U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE,
W. A. GRAHAM, COMMISSIONER; B. W. KILGORE, STATE CHEMIST
AND DIRECTOR OF EXPERIMENT STATION;
C. B. WILLIAMS, AGRONOMIST.

SOIL SURVEY OF HOKE COUNTY, NORTH CAROLINA.

BY

E. S. VANATTA, IN CHARGE, AND W. B. COBB, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND L. L. BRINKLEY AND S. F. DAVIDSON, OF THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1918.]

WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Soils,
Washington, D. C., June 28, 1920.

Sir: In the extension of the soil survey in the State of North Carolina during the field season of 1918 a survey was undertaken in Hoke County. This work was done in cooperation with the North Carolina Department of Agriculture.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of field operations of the Bureau of Soils for 1918, as authorized by law.

Respectfully,

Milton Whitney,
Chief of Bureau.

Hon. E. T. Meredith,
Secretary of Agriculture.

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MAP.

Soil map, Hoke County sheet, North Carolina.

SOIL SURVEY OF HOKE COUNTY, NORTH CAROLINA.

By E. S. VANATTA, In Charge, and W. B. COBB, of the U. S. Department of Agriculture, and L. L. BRINKLEY and S. F. DAVIDSON, of the North Carolina Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Hoke County is situated in the southern part of North Carolina, a short distance west of Fayetteville. Its greatest length north and south is 29 miles, its greatest width 21 miles, and its area 417 square miles, or 266,880 acres.

Within this territory there are two distinct physiographic divisions, locally known as the "sand hills" and the "flatwoods," these forming, respectively, the northern and the southern parts of the county. A line separating the two divisions would follow in a general way the old turnpike road from Turnpike Bridge, over Drowning Creek, to Raeford, and thence extend slightly south of east along the north side of Rockfish Creek. The sand-hill region is in general ridgy, the surface varying from gently undulating along the crests of the wider divides to decidedly rolling and in places broken in belts along the stream courses. Occasional hills stand out prominently, and the topography as seen from these consists of a series of alternating ridges and valleys, with here and there a conspicuously higher hill or chain of hills, the general outlines being similar to those of the Appalachian region, although on a much reduced scale. Probably the highest and best known of the elevations are at Sanatorium, along the Aberdeen & Rockfish Railroad, and Blues Mountain, in the north-central part of the county.

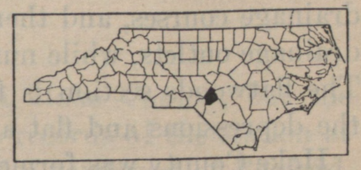

FIG. 1.—Sketch map showing location of the Hoke County area, North Carolina.

In passing from the sand hills to the flatwoods section of the county there is a fairly uniform drop in elevation of 10 to 20 feet. While the general topography here is flat the surface ranges from gently undulating to gently rolling in places, with long, gradual slopes to the streams. Throughout this section occur numerous depressions or "bays," ranging in size from an acre or less to 1 or more

square miles. These, unless artificially drained, are water-logged through a considerable part of the year.

Along practically every creek in the county there is more or less bottom land. The most extensive strips are those along Little River, Drowning and Rockfish Creeks, and Raft Swamp. The first bottoms are all low and swampy, and at present utilized, where used at all, only as range for live stock. There is, however, a considerable area of second bottoms or terraces along the various streams which with proper attention to drainage is well suited to agriculture.

Hoke County is drained through Little River and its tributaries in the northern part; Rockfish Creek and its tributaries in the central part; Little Rockfish Creek along the eastern county line; Raft Swamp, Little Raft Swamp, and Big Marsh Swamp in the southern part; and Drowning Creek and its tributaries along the western county line. These streams and their tributaries have a relatively strong current even in the flatwoods section, and there are a number of small water-power mills on the smaller creeks throughout the county. Hydroelectric power is developed at two stations along Little River.

The sand-hill section of the county is thoroughly dissected with drainage courses, and there are no important areas without natural drainage outlets, while numerous slopes are subject to severe erosion. The flatwoods section is fairly well drained, with the exception of the depressions and flat areas, which must be artificially drained.

