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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF FLORENCE COUNTY, SOUTH CAROLINA.

BY

J. H. AGEE, J. A. KERR, AND W. E. McLENDON.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1914.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1916.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., September 23, 1915.

SIR: In the extension of the soil survey in the State of South Carolina work was undertaken in Florence County and completed during the field season of 1914.

I have the honor to transmit herewith the manuscript and map covering this area and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1914, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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Soil map, Florence County sheet, South Carolina.

SOIL SURVEY OF FLORENCE COUNTY, SOUTH CAROLINA.

By J. H. AGEE, J. A. KERR, and W. E. McLENDON.

DESCRIPTION OF THE AREA.

Florence County is situated in the east-central part of South Carolina, about halfway between the coast and the Piedmont region. It is bounded on the north by Darlington and Marlboro Counties, on the east by Dillon and Marion Counties, from which it is separated by the Peedee River, on the south by Clarendon and Williamsburg Counties, and on the west by Sumter, Lee, and Darlington Counties. It has an area of 751 square miles, or 480,640 acres.

The elevation above sea level is probably nowhere much over 100 feet. The surface of most of the county is flat. There is some variation in the surface, consisting principally of slight elevations in the undulating uplands and the gently rolling topography along drainage courses. The stream bottoms and second bottoms (terraces) are practically all level, except for the slight interruptions of drainage-way depressions and abandoned stream channels. Topographically almost all of the county is well suited to cultivation and is too nearly level to be subject to serious erosion.

The Peedee River extends along the entire length of the eastern boundary of the county and is navigable above the county at least as far as Cheraw, near the North Carolina line. Wide bottoms border this river. Black Creek, the first important tributary below the Darlington-Florence County line, has very little swamp along its course and has a well-defined channel. Jeffries Creek, another important tributary of the Peedee, crosses the northern part of the county. Lynches River first touches the county at the extreme western corner. In places Sparrow Swamp, one of the tributaries of Lynches River is more than a mile wide. Along Lynches River there are wide terraces in places, as on the southeast side of the river opposite Elim. The county is not ramified by a widespread drainage system; in fact, in large areas there are not sufficient streams to carry off the drainage water.

Artesian wells supply water for many of the towns, villages, and farmhouses, and flowing wells are numerous in the southern part

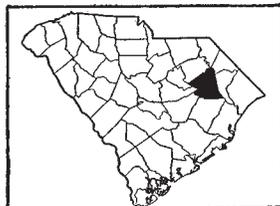


FIG. 1.—Sketch map showing location of the Florence County area, South Carolina.

of the county. Many of the open, shallow wells are only 10 or 12 feet deep, while the deep wells, which are usually artesian, range from 50 to 500 feet in depth.

Florence County was organized in 1888 from parts of Darlington and Marion Counties. Since then its area has been increased on three occasions by additions from Williamsburg County. The early settlers came from the eastern part of the State and from colonies to the north. They were mainly of English, French Huguenot, and Scotch-Irish descent. Many of the families living in the county at the present time are direct descendants of these early settlers. According to the 1910 census, the county has a population of 35,671, but this does not include the area recently annexed from Williamsburg County, which embraces the Scranton, Lake City, and Leo sections.

Florence, the county seat, has a population of 7,054. It is the railroad center for the eastern part of the State. The Atlantic Coast Line shops, employing several hundred men, are situated at this place. The elevation of Florence is 136 feet above sea level. Timmonsville has a population of 1,708 and is situated in a prosperous farming section. Lake City, in the extreme southern part of the county, has a population of about 1,200 and is a trading center for the surrounding section. Its elevation is 70 feet above sea level. Olanta is important as a trading center for the southwestern corner of the county. It has made considerable growth in the last few years and is one of the largest tobacco markets in the county.

Poston is situated on a high elevation in the neck between the Peedee and Lynches Rivers, about 35 miles from Florence. Considerable trucking is carried on in this section, and Poston is a point of shipment to the northern markets. Pamplico is on the Carolina, Atlantic & Western Railway about 20 miles from Florence. Ebenezer, Mars Bluff, Coward, Savage, Cartersville, Hyman, Hannah, Leo, and Effingham are small villages.

One line of the Atlantic Coast Line Railroad crosses the county from north to south and another crosses the northern section from east to west, the two lines intersecting at Florence. The Carolina, Atlantic & Western has a line from McBee to Timmonsville and another from McBee to Florence. An extension of this line has just been completed from Florence to Poston, where it connects with the Hamlet and Charleston division of the same line, the latter crossing the extreme southeastern corner of the county. The Alcolu Railroad enters the county in the southwest near Olanta and extends as far as Hamville, which is about 12 miles from Timmonsville and about 17 miles from Florence.

The county has a good system of public roads, and nearly all parts of it are supplied with rural mail delivery and telephone service.

The public schools have been greatly improved during the last four years. Substantial school buildings are to be seen in every section of the county.

CLIMATE.

Florence County has a mild, pleasant climate, and farming operations can usually be carried on throughout the year. The average date of the last killing frost in the spring is March 31 and of the first in the fall, November 7. The latest date recorded of killing frost in the spring is April 24 and the earliest in the fall, October 12. The planting of corn begins about the middle of March. Cotton and tobacco, being more susceptible to injury by cold weather, are not planted until the 1st of April, and planting continues until the 15th of May. Extremes of temperature seldom occur.

There is no record of crop failure due to insufficient rainfall. Crops are more likely to suffer from an excess of moisture than from drought. The annual precipitation is about 47 inches. Rainfall is heaviest during the growing season.

The following table, compiled from the records of the Weather Bureau station at Florence, shows the normal monthly, seasonal, and annual temperature and precipitation:

Normal monthly, seasonal, and annual temperature and precipitation at Florence.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	44.0	79	16	3.11	4.59	1.36
January.....	43.3	89	6	2.67	1.30	3.60
February.....	45.1	86	-1	4.45	5.49	6.52
Winter.....	44.1			10.23	11.38	11.48
March.....	55.3	98	20	3.25	1.98	3.89
April.....	61.1	94	26	3.10	2.42	6.12
May.....	72.6	100	38	3.72	2.89	4.46
Spring.....	63.0			10.07	7.29	14.47
June.....	78.6	103	43	5.31	2.82	3.43
July.....	81.4	107	59	5.72	2.43	6.79
August.....	80.3	100	54	5.73	4.22	6.33
Summer.....	80.1			16.76	9.47	16.55
September.....	74.6	99	30	4.21	1.16	6.77
October.....	63.0	90	30	2.87	3.79	4.44
November.....	54.3	90	17	2.41	4.38	1.26
Fall.....	64.0			9.49	9.33	12.47
Year.....	62.8	107	-1	46.55	37.47	54.97

AGRICULTURE.

The settlement of the portion of the State now embraced in Florence County was begun in the first half of the eighteenth century. Hunting and trading were the principal pursuits of the first settlers, little attention being given to agriculture. Various crops were tried by the settlers, and corn and wheat proved successful. With the introduction of the culture of indigo an impetus was given to agriculture which caused the farms to expand and the population to increase. A royalty was given by England for every pound of indigo exported from the Colonies, and this crop remained the chief source of income from the farms for more than 50 years. Portions of the Peedee River second bottoms were the first to be cultivated, but owing to the unhealthful conditions existing along the river the people moved back to the upland areas, near the other larger streams. Cotton later became the principal crop, and has continued so until the present time. Corn, wheat, and oats were grown, but little time or care was given to their cultivation. Agriculture underwent a period of severe depression during the Civil War. It gradually became reestablished, however, and is now in the most highly developed condition in its history. The growing of bright tobacco, an industry of comparatively recent introduction, has materially aided in the diversification of farming operations.

The first census report of agricultural conditions in the county was made in 1890, covering the year 1889. In this year there were 30,968 acres devoted to corn, with a production of 273,981 bushels; 43,614 acres to cotton, yielding 14,215 bales; 5,281 acres to oats, with a production of 53,025 bushels; 1,347 acres to sweet potatoes, with a production of 92,948 bushels; and 144 acres to tobacco, which produced 116,550 pounds. In 1899 the area in corn had increased to 39,983 acres, with a production of 381,970 bushels, and the acreage of cotton had decreased to 37,966 acres, from which 17,640 bales were harvested. The acreage of oats was 5,130 acres and the production 71,530 bushels. There was an important increase in both the acreage and production of tobacco, 3,961 acres producing 2,995,410 pounds. In 1909 the acreage and production of the leading crops were as follows: Corn, 33,512 acres, producing 585,461 bushels; cotton, 56,590 acres, producing 36,062 bales; and oats, 8,484 acres, producing 203,155 bushels. The tobacco acreage increased to 5,052 acres and the production to 4,362,338 pounds, an average of about 860 pounds per acre. In addition to these crops there were 4,223 acres in cowpeas, producing 11,006 bushels, and 5,503 acres in grains cut green for hay. Some of the minor crops grown for home consumption are Irish potatoes, beans, peanuts, wheat, sugar cane, sorghum, and miscellaneous vegetables.

