarse, medium, fine or very fine sand to a heavy clay. The color ranges from brown to red, with considerable rusty-brown and drab mottling from the surface downward. The lighter textured soil appears in the natural levees of the river and along bayous and sloughs.

Much of the fine material originated in the Piedmont Plateau, while the coarser deposits are probably largely of Coastal Plain origin.

This type of Swamp supports a dense tree growth, consisting of white, black, and water oak, black, sweet, and tupelo gum, slash and longleaf pine, ironwood, dogwood, cypress, magnolia, and bay. In addition there is found a growth of saw palmetto, gallberry, and other vines and shrubs.

The better drained portions afford some pasturage for hogs and cattle, but no further agricultural utilization is possible until levees are constructed to protect this area from overflow by the Altamaha River and other large streams that flow into this river from the north. Much of the soil is believed to be productive and adapted to the staple crops of the region, but its reclamation by ditching and diking is a matter to be undertaken only on a large scale and at great expense.

The areas of Swamp composed principally of Johnston material occur as narrow strips of wet, soggy land which support a dense growth of longleaf and slash pine, bay, magnolia, titi, maple, cypress, gallberry, and other water-loving trees and plants. The areas border

nearly every branch and creek in the county. The material is usually sandy in texture, dark gray in color, and carries a large quantity of organic matter in the surface portion. Such areas where of sufficient width have been mapped as Swamp, but some of the narrow strips have been included with the adjoining soil types. Streams traverse certain of these areas in rather poorly defined channels and water spreads out over the Swamp after rains. In other places water flows only after protracted wet spells, but seepage from the uplands keeps the land in a saturated condition during the greater part of the year.

These areas, owing to their small extent, low position, and poor drainage, have a low agricultural value. Reclamation by ditching would be warranted only where the area is sufficient to justify the expense. When improved, they should be adapted to the production of lespedeza, corn, grasses, and various forage crops.

SUMMARY.

Tattnall County is located in southeastern Georgia and comprises an area of 597 square miles, or 382,080 acres.

The surface varies from flat to gently rolling. The greater part of the county is well drained, but there are extensive poorly drained stretches in the upland as well as on the terraces and in the stream bottoms.

The territory now comprising Tattnall County was settled in the latter part of the eighteenth century. In 1910, according to the census, the county had a population of 18,569; the size and population of the county has, however, been reduced since then in forming Candler County.

Good transportation facilities are afforded by four railroads and river service. There is a considerable mileage of sand-clay roads, and the dirt roads are usually kept in fairly good condition. Rural mail routes and telephone lines reach nearly all sections of the county.

The climate of Tattnall County is mild and pleasant. The summers are long and hot, but are moderated by breezes. The growing season is long and all crops mature without danger of frosts. The mean average precipitation for the year is 53 inches, which is well distributed.

General farming is the principal industry. Cotton is the leading crop. Both Sea Island and short-staple upland cotton are produced, the acreage devoted to each being about the same, although short-staple cotton is growing in favor. Corn, oats, and sugar cane are among the leading products. Sweet and Irish potatoes are the most important vegetables, oats and cowpeas constitute the hay crops, and velvet beans and peanuts are grown for forage. Watermelons, cantaloupes, cabbage, cucumbers, and snap beans do very well, but

are grown only for home consumption. The cultural methods have been much improved during the last decade.

The soils of Tattnall County form a part of two provinces, the Coastal Plain and the River Flood Plains. The Coastal Plain soils are represented by 6 series and 14 types. The River Flood Plains soils, which consist of 6 series and 13 types, exclusive of Swamp and Peat, are from alluvial deposits.

The Tifton sandy loam and fine sandy loam are the strongest and most productive soils of the county. These soils are especially adapted to cotton, 1 bale to the acre being a common yield for short-staple cotton where the clay is within 8 to 12 inches of the surface. Oats, corn, velvet beans, cowpeas, and Bermuda grass give good yields. Truck crops do well on the deeper phases.

The Norfolk soils are not so productive as the Tifton, yet where the clay is near the surface very good crops of cotton, corn, oats, sugar cane, and forage are grown. The deeper sandy soils are loose, droughty, and deficient in organic matter. The Norfolk soils are warm natured and suitable for early truck crops.

The Portsmouth, Scranton, and Plummer are upland soils, occurring in the "flatwoods" section and other poorly drained areas of the county and are at present undeveloped. When drained, they should make good corn and trucking soils.

The Hoffman coarse sandy loam is an inextensive and unimportant upland type.

The Kalmia soils of the stream second bottoms are well above overflow and generally well drained. They resemble the Norfolk series in character of material and crop production. As with the Norfolk soils, the depth of the sandy clay below the surface is the prime factor in determining productiveness.

The Okenee and Leaf series are poorly drained soils of the second bottoms. They are used almost exclusively for grazing, but could be utilized in producing the staple crops if properly drained.

The Johnston, Chastain, and Thompson series are flood-plain soils at present used only for grazing. Their reclamation would entail extensive ditching and the construction of levees. If burning over could be prevented, the reproduction of longleaf pine would be profitable on these soils.

The Peat beds are almost worthless in their present state, but if drained would, with proper fertilization, give good yields of onions, celery, and Irish potatoes.

The reclamation of the Swamp would in most cases require labor and expense not warranted by the present price of land. Its most profitable use is for pasturage and forestry.

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