The above census data do not include that portion of the county recently annexed from Williamsburg County, which embraces all of Lee, Lake, and Lake City Townships. In the vicinity of Lake City trucking is becoming quite important, beans, peas, tomatoes, cantaloupes, and the hardier vegetables, such as lettuce and cabbage, being grown and shipped to northern markets. Considerable tobacco is also grown in this section.

Farms operated by tenants are usually devoted mainly to the production of cotton, corn, and tobacco. The ordinary yield of cotton on such farms is a little over one-half bale per acre, while that of corn is about 16 bushels. These yields could easily be increased, as is demonstrated by the better farmers, who obtain 1 bale to 2 bales of cotton and 40 to 60 bushels of corn per acre. The yields of tobacco are quite satisfactory. About 65 per cent of the farms are operated by tenants.

Small tracts of virgin forest remain in the uplands, and the value of the timber on these has increased considerably in the last few years. Large quantities of cypress and gum are being cut from the swampy areas, the cypress being used for shingles and the gum for baskets and shipping cases for fruit and truck.

Land intended for cotton, corn, or tobacco is left bare during the winter and practically all of the plowing is done during the late winter and early spring. Experience indicates that better results follow where the land which is to be used for cotton, corn, or tobacco is thoroughly broken to a depth of 6 to 10 inches with a 2-horse plow and then harrowed to a good tilth for a considerable period before the rows are bedded.

The well-drained Norfolk soils, the fine sandy loam and sandy loam, are the principal tobacco soils. Small areas of cotton are grown on nearly every type of soil in the county, with varying results, depending on the soil, its state of improvement, the kind of management, and fertilization.

The ordinary yield of tobacco in the county is somewhat over 800 pounds per acre. The price has averaged about 14 cents per pound. During the year 1913, 11,242,723 pounds were marketed in this county, aggregating in value \$1,534,454. The tobacco is easily grown in connection with other crops, provided too large an acreage is not put in. Tobacco is the money crop of second importance in the county.

A larger yield of tobacco and better quality of leaf are said to be obtained by early setting, as late set plants are more likely to be damaged by worms. It requires about a week to cure the tobacco in the barn. All the tobacco is fire-cured.

Large quantities of commercial fertilizer are used in Florence County. In 1909, according to the census, 3,436 farms report a total

expenditure of \$536,146 for fertilizer. The greater part of the fertilizer is used in growing cotton, corn, and tobacco, heavy fertilization being necessary to insure vigorous and continuous growth. An 8-4-4 mixture in applications varying from 800 to 1,400 pounds per acre is generally used. Many of the farmers also give a light application of manure. Notwithstanding the heavy acreage applications used in growing tobacco, much the greater part of the fertilizer is applied to the cotton fields. Many of the farmers use a top dressing of nitrate of soda on cotton and corn in addition to the commercial fertilizer. Where nitrate of soda is used the ordinary applications range from 50 to 125 pounds per acre.

Florence County as a whole is a prosperous agricultural section. Improved farm machinery is used and properly housed in nearly every part of the county.

The price of land throughout the county is exceptionally high. The sandy loams and fine sandy loams, even with only fair drainage, sell for \$50 to \$150 an acre, and the sands bring as much as \$60 to \$70 an acre. The farm buildings are in most cases fairly well kept. Many 1-horse wagons and plows are used, heavy farm equipment being necessary on only a few of the farms.

SOILS.

The soils of Florence County are predominantly sandy, and include coarse sands, coarse sandy loams, sands, sandy loams, fine sands, fine sandy loams, and very fine sandy loams. There are scattered bodies of loam, silt loam, and clay, making an important total area, but very small as compared with the total extent of the sandy types. Difference in drainage conditions has had much to do with the present difference in character of the soils, having determined the color of the material by retarding or accelerating oxidation and the accumulation of dark-colored organic matter. The degree of drainage has been determined by topography mainly, but to a considerable degree by the porosity of the subsoil. The high and sloping sandy soils are well drained, while the low-lying soils and those having an impervious clay subsoil, such as the Coxville, have very poor or imperfect drainage. The uniform color of the soil and subsoil of types like the Norfolk, Ruston, and Orangeburg is due to good drainage and good oxidation, while the black surface-soil color and mottled subsoil color of soils like the Coxville and Portsmouth are due to poor drainage and poor oxidation.

The topographic position also has had some influence in determining the texture of the soils, even in the uplands. In low situations fine material has washed in from lighter textured soils of the surrounding slopes, thus developing soils finer textured, at least in the surface portion.

The soils are classified as (1) Coastal Plain or old sedimentary soils, and (2) stream-bottom soils, including (*a*) recent alluvium of the frequently overflowed stream bottoms and (*b*) old alluvium of the second bottoms, or terraces, standing now either above overflow or at least above normal overflow.

The Coastal Plain material was laid down by water, probably in the ocean which in prehistoric times covered the entire region. Since the recession of the sea this material has been changed in varying degrees by drainage and erosion. The overflowed stream bottoms—the first bottoms—are being built up by each successive overflow, alluvial material being laid down over the surface. Here little progress is being made in the direction of that process of weathering which gives rise to the well-drained upland soils, because the frequent addition of fresh soil and the poor drainage prevent oxidation, in many places apparently changing the darker deposits to gray material by deoxidation processes. On the better drained terraces the soils are being changed along lines more nearly like the process of weathering going on in the upland areas.

There are evidences of considerable shifting of the larger stream courses. Polk Swamp in all probability represents a former channel of Black Creek. The Peedee River at one time used the present channel of Herring Creek and a part of Back Swamp Creek and flowed along the bluff, returning to its present channel near the Atlantic Coast Line Railroad bridge. The Peedee River continued to cut back into the uplands until it reached Black Creek at the present head of Polk Swamp. After receiving the water from this stream the river has gradually shifted to the east, building up as it went the wide terrace as it now appears. Polecat Slough, on the lower edge of the wide terrace developed along Lynches River, represents a former channel of the latter stream, and it is used now as an outlet for the drainage of adjoining land.

Exclusive of Sandhill and Swamp, 31 distinct soil types are mapped in Florence County. These types are separated mainly on the basis of texture. They are grouped into 10 series on the basis of similarity of origin, color, or range of color, of the soil and subsoil, structure of the subsoil, and general topographic conditions. The upland soils mapped are the Norfolk, Orangeburg, Ruston, Portsmouth, and Coxville; the second-bottom or terrace soils are the Okenee, Myatt, Cahaba, Kalmia, and the first-bottom, the Johnston.

As a whole the soils of the county are in need of artificial drainage to promote the rapid run-off of water. Even some of the better drained soils would be benefited by shallow ditches through the fields.

In the following pages the several types are described in detail. Their distribution is shown on the accompanying map.

The following table gives the name and the actual and relative extent of each of the several soils mapped in Florence County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sandy loam.....	53,376	14.6	Norfolk very fine sandy loam..	6,976	1.4
Flat phase.....	16,960		Norfolk fine sand.....	6,912	1.4
Swamp.....	64,128	13.3	Johnston loam.....	4,736	1.0
Norfolk fine sandy loam.....	44,800	9.3	Myatt fine sandy loam.....	4,224	.9
Coxville sandy loam.....	40,832	8.5	Ruston sandy loam.....	4,224	.9
Portsmouth fine sandy loam..	28,672	6.0	Kalmia coarse sand.....	4,096	.9
Coxville fine sandy loam.....	27,840	5.8	Norfolk coarse sand.....	4,032	.8
Coxville loam.....	25,920	5.4	Ruston loamy coarse sand....	3,520	.7
Norfolk coarse sandy loam....	20,992	4.4	Ruston fine sandy loam.....	3,392	.7
Coxville very fine sandy loam.	17,216	3.6	Kalmia coarse sandy loam....	3,264	.7
Okenee loam.....	15,168	3.2	Cahaba fine sandy loam.....	2,752	.6
Portsmouth sandy loam.....	14,080	2.9	Orangeburg fine sandy loam..	1,920	.4
Kalmia fine sandy loam.....	12,224	2.5	Cahaba sandy loam.....	1,856	.4
Coxville silt loam.....	8,128	1.7	Sandhill.....	1,024	.2
Kalmia sandy loam.....	7,872	1.6	Orangeburg very fine sandy		
Norfolk sand.....	7,616	1.6	loam.....	256	.1
Kalmia clay.....	7,552	1.6			
Ruston coarse sandy loam....	7,104	1.5	Total.....	480,640
Portsmouth loam.....	6,976	1.4			

ORANGEBURG SERIES.

The soils of the Orangeburg series are gray to reddish-brown in color and open in structure. The subsoils are red in color and consist of a friable sandy clay. The series is confined to the uplands of the Coastal Plain, being most extensively developed in a belt extending from southern North Carolina to central Texas. In Florence County the Orangeburg series is represented by two types—the fine sandy loam and very fine sandy loam.

ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam consists of a grayish fine sand or loamy fine sand, passing at about 3 to 5 inches into yellowish loamy fine sand, which is underlain at about 8 to 15 inches by a reddish fine sandy loam, passing quickly into a red fine sandy clay. The clay is encountered within a few inches of the surface in occasional washed ("galled") spots.

The surface is mainly level to undulating, the type standing a little higher than the associated soils of the Norfolk series. Most of the type occurs in small areas in the northern part of the county. It is well drained and is easy to cultivate. The soil has a tendency

to form a crust after rains, but this can be largely prevented by keeping it well supplied with organic matter.

This is considered one of the best soils in the county for the general farm crops, with the exception of bright tobacco, the leaf of which is said to be inferior in burning and curing qualities when grown on this type. According to demonstrations by farmers and the South Carolina experiment station, from one-fourth to one-third less commercial fertilizer is required on this soil than upon the Norfolk fine sandy loam. Sweet and Irish potatoes, sorghum, cowpeas, velvet beans, vetch, cotton, corn, and peanuts succeed. Peaches are grown with success on this soil in many parts of the South.

ORANGEBURG VERY FINE SANDY LOAM.

The Orangeburg very fine sandy loam consists of a grayish very fine sand which passes at 5 or 6 inches into pale-yellow very fine sandy loam to loamy fine sand, and this, in turn, at about 10 to 15 inches, into red, friable fine sandy clay. The surface is very gently rolling to nearly level. Some eroded spots with a reddish surface soil are seen on the occasional slight slopes.

This type is very inextensive, occupying a flat area and a slope about 2 miles northwest of Florence.

This soil has about the same value as the Orangeburg fine sandy loam, but it is more inclined to bake, and consequently more care is required to keep it in good tilth. With good management cotton, oats, corn, grass, and forage crops should yield somewhat better than on the fine sandy loam. This type does not require so much fertilizer as the corresponding member of the Norfolk series.

COXVILLE SERIES.

The soils of the Coxville series are dark-gray to nearly black in color. The subsoils range from a moderately mellow, friable clay in the upper portion to yellowish, rather plastic, compact clay mottled with drab and bright red in the lower portion. The topography is prevailingly flat, with frequent sparsely timbered areas. The treeless lands are found on the savannas of the seaward portion of the Atlantic Coastal Plain. Most of the types are so flat that water stands on the surface, making open ditching necessary before they can be successfully used for agriculture. The series includes five types in Florence County—the Coxville sandy loam, very fine sandy loam, fine sandy loam, loam, and silt loam.

COXVILLE SANDY LOAM.

The surface soil of the Coxville sandy loam consists of a dark-gray to nearly black loamy sand to a depth of 3 to 5 inches, and below this

a yellowish to grayish sandy loam extending to a depth of about 10 to 15 inches. The subsoil is a mottled gray and yellow sandy clay, showing considerable red mottlings and being more plastic in the lower subsoil.

This soil is confined to flat and depressed areas of imperfect drainage. It has a wide distribution through the uplands, the larger areas occurring in the southern and southwestern parts of the county. The areas that have been ditched and put under cultivation give fair yields of cotton, corn, oats, cowpeas, and other forage crops. Tobacco does fairly well.

The original growth consists chiefly of longleaf pine. Cut-over areas have a second growth of longleaf pine, with a scattering of scrub oak. Wild grasses afford good grazing on some of these areas.

Applications of lime likely would prove beneficial to this soil when properly drained. Large applications of commercial fertilizers, with some manure, are used with all crops on this soil.

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

Mechanical analyses of Coxville sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
242406.....	Soil.....	9.8	24.0	8.2	17.4	8.4	24.9	7.4
242407.....	Subsoil.....	11.0	31.4	12.7	17.3	5.0	9.1	13.0

COXVILLE VERY FINE SANDY LOAM.

The Coxville very fine sandy loam consists of a gray to dark-gray loamy fine sand, underlain at about 5 inches by yellowish-gray, pale-yellow, or mottled gray and yellow very fine sandy loam or fine sandy clay loam, which at about 8 to 15 inches grades into gray fine sandy clay, usually mottled with yellow. In the lower part of the subsoil red mottlings appear and the structure is more plastic. Typically the lower subsoil is a plastic fine sandy clay or clay of a rather impervious nature and mottled yellowish-red and grayish-drab color.

The type occupies flats and slight depressions lying a little below the associated Norfolk soils and above the Portsmouth. Its drainage is imperfect, but not so poor as that of the Portsmouth. As mapped it includes some Portsmouth areas that can not satisfactorily be separated.

The largest area of Coxville very fine sandy loam occurs to the west of Hannah, extending along the public road toward Bass Bridge to Dry Branch, and up Dry Branch in an irregular area comprising about 2 square miles. The other small areas are scattered

throughout the upland in association with nearly all of the other types.

A considerable part of this type has been drained and put under cultivation. Corn, cotton, oats, and cowpeas do well. Some tobacco is grown. The forested areas support a good undergrowth of wild grasses and lespedeza. Lespedeza could probably be grown successfully as a hay crop. A variety of forage crops, also strawberries, Irish potatoes, tomatoes, and cabbage have been successfully grown on the sandy Coxville soils in other parts of the Coastal Plain, and undoubtedly would succeed here.

After rains this soil has a tendency to compact. This trouble likely can be eliminated or reduced by the proper use of lime and liberal additions of vegetable matter, either in the form of barnyard manure or green crops plowed under. Large applications of commercial fertilizers are used in the growing of all crops.

COXVILLE FINE SANDY LOAM.

The Coxville fine sandy loam is typically a gray to dark-gray loamy fine sand, underlain at 5 or 6 inches by yellowish-gray, pale-yellow, or mottled gray and yellow fine sandy loam to fine sandy clay loam, which in turn grades at about 10 to 15 inches into fine sandy clay mottled gray and yellow in the upper part and gray, yellow, and red in the lower part. The lower subsoil is characteristically plastic and rather impervious. In some of the lower situations the surface material is black and mucky, and there are included patches of Portsmouth fine sandy loam. There are also small patches of Norfolk fine sandy loam and a phase ranging from Coxville fine sandy loam to Norfolk fine sandy loam included with the type. These included soils were either too small or too irregularly distributed to map separately.

This soil occurs on flats and in shallow depressions having poor drainage. It is developed throughout the upland regions.

Much of this type has been drained and put under cultivation, principally to corn, cotton, and oats. Some tobacco is grown. Cowpeas, velvet beans, bur clover, crimson clover, and sorghum should do well. Lespedeza succeeds, and could probably be made a valuable hay crop. Strawberries, Irish potatoes, cabbage, and various vegetables are successfully grown on this soil in other parts of the State. Fertilizers are used generally, and lime would probably prove beneficial. Applications of manure and the growing of legumes increase crop yields.

COXVILLE LOAM.

The Coxville loam is a dark-gray to black loam, underlain at shallow depths by gray or mottled gray and yellow sandy loam to sandy

clay loam, this passing into mottled red, yellow, and gray or drab, compact sandy clay of rather plastic character. Included in the areas of Coxville loam are some small patches of Portsmouth soils which are too small and irregularly distributed to map satisfactorily. In many of the larger areas the soil consists of a dark-gray to black fine sand to loamy very fine sand underlain at a depth of about 2 to 4 inches by grayish-yellow silty loam to silty clay. The subsoil is the same as that of the typical developments.

The largest area of Coxville loam is that to the east of Bass Bridge, extending in a general north and south direction between Hyman and Hannah and separated from the swampy first bottom of Lynches River on the west by a narrow strip of well-drained land consisting principally of Norfolk soils and Coxville very fine sandy loam.

Artificial drainage is necessary before this type can be cultivated successfully. Most of it is forested with a second growth of long-leaf pine, with some shortleaf pine. Lespedeza and native grasses furnish some pasturage.

With proper drainage and some fertilization corn, oats, forage crops, strawberries, and cabbage may be expected to do well. Cotton also has succeeded on this soil.

COXVILLE SILT LOAM.

The Coxville silt loam is a black silt loam, passing at about 3 to 5 inches into a light-gray silt loam, and this quickly into a light-gray silty clay loam and then into clay showing yellow mottlings. The lower subsoil is typically a rather impervious, plastic clay, mottled red, yellow, and gray or drab in color. In places the subsoil does not show the red mottlings, and here the clay is more sandy; such areas represent inclusions of the Portsmouth silt loam. There are some included areas, occurring on flats and slopes, which have a grayish loamy very fine sand to silt loam, underlain at 2 or 3 inches by yellow fine sandy clay, passing at 12 to 14 inches into stiff, bright-yellow clay with reddish mottlings.

The type occurs in flat and slightly depressed areas of poor drainage, usually where streams have not developed to any considerable extent, and this accounts for the imperfect drainage of this as well as some of the other flat soils. The largest area occurs between Lake Swamp and the Lynches River in the vicinity of Lees Crossroads.

Most of the type is in forest of shortleaf pine, sweet gum, and black gum, with an undergrowth of myrtle, azalia, and fern. In a few places a growth of lespedeza and some wild grasses affords good pasturage. It is necessary thoroughly to drain this soil in

order to cultivate it. Corn and oats do well. Commercial fertilizer and barnyard manure are considered necessary for good yields. Tomatoes, strawberries, cabbage, onions, and several other vegetables will succeed. The type is used with considerable success in other parts of the State for strawberries.

On the included grayish areas cotton and corn do well when properly cultivated. Tomatoes, peas, beans, and potatoes have been successfully grown on this soil.

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

Mechanical analyses of Coxville silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt	Clay.
		<i>Per cent.</i>						
242412.....	Soil.....	0.2	1.3	0.8	22.0	7.6	56.8	11.0
242413.....	Subsoil.....	.1	.9	.7	15.1	7.6	53.6	22.2

PORTSMOUTH SERIES.

The Portsmouth series includes dark-gray to black soils, resting on light-gray or mottled gray and yellow subsoils. The soils are high in organic matter, and the heavier members are always plastic, though carrying a noticeable quantity of sand. The soils of this series are developed in flat or slightly depressed, poorly drained areas. The series is most extensively developed in the flatwoods or low seaward portion of the Coastal Plain east of the Mississippi River, though scattered areas are found also in the higher parts of the Coastal Plain country. Three types are encountered in Florence County—the Portsmouth loam, fine sandy loam, and sandy loam.

PORTSMOUTH LOAM.

The Portsmouth loam consists of a dark-gray to black mucky loam, underlain at about 10 to 24 inches by dark-gray or gray sandy clay loam or sandy clay, in some areas mottled with yellow. In places the lower subsoil is rather stiff, while in others it is decidedly sandy or even a coarse sand. The surface occasionally ranges close to sandy loam, and there are included areas of true sandy loam. In the western part of the county there are some included small bodies of Portsmouth silt loam, which differs from the loam chiefly in the silty character of the soil.

The type is distributed in small areas throughout the upland portion of the county, occupying depressions and naturally having very poor drainage. Only small patches of this type are under cultivation. Much of the better timber has been removed. Where the type

is well drained it produces good crops of corn and oats. The included silt loam would probably have about the same agricultural value as the loam when drained, although the soil likely would compact more and thus require more intensive tillage.

PORTSMOUTH FINE SANDY LOAM.

The soil of the Portsmouth fine sandy loam consists of a dark-gray to almost black loamy fine sand or fine sandy loam, underlain at depths of 5 to 10 inches by a light-gray fine sandy loam extending to a depth of about 15 inches. Here the subsoil proper begins. This is a light-gray fine sandy clay, usually mottled with yellow. In some places the subsoil is stiff, while in others it is friable.

This type is developed over low, flat areas not yet reached by streams. It is poorly drained. Some areas have been cleared, drained, and put in cultivation, but most of the type remains forested. A part of the timber has been removed, but there remains a growth of shortleaf pine, sweet gum, black gum, willow oak, and water oak. Azalia, huckleberry, gallberry, and other shrubs, vines, and ferns grow in abundance.

This is one of the most extensive soils in the county. It is associated with nearly every other type in the uplands. The largest areas are west and north of Hyman. Much of this type is utilized for grazing. Most of the cleared areas are used for growing corn and oats. Cabbage, cowpeas, and strawberries succeed.

PORTSMOUTH SANDY LOAM.

The Portsmouth sandy loam is a black loamy sand to sandy loam, underlain at about 6 to 12 inches by light-gray loamy sand or sandy loam, which grades into light-gray sandy clay or sandy clay loam, often mottled with yellow. In places the soil is of a dark-gray color. This is particularly true of the areas that have been drained and under cultivation for some time.

The type is distributed throughout the uplands, the larger areas occurring in the southwestern part of the county in the vicinity of Olanta and bordering Clarendon County.

It occupies poorly drained depressions. Some of these are referred to as "bays." All of the land requires drainage before it can be successfully used for agriculture. Most of the type supports a forest growth which consists chiefly of shortleaf pine, sweet gum, black gum, water oak, and willow oak, with usually a scattering of shrubs and vines.

Corn and oats do well on this soil where properly drained. Lime usually proves beneficial to a soil of this kind, but it has not been used to any extent in this county. Applications of commercial fer-

tilizer are made in the growing of all crops. In areas where g drainage has been established the type produces fair crops of cot and good crops of cowpeas.

NORFOLK SERIES.

The Norfolk soils are characterized by the light-gray to grayish-yellow color of the surface soils, and by the yellow color and friable structure of the sand or sandy clay subsoils. They occupy nearly level to rolling uplands throughout the Coastal Plain and have been derived from unconsolidated deposits of sands and clays. Seven types are encountered in Florence County. These are the Norfolk coarse sandy loam, very fine sandy loam, sandy loam, fine sandy loam, sand, fine sand and coarse sand.

NORFOLK COARSE SANDY LOAM.

The Norfolk coarse sandy loam consists of a gray coarse sand to loamy coarse sand, grading at about 5 to 8 inches into pale-yellow coarse sand or loamy coarse sand, and underlain at about 10 to 20 inches by yellow, friable coarse sandy clay. In many places the type grades imperceptibly into the Norfolk sandy loam.

The soil has good drainage, most of it bordering the areas of Swamp. Its surface is nearly level to gently sloping, being sufficiently sloping in places to make contour cultivation desirable to prevent washing.

Where fertilized or manured this type produces good yields of cotton, corn, oats, tobacco, cowpeas, rye, and vetch.

NORFOLK VERY FINE SANDY LOAM.

The Norfolk very fine sandy loam differs from the fine sandy loam type principally in its finer texture and in its shallower depth to the sandy clay subsoil. In representative areas it consists of a grayish very fine sand or loamy very fine sand, grading at about 1 inch to 4 inches into pale-yellow loamy very fine sand to very fine sandy loam, which, in turn, passes at a depth of about 10 to 15 inches into yellow, friable fine sandy clay. There are places where the clay is nearer the surface, and here the soil seems more inclined to compact than where the clay lies deeper.

The surface varies from level to gently undulating. Most of the type, however, is almost level. Some areas are slightly depressed, but generally the type passes into another soil—the Coxville or Portsmouth—in the depressions. Large areas occur west of Florence.

It is more difficult to maintain a good seed-bed condition on this type than on the coarser soils, and heavier teams and plows are neces-

sary for the deep, thorough plowing required for the maintenance of the proper tilth. The incorporation of vegetable matter with the soil counteracts its tendency to become compact in dry weather and to form a crust after rains. Frequent shallow cultivation is necessary to enable the soil to hold moisture in dry spells. Shallow running implements such as the weeder will destroy the thin surface crust which forms after rains.

This is an excellent agricultural soil, being well suited to cotton, corn, oats, tobacco, peanuts, sweet and Irish potatoes, forage crops, and a variety of vegetables.

Applications of commercial fertilizers are made with all crops.

NORFOLK SANDY LOAM.

The soil of the Norfolk sandy loam is a gray sand to loamy sand about 2 to 5 inches deep, passing into a pale-yellow sand to loamy sand, which extends to a depth of about 10 to 20 inches. The subsoil is a yellow, friable sandy clay or sandy loam, abruptly passing into sandy clay.

The topography of the Norfolk sandy loam is very similar to that of the Norfolk coarse sandy loam, being nearly level to slightly sloping. This type occupies somewhat higher elevations than the associated soils, and some of the areas form a slight ridge between the more poorly drained soils and the stream bottoms. The drainage of the type is thorough. Crops are apt to suffer from lack of moisture in dry spells unless a good supply of humus is maintained and frequent shallow cultivation is carried on.

This is considered an excellent soil for the growing of the general farm crops, especially cotton and bright-leaf tobacco. Sweet potatoes, Irish potatoes, cowpeas, various vegetables, and peanuts are among the other crops that succeed. Commercial fertilizers and manure are considered necessary for the production of good yields.

Norfolk sandy loam, flat phase.—The Norfolk sandy loam, flat phase, as mapped, represents mixed areas of Norfolk sandy loam, frequently having a rather mottled subsoil, Portsmouth sandy loam and fine sandy loam, and some Coxville silty clay loam and fine sandy loam, where these soils have such a patchy, irregular occurrence and are so closely associated that they can not be satisfactorily separated on a map of the scale used. The Norfolk sandy loam predominates.

This phase occurs in the higher situations, which, however, are nearly level. It consists of grayish sand or loamy sand, grading into a pale-yellow loamy sand extending to a depth of about 8 to 15 inches, where a yellow, friable sandy clay is reached. This usually has mottlings of gray and reddish yellow in the lower depths. The flat

phase of the Norfolk sandy loam has an imperfectly drained subsoil and apparently represents an approach toward the Coxville.

Most of the Norfolk sandy loam, flat phase, is under cultivation, and some of the depressed areas, the Portsmouth and Coxville, have been drained and put under cultivation. Better results would follow more extensive drainage.

NORFOLK FINE SANDY LOAM.

The typical Norfolk fine sandy loam is a grayish fine sand to loamy fine sand, underlain at 2 to 5 inches by pale-yellow loamy fine sand, and at about 10 to 20 inches by a yellow, friable fine sandy clay. In the forested areas the gray surface material is not more than 1 inch to 3 inches deep, while in cultivated fields it averages about 5 inches.

Most of the land has been cut over, but a scant growth of shortleaf and longleaf pine, with some scrub oak, occupies the uncleared portion.

The surface of the Norfolk fine sandy loam is level to gently undulating. It is texturally and topographically well suited to tillage operations, and to the use of improved farm machinery.

This is one of the most extensive of the upland soils of the county, being well distributed through all sections. Its greatest development occurs north of Florence, bordering High Hill Creek. It occupies in this area the most elevated portion of the county and is well drained by High Hill Creek and its tributary streams.

With proper applications of commercial fertilizers cotton and bright tobacco, the principal crops grown, give good results. Oats, cowpeas, sorghum, sweet potatoes, and corn do well, although the yields of these and other crops depend largely on methods of cultivation and the quantities of fertilizers used.

NORFOLK SAND.

The Norfolk sand consists of a gray, loose sand, underlain at a depth of about 3 to 5 inches by pale-yellow or grayish-yellow sand which grades into pale-yellow sand. The subsoil is loose and open, but not quite so much so as that of the Norfolk coarse sand, and consequently the land is more retentive of moisture and more dependable for crop production in dry seasons. In places there are included areas which are noticeably loamy, as in the neighborhood of Salem. Here the soil approaches in character the Norfolk sandy loam. In a small area about three-fourths mile south of Salem the type has somewhat the appearance of Sandhill.

The Norfolk sand occupies narrow strips along stream courses and flattish upland areas. In some places the surface is somewhat

rolling. The area extending from Stone Landing on the Peedee River to the mouth of the Big Swamp and lying between Deep Creek and Big Swamp is the largest body of the type in the county. The flatter portions are farmed, while the ridge portions support a scant growth of scrub oak, with some second-growth pine.

The soil warms up early in the spring and is well adapted to early vegetables, although it is not used to any extent for this purpose. The Norfolk sand is considered a good tobacco soil, although heavy applications of fertilizer are necessary for good yields. The quality of the leaf is good. In favorable seasons fair yields of cotton and corn are produced on this type with heavy manuring or fertilizing. The soil is very deficient in organic matter, and much improvement always follows the growing of the legumes, such as cowpeas, and a green crop turned under at intervals makes the soil more loamy and more productive.

NORFOLK FINE SAND.

The surface soil of the Norfolk fine sand consists of a gray loose fine sand to a depth of 3 to 5 inches. This is underlain by pale-yellow or yellowish-gray loose fine sand, which extends to a depth of 3 feet or more.

This is the most extensive of the sand types. It occurs in the uplands along the areas of Swamp bordering the Peedee River, and is also found along the east side of Lynches River, southwest of Evergreen. One large area occurs about $2\frac{1}{2}$ miles east of Florence.

The topography varies from nearly flat to rather rolling. The better lying areas are used for the general crops, the yields of which are much lower than those obtained on the sandy loam and fine sandy loam of this series. Owing to the fine texture of the soil and subsoil, it is a little more retentive of moisture, and is therefore surer to produce crops in dry seasons than the Norfolk sand and the Norfolk coarse sand. Forested areas support a growth of scrub oak, with some hickory and longleaf pine.

The type is well suited to the growing of bright tobacco, but large applications of commercial fertilizer are necessary to produce satisfactory yields. The type is not used for the growing of early vegetables, although it is well suited to trucking, and is extensively used for that purpose in many places along the Atlantic seaboard. Cotton, corn, forage crops, sweet potatoes, and watermelons are grown in many sections with varying degrees of success, depending largely upon the quantity of manure or fertilizer applied.

NORFOLK COARSE SAND.

The Norfolk coarse sand is a gray, loose coarse sand which passes at about 5 to 6 inches into pale-yellow or yellow loose sand extend-

ing to a depth of 3 feet or more. In the wooded areas the yellow material begins at about 1 inch to 3 inches below the surface. The soil is excessively drained, and crops suffer from lack of moisture during periods of drought.

The Norfolk coarse sand occurs in very small areas usually occupying the slopes adjoining stream bottoms or occurring as narrow ridges. The areas of largest extent are those between Lake Swamp and Sparrow Swamp and that bordering Open Bay on the northeast side.

Large applications of fertilizer or manure are necessary with all crops for satisfactory yields. Much of this type is utilized for growing bright tobacco. The quality of the leaf is excellent. Acreage applications of 800 to 1,400 pounds of an 8-4-4 mixture, with light applications of barnyard manure, are said to give yields of upward of 1,000 pounds per acre. This is a poor soil for corn. Cotton gives fair yields with large applications of commercial fertilizer and barnyard manure. The type is greatly improved by turning under vegetable matter.

RUSTON SERIES.

The Ruston soils are gray to grayish-brown and are underlain by reddish-yellow to yellowish-red or dull-red, moderately friable subsoils, prevailing of sandy clay. The series holds an intermediate place between the Orangeburg and Norfolk soils in the color of its subsoils, and a similar place between the Orangeburg and Norfolk on the one side, and the Susquehanna on the other, in point of subsoil structure. Occasionally the lower subsoils are mottled with gray and shades of yellow. The soils are closely associated with the Orangeburg and Susquehanna and are probably derived from practically the same formation as the Orangeburg. Four types are mapped in Florence County—the Ruston sandy loam, coarse sandy loam, fine sandy loam, and loamy coarse sand.

RUSTON SANDY LOAM.

The Ruston sandy loam consists of a gray to brownish-gray sand overlying yellowish loamy sand at a depth of about 5 to 8 inches. This loamy sand grades into a reddish-yellow to yellowish-red, friable sandy clay at about 10 to 15 inches. Sharp boundary lines can not everywhere be drawn between the Norfolk sandy loam and this type, as they grade into each other. Usually this type is slightly elevated above the adjoining Norfolk soils, and occupies narrow strips on stream slopes. The surface ranges from practically level to gently undulating and gently sloping.

The Ruston sandy loam is distributed throughout the northern part of the county. It is used for about the same crops as the Norfolk sandy loam. It is considered a somewhat better soil than the latter for the production of general crops, with the possible exception of bright tobacco. It is said that the leaf grown on this type is not so good as that produced on some of the Norfolk soils, having inferior burning qualities. Commercial fertilizers and manure are used in crop production, and the yields depend largely on the fertilizing and manuring, the season, and the cultural methods employed.

RUSTON COARSE SANDY LOAM.

The Ruston coarse sandy loam consists of a gray coarse sand which passes at about 5 or 6 inches into a pale-yellow loamy coarse sand, this in turn grading at about 12 to 20 inches into reddish-yellow to yellowish-red friable sandy clay. Often the upper subsoil is a sandy loam.

This soil occurs mainly in almost level areas. It is closely associated with the Norfolk coarse sandy loam, occupying the adjoining gentle slopes. It is well drained and is suited to the growing of corn, cotton, oats, and tobacco. It is deficient in organic matter and requires additions of manure or fertilizers for satisfactory results. The growing of legumes and the occasional replenishment of the organic-matter supply result in better yields.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam has a soil consisting of gray fine sand or loamy fine sand about 3 to 5 inches deep, overlying a yellowish loamy fine sand to fine sandy loam, which extends to a depth of about 10 to 20 inches. The subsoil is a reddish-yellow or yellowish-red, friable fine sandy clay. In some places a reddish-yellow fine sandy loam is encountered at depths of about 8 to 16 inches. In a few areas the soil is a light-gray very fine sandy loam. Here the fine sandy clay is reached at shallower depths. This type grades into the Norfolk fine sandy loam just as the Ruston sandy loam grades into the Norfolk sandy loam. Included in some of the areas are small patches of Orangeburg fine sandy loam on slight knolls and ridges.

Most of this type occupies very gently rolling areas. A part of it occurs on stream slopes. It has good surface drainage, and very little of it is so sloping as to cause washing. The type occurs throughout the northern part of the county, closely associated with the Norfolk fine sandy loam.

The Ruston fine sandy loam is quite well suited to the growing of all farm crops that succeed in this section. Tobacco is probably of

not so good a quality as that grown on the Norfolk fine sandy loam, but the yield is good. Fertilizers are used for all crops.

RUSTON LOAMY COARSE SAND.

The Ruston loamy coarse sand consists of a grayish-brown coarse sand to loamy coarse sand, underlain at a depth of about 6 to 10 inches by a yellowish-red to reddish-yellow loamy coarse sand, which is rather sticky in the lower subsoil.

The type occupies flat to undulating upland areas, which are well drained.

With liberal applications of manure or commercial fertilizer this soil gives good yields of corn, cotton, oats, cowpeas, velvet beans, and other crops of the region. Some very good tobacco has been grown on it.

KALMIA SERIES.

The Kalmia series includes types with gray to grayish-yellow surface soils and mottled gray and yellow subsoils. The series is developed along streams of the Coastal Plain region on terraces lying largely above overflow. It occurs most extensively in the Gulf States east of the Mississippi River, but also in other parts of the Coastal Plain. The soils in this series are formed from old alluvial deposits. Five members of the Kalmia series are recognized in Florence County—the sandy loam, fine sandy loam, coarse sandy loam, clay, and coarse sand.

KALMIA SANDY LOAM.

The Kalmia sandy loam consists of a grayish loamy sand, passing at about 5 to 8 inches into pale-yellow sand or sandy loam, and this at about 10 to 20 inches into yellow sandy clay, frequently mottled with gray in the lower part. This mottling is especially conspicuous in the subsoil of the flatter and more poorly drained areas. The type as mapped includes small areas of Myatt fine sandy loam and sandy loam which can not be satisfactorily separated on the map.

The Kalmia sandy loam occurs on terraces of the Lynches and Peedee Rivers. There are no extensive areas, the soil occurring in small bodies closely associated with the other terrace soils. It is characteristically found in slight depressions and flat areas, with some patches of a poorly drained phase approaching the character of Myatt sandy loam.

Nearly all of the type is under cultivation to corn, oats, cotton, and tobacco. In its best drained development the crop value corresponds very closely with that of the Norfolk sandy loam, but the yields are probably somewhat larger on the average, and crops are less affected by droughts.

Like all the well-drained sandy soils of the region, the Kalmia sandy loam is deficient in organic matter, and large applications of commercial fertilizer and manure are required for the production of good yields of any crop. The growing of crops such as cowpeas, vetch, and rye affords a ready means of supplying needed organic matter.

KALMIA FINE SANDY LOAM.

The Kalmia fine sandy loam is a grayish fine sandy loam overlying pale-yellow fine sand or loamy fine sand at about 5 to 8 inches. This extends to a depth of about 10 to 24 inches, where yellow or pale-yellow fine sandy loam is reached, and this passes quickly into yellow fine sandy clay, in places mottled with gray in the lower part of the 3-foot section.

The surface is, as a rule, level, but occasional depressions include soils of a darker color in the surface section. A shallow phase occurs on the Lynches River east of Half Moon and near the confluence of this stream with the Peedee River. Here the top soil is not so deep as that of the typical Kalmia fine sandy loam, the fine sandy clay usually being encountered at 8 to 15 inches.

This type is found on the second bottoms along the Lynches and Peedee Rivers. The largest area is that in the neck between Lake Swamp and Lynches River.

The Kalmia fine sandy loam is the most extensive of the terrace soils used for farming. It is devoted to corn, cotton, oats, tobacco, and forage crops. The yields are about the same as on the Norfolk fine sandy loam.

In the growing of tobacco applications of 800 to 1,400 pounds of an 8-4-4 mixture of commercial fertilizer are frequently made with very satisfactory results. Corn and cotton are also fertilized, but the applications are lighter than those for tobacco. Corn yields vary from about 10 to 35 bushels and cotton from about one-third to one bale per acre. Oats and cowpeas do well. Among other crops that succeed are vetch, sorghum, rye, Irish and sweet potatoes, watermelons, and cucumbers. This soil is deficient in humus. Crop yields undoubtedly would be increased by building up the supply of organic matter.

KALMIA COARSE SANDY LOAM.

The Kalmia coarse sandy loam is a grayish, loose, coarse sand underlain at about 6 to 8 inches by pale-yellow coarse sand or loamy coarse sand which passes at any level from about 15 to 30 inches into a yellow or pale-yellow coarse sandy clay.

This soil occupies the better drained, higher, and more hummocky situations on the second bottoms (terraces) of the larger streams. Its surface is level to billowy.

The largest area is that on the terrace of Lynch's River southeast of Welsh Bridge. This extends in a narrow strip along the south side of the river, separating the areas of Okenee loam from the Swamp adjacent to the channel of the river.

An excellent bright leaf tobacco is produced on this soil, with fair yields of corn, cotton, and oats, where liberally fertilized or manured. Large applications of commercial fertilizer, with frequent additions of manure, are made for all crops, the quantities used for tobacco and cotton being, as a rule, somewhat larger than those for corn and oats.

This type compares favorably with the coarse sandy loam of the Norfolk series, being considered a little better for tobacco. It is in need of humus, and the growing of some leguminous crop in a rotation with other crops has been found beneficial.

KALMIA CLAY.

The Kalmia clay consists of a grayish fine sandy loam to silty clay loam which at 3 or 4 inches passes abruptly into a pale-yellow clay or sandy clay of a compact structure. In many places the lower subsoil shows mottlings of reddish yellow and gray. It also shows in places a reddish cast approaching the Cahaba clay in character. As mapped, the type includes numerous patchy areas of other soils, chiefly the fine sandy loam, very fine sandy loam, and silty clay loam of the Myatt and Kalmia series, and some strips of Johnston and Bibb (light-gray) loam and fine sandy loam in the drainage-way depressions.

This soil occurs on the low terraces of the Peedee and Lynch's Rivers. The largest area occurs on a low terrace of the Peedee to the north of Mars Bluff. During periods of very high water the type is overflowed, but the lower bottoms comprising areas of Swamp are inundated much oftener than the terrace on which this type occurs.

Most of the large area just north of Mars Bluff was at one time under cultivation, but since the flood of 1906 only small patches of the area have been farmed. A considerable part of the area is forested with pine, sweet gum, black gum, water oak, and maple.

Lespedeza and a number of wild grasses grow luxuriantly in the more open places, indicating a good use for such land for pasturage and hay.

The boundaries of this type are drawn with only approximate accuracy, not having been traced definitely, owing to the overflowed condition of the bottoms at the time of the survey.

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

Mechanical analyses of Kalmia clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
242442.....	Soil.....	1.9	8.0	7.1	15.4	19.0	38.6	9.8
242443.....	Subsoil.....	1.6	4.5	4.6	10.3	14.0	32.6	33.0

KALMIA COARSE SAND.

The surface soil of the Kalmia coarse sand is a grayish, loose coarse sand or sand, which at about 3 to 8 inches passes into pale-yellow to grayish-yellow coarse sand or sand, usually extending to a depth of 3 feet or more, without much change.

This type is fairly well drained. It occupies flattish swells and hummocks on the second bottoms of Lynches River. The type is used principally for the same crops as the Norfolk sand; the better lying areas are slightly more productive. Fair yields of cotton, tobacco, and corn are produced with heavy fertilizing or manuring. The type is much in need of organic matter, such as can be supplied by plowing under green crops or adding manure.

OKENEE SERIES.

The surface soils of the Okenee series are dark gray to black, with subsoils of gray or drab mottled with yellow. These types occur on terraces along the rivers of the Coastal Plain, and have a level topography and poor drainage. In some cases the surface soil contains enough organic matter to make it somewhat mucky. The subsoils are usually water-logged. The series is represented in Florence County by a single type—the Okenee loam.

OKENEE LOAM.

The soil of the Okenee loam is a black mucky loam which either grades into grayish fine sandy loam to rather plastic fine sandy clay or extends to a depth of 3 feet without important change. There are some included patches of fine sandy loam.

The type occurs in wet situations on the second bottoms of streams, and in a few instances occupies the drainage ways through the terraces. Most of it is forested. Gum, pine, maple, and in places cypress constitute the principal tree growth.

This soil has proved fairly productive when drained, especially with oats. Lespedeza and various grasses succeed. Lime is usually beneficial on land of this kind.

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

Mechanical analyses of Okenee loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
242438.....	Soil.....	2.4	10.2	8.6	26.8	10.4	18.7	22.8
242439.....	Subsoil.....	4.6	13.9	8.2	31.0	11.8	11.3	19.4

MYATT SERIES.

The Myatt series includes types with gray surface soils and gray to mottled gray and yellow impervious subsoils. These soils occur on terraces lying along streams in the Coastal Plain province. They lie mainly above overflow, but are flat and poorly drained. The old alluvium from which they are derived consists mainly of reworked Coastal Plain materials. The fine sandy loam is the only member of the Myatt series encountered in Florence County.

MYATT FINE SANDY LOAM.

The soil of the Myatt fine sandy loam consists of a gray to dark-gray fine sandy loam to a depth of about 5 to 8 inches, underlain by grayish fine sandy clay of a rather stiff nature and frequently mottled with yellow. In places the subsoil contains but little sand and is quite stiff.

This type occurs as flat or depressed areas in the second bottoms of the larger streams of the county. It has very poor drainage. Small areas are drained by open ditches, and cultivated, and in places fair yields of cotton, corn, and oats are obtained. Applications of lime would likely improve the soil after it has been drained. The uncultivated areas support a fair growth of lespedeza and "wild" grasses where the forest is not dense. In a few of the drainage ways included in the areas mapped the soil is more nearly a loam. Owing to its poor drainage and limited occurrence this type is of little importance.

CAHABA SERIES.

The types of soil included in the Cahaba series have brown to reddish-brown surface soils and yellowish-red to reddish-brown subsoils. The series occupies old stream terraces lying largely above overflow, and includes the best drained areas on such terraces. It is formed from old alluvial deposits. It is extensively and typically developed in the Coastal Plain of Alabama and Mississippi, and may

be encountered anywhere within this physiographic province where high terraces are encountered. Two types are recognized in Florence County—the Cahaba fine sandy loam and sandy loam.

CAHABA FINE SANDY LOAM.

The soil of the Cahaba fine sandy loam consists of about 4 to 10 inches of light-gray to brownish fine sand to loamy fine sand, underlain by a reddish-yellow sandy clay which extends to a depth of about 15 to 18 inches and passes gradually into a pale-red silty clay or clay, which continues without change to a depth of 3 feet or more. The surface material in many places is somewhat lighter in color than the typical soil. Patches too small to map on the scale used are found in eroded places where the silty clay or clay of the subsoil is exposed. These would have been mapped as Cahaba silty clay loam if they had been large enough.

The topography is nearly flat to undulating, which gives fair surface drainage. The type lies high above ordinary overflows of the river, and is rarely inundated, though in 1906 the crops were destroyed by flood.

The type is developed on second bottoms, principally along the Lynches River. The largest area occurs between Sparrow Swamp and Lynches River to the north of Lynches Bridge. This area occupies a distinct terrace of Lynches River, which is about 8 to 12 feet higher than the Swamp in the first bottoms and about the same distance below the adjoining areas of Kalmia fine sandy loam.

Practically all the areas mapped are cleared and under cultivation. The field crops common to this section of the State, including tobacco, are grown successfully, the yields depending on the season, amount of fertilization, and cultural methods. The type is deficient in organic matter. The plowing under of green crops such as cowpeas, vetch, and rye would supply needed humus. Commercial fertilizers are considered necessary to the successful production of all crops and are used in large quantities with tobacco.

CAHABA SANDY LOAM.

The surface soil of the Cahaba sandy loam consists of a brownish-gray to light-brown loamy sand, grading at about 6 to 8 inches into a brownish-yellow loamy sand, which extends to a depth of 15 to 18 inches. The subsoil is a reddish-yellow sandy clay or clay which grades into a yellowish-red to red stiff clay in the lower portion of the 3-foot section. There are some unimportant small areas of Cahaba loamy coarse sand which are not shown owing to their small extent. These consist of brownish coarse sand, underlain at about 5 inches by orange-colored loamy coarse sand which quickly passes into reddish-yellow loamy coarse sand.

This type is developed in small areas on the terraces of the Lynches and Peedee Rivers. The soil is well drained and only during extreme high water is it inundated. All the field crops grown in this section of the State do well, and bright-leaf tobacco of good quality is produced. Best results are obtained with tobacco by applying from 800 to 1,000 pounds of an 8-4-4 mixture of commercial fertilizer per acre. About the same quantity of fertilizer is used for corn, cotton, and oats. In case a top dressing of nitrate of soda is used the quantity of the 8-4-4 mixture may be diminished by 150 pounds. Three-fourths to 1 bale of cotton, 30 to 70 bushels of corn, and 50 to 90 bushels of oats are considered good acreage yields on this type. In addition to cotton, corn, and oats, some Irish potatoes, melons, and sweet potatoes are grown.

On the included loamy coarse sand the same crops are grown, but lighter yields are obtained.

JOHNSTON SERIES.

The types of the Johnston series are distinguished by the black color of the surface soils and the gray, yellow, and brownish color of the subsoils. These types are alluvial first-bottom soils in the Coastal Plain region and are subject to overflow. They are derived from materials washed mostly from Coastal Plain soils, with an admixture of material from Piedmont soils along streams issuing from that province into the Coastal Plain province. In Florence County only one member of this series is recognized—the Johnston loam.

JOHNSTON LOAM.

The Johnston loam is a black mucky loam which usually extends to a depth of 3 feet or more without much change or which passes into a dark-gray to black sandy loam to sandy clay. Along Polk Swamp the type includes some small areas of Johnston sandy loam which are not separated on account of their unimportant extent. These areas comprise a black sandy loam or loamy sand grading into dark-gray to black sandy loam, with some overwash of light-gray coarse sand in places.

This type is poorly drained. It occurs in stream bottoms, and is subject to overflow. The areas along Polk Swamp are the most extensive mapped. Many small areas of this type are included with Swamp.

Practically all the type is now forested, chiefly with sweet gum, black gum, water oak, and willow oak. At one time nearly all of the type was under cultivation, drainage being fairly well established by canals and lateral ditches. Native grasses afford good pasturage, and the land is now used principally for grazing. Lespedeza could prob-

ably be grown as a hay crop. With proper drainage this would prove a good corn, oats, and forage-crop soil. Cabbage, Irish potatoes, onions, and tomatoes would do well.

MISCELLANEOUS MATERIAL.

SANDHILL.

Sandhill consists of very loose fine to coarse sand, having a depth of 3 feet or more. It is almost entirely white sand and very porous and droughty. There is little organic matter present and the soil has a very low agricultural value. The areas mapped occur on the terrace of Lynches River to the south of Elim, and also to the south of Lynches Bridge.

The Sandhill areas have an elevation of 5 to 20 feet above the level of the terrace and have somewhat the appearance of large mounds. They support a scant growth of scrub oak. In places there is little vegetation.

SWAMP.

Swamp includes the low-lying first-bottom areas along the rivers and streams throughout the county. In the wider bottoms water stands throughout the greater part of the year in the depressions and abandoned stream channels. The material is so variable in character that no definite textural classification can be made. In some of the Swamp the soil is a black sandy loam (Johnston sandy loam) or muck, while in others the material is gray, representing the Bibb soils. Much of this land consists of brownish loam or silt loam underlain at a few inches by mottled gray and yellow, or rusty-brown and drab silty clay loam, silt loam, or silty clay. In the bottoms of Lynches River much of the soil is a light-brownish loam to fine sandy loam, underlain by mottled yellow and reddish-yellow clay loam to sandy clay. In the broad Peedee River bottom the Swamp varies from reddish-brown silty clay loam with mottled yellowish and grayish or drab silty clay loam or silty clay subsoils in the better drained, higher areas to gray silty clay loam or fine sandy loam underlain by mottled light-gray or drab and yellowish silty clay loam to fine sandy clay. In places the surface soil is very mucky. There are many other variations occurring in small areas.

All of the Swamp is rather heavily forested, mainly with cypress, tupelo, birch, maple, ironwood, sweet gum, black gum, water oak, willow oak, and bay. In many places there is a thick undergrowth of shrubs and vines.

The Swamp along Lynches River is not a mile wide at any place, while that along its largest tributary, Sparrow Swamp, has a width

of a mile or more some distance above its mouth. The widest area mapped as Swamp is that along the Peedee River just north of Mars Bluff Landing, where it is about 2 miles wide. The Swamp areas embrace rich soils, but reclamation by diking or throwing up high levees and using pumps for carrying away the excessive rainfall would be very expensive. Much of the Swamp could be cleared, however, and used for pasture and hay land without such expensive improvement. Wild grasses and lespedeza would afford good grazing.

DRAINAGE.

The importance of artificial drainage is appreciated by practically every farmer in the county. Large areas has been drained. Much of the county is nearly flat, and cultivated fields require open ditches to carry off excess rainfall. Even in the better drained sections many fields have very small spots of soil that require artificial drainage. In order to avoid cutting up the fields it is better in most cases to use tiles or a substitute therefor rather than open ditches. In portions of the county some distance from railroads a few of the farmers use poles as a substitute for tile. In such cases the ditches are dug deeper than usual, the poles being placed lengthwise in them and covered with straw and then with earth. It is said that crawfish dig small openings from the surface to the poles and that the poles are really more satisfactory than tiles. They of course are not so durable.

In the construction of public roads through some of the poorly drained flats the county and farmers have cooperated in digging large drainage ways. These not only drain the roads and the adjoining fields but serve as canals to which cross ditches can be dug. Some of these canals are as much as 10 feet deep and 3 miles long. A great number of them could be enlarged sufficiently to drain much more extensive areas than at present. Canals cut parallel with the present stream courses through many of the interstream flats and depressions would make available for cultivation large tracts that are at present used only for grazing, and also effect a marked improvement in the sanitary conditions of these sections.

SUMMARY.

Florence County has an area of approximately 751 square miles, or 480,640 acres, and is situated in the east-central part of South Carolina. It lies wholly within the Coastal Plain province. The topography is level to very gently sloping. Most of the drainage is carried through the Peedee and Lynches Rivers.

The first settlement in the county was made early in the eighteenth century. The county has a population of about 36,000. Florence, the county seat and largest town, has a population of about 7,000. The county is well supplied with transportation facilities.

The climate is characterized by ample rainfall and a long growing season, and is favorable to a diversified type of agriculture.

General farming is the principal interest, with cotton and tobacco the leading crops. Oats, corn, rye, cowpeas, and small quantities of truck crops are also grown. Crops are usually given large applications of fertilizer. Definite crop rotations are not generally practiced. Modern machinery is in general use, and the county as a whole is in a prosperous condition.

The upland soils of Florence County are included in the Norfolk, Orangeburg, Ruston, Portsmouth, and Coxville series, and those of the terraces in the Kalmia, Cahaba, Okenee, and Myatt series, while the Johnston series and Swamp are recent soils and represent overflowed lands. Sandhill includes ridged sand areas on the terrace of Lynches River. Exclusive of Sandhill and Swamp, 31 soil types are mapped.

The Norfolk coarse sand is the lightest of the upland soils, but with large applications of commercial fertilizer the type gives fair yields of tobacco and cotton. The Norfolk sand is a better soil than the Norfolk coarse sand, being less subject to drought. The fine sand of this series has about the same value and is used for about the same crops as the sand. Large applications of fertilizer are necessary for satisfactory yields. The Norfolk coarse sandy loam is a well-drained type, used for the general farm crops. The sandy loam type is a good bright-tobacco soil, and is highly prized for general farm crops. The Norfolk fine sandy loam has a wide distribution, and is considered one of the best soils for general farming. The very fine sandy loam occurs near Florence and in the east-central section of the county. It is heavier than the Norfolk fine sandy loam and requires better management, owing to its tendency to pack after rains.

The Ruston loamy coarse sand is highly prized as a bright-leaf tobacco soil and produces fair yields of the general farm crops with liberal applications of fertilizers. The Ruston coarse sandy loam is well drained and is considered a somewhat stronger soil than the Norfolk coarse sandy loam. It is used principally for corn, cotton, and oats. The sandy loam of this series has a limited distribution in the county. Most of it is under cultivation to the general farm crops. The fine sandy loam is well drained and has about the same value as the Norfolk fine sandy loam.

The Orangeburg fine sandy loam is considered an exceptionally strong soil for the general farm crops. It requires about one-third

less commercial fertilizer than the Norfolk fine sandy loam. The Orangeburg very fine sandy loam is the least extensive soil type in the county. It is one of the best soils for general farm crops in the Coastal Plain province.

The Coxville sandy loam when drained is used for the general farm crops of the section. It occurs in large, unbroken areas east of Olanta. Tobacco, corn, oats, and cotton give fair yields. The fine sandy loam is distributed throughout the uplands of the county. When drained and brought under cultivation it gives yields which compare favorably with those of the Norfolk fine sandy loam. The Coxville very fine sandy loam is harder to drain than the light members of this series and is a less desirable soil. The Coxville loam is poorly drained and much of it is still in forest or used for grazing. Artificial drainage is necessary before this soil can be used for farming. The Coxville silt loam is mainly forested. When thoroughly drained, limed, fertilized, and manured it gives good yields of corn, oats, tomatoes, onions, cabbage, and other crops.

The Portsmouth sandy loam is in need of drainage. Small portions of this type are cultivated in connection with areas of better drained soils. Much of the type, however, remains in forest. The fine sandy loam of this series occupies areas known locally as "bays," and very little of it is cultivated; it is used mainly for pasturage. The Portsmouth loam occupies low areas in the uplands and is considered a poor soil for agricultural purposes. Very little of it is drained and cultivated.

The Kalmia coarse sand occupies portions of the better drained terraces. It gives fair yields with careful cultivation. The coarse sandy loam is considered a good soil for the general farm crops. It produces a good quality of bright-leaf tobacco. The sandy loam of this series is nearly all under cultivation to corn, cotton, oats, and tobacco. The fine sandy loam type occurs on the low terraces of the larger stream courses, and is a good soil for the general farm crops. The Kalmia clay occupies second-bottom, fairly well drained areas which are overflowed only at very infrequent intervals. It could probably be used for hay crops, and is now used principally for grazing. Lespedeza does well. Large areas of the type remain in forest.

The Cahaba sandy loam and fine sandy loam are considered good soils for general farming and are held in high esteem for the extra quality of bright tobacco which they produce. The soil is friable, easily tilled, and retentive of moisture.

The Myatt fine sandy loam is poorly drained, and most of it is utilized for grazing. Where drained it gives fair yields of cotton, oats, and corn. Lime is beneficial.

The Johnston loam is confined principally to the Polk Swamp bottoms. Most of it is used for grazing.

The Okenee loam is a poorly drained second-bottom soil. It is mainly forested, but has proved fairly productive with proper drainage.

The term Swamp is applied to all the soils along stream courses subject to frequent overflow and so mixed in texture that type separations can not be made. Sandhill includes sand ridges on the terrace of Lynch's River. It is of no agricultural value.



[PUBLIC RESOLUTION--No. 9.]

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

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

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

Approved, March 14, 1904.

[On July 1, 1931, the Division of Soils was reorganized as the Bureau of Soils.]

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