Hoke County was formed by an act of the State legislature in 1911, from parts of Robeson and Cumberland Counties. Raeford was made the county seat. The early settlers in this general region were largely Scotch or of Scotch descent, with some English. Settlement gradually spread up the Cape Fear River Valley to the present site of Fayetteville and thence into what is now Hoke County. The population has steadily increased. As the county was formed since the 1910 census, there are no available statistics of population. The flatwoods section of the county is comparatively thickly populated, but the sand-hill section is only sparsely settled. The population is about evenly divided between the white and negro races.

Raeford, the county seat, in the south-central part of the county, on the Aberdeen & Rockfish Railroad, had a population of 580 in 1910, according to the census, but since becoming the county seat it has grown rapidly. Rockfish, Arabia, Dundarrach, Timberland, and Montrose are small villages on the Aberdeen & Rockfish Railroad.[1]

The principal industry of Hoke County, aside from agriculture, is lumbering, and as the greater part of the merchantable timber has

[1] Since this report was written the preliminary announcement of the population of Hoke County and its civil divisions in 1920 has been issued by the Bureau of the Census, as follows: Hoke County, 11,722; rural, 11,722; Raeford, 1,235.

been cut, this is now of no great importance. The turpentine industry was at one time of considerable importance, but it has decreased until there is only a small output. At Raeford there is in operation a cotton mill, an oil mill, and a factory manufacturing plows.

The railroad facilities of the county are furnished by the Aberdeen & Rockfish Railroad, which extends from Aberdeen, Moore County, where it connects with the Seaboard Air Line Railroad (Washington-Atlanta Division) and the Norfolk Southern Railroad, southeastward to Raeford and thence in a general easterly direction to Fayetteville, Cumberland County, where it connects with the Atlantic Coast Line Railroad (Washington-Atlanta Division) and the Norfolk Southern Railroad (Fayetteville-Raleigh Division). A branch line of the Aberdeen & Rockfish Railroad reaches from Raeford southwest to Wagram, in Scotland County.

The public roads in Hoke County are generally good. Through most sections of the county both clay and sand are available, and there are a number of well-kept sand-clay roads.

Churches and schools are numerous throughout the county. Practically all of the county is served by rural mail delivery routes.

CLIMATE.

There is no Weather Bureau station in Hoke County, but the following climatic data, compiled from the records of the station at Southern Pines, Moore County, about 15 miles northwest of Raeford, are fairly representative of conditions in Hoke County:

Normal monthly, seasonal, and annual temperature and precipitation at Southern Pines, Moore County.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1914).	Total amount for the wettest year (1901).	Snow, average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
December	44.5	80	5	3.60	5.06	4.86	2.1
January	43.4	84	6	3.48	2.20	3.17	2.0
February	44.1	81	−4	4.20	2.85	1.81	4.1
Winter	44.0	84	−4	11.28	10.11	9.84	8.2
March	54.4	100	15	3.97	2.25	5.35	0.4
April	61.4	101	25	3.43	1.87	5.73	T.
May	70.8	101	37	4.18	.85	8.88	.....
Spring	62.2	101	15	11.58	4.97	19.96	0.4

Normal monthly, seasonal, and annual temperature, etc.—Continued.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1914).	Total amount for the wettest year (1901).	Snow, average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
June	77.3	103	48	4.91	4.30	5.59	.....
July	79.3	106	50	7.10	3.10	13.23	.....
August	78.5	106	52	7.00	4.00	13.43	.....
Summer	78.4	106	48	19.01	11.40	32.25	.....
September	73.9	103	40	2.94	3.25	9.59	.....
October	62.4	94	25	3.14	2.60	.46	T.
November	52.8	83	13	2.52	2.55	1.93	T.
Fall	63.0	103	13	8.60	8.40	11.98	T.
Year	61.9	106	−4	50.47	34.88	74.03	8.6

The mean annual temperature is 61.9° F., and the mean annual rainfall 50.47 inches. The precipitation is fairly uniform from year to year, and is generally well distributed throughout the growing season. Crops seldom suffer from severe drought, and never are a total failure. The winters are characterized by short periods of warm weather alternating with periods of about the same duration, during which the weather is cool enough to make fires desirable. Zero weather is rare.

The dates of the latest recorded killing frost in the spring and of the earliest in the fall are, respectively, April 22 and October 10. The average dates of the last killing frost in the spring and the first in the fall are, respectively, April 1 and October 31. The average length of the growing season is 214 days, which is ample for the maturing of all the general farm crops. Usually two crops, such as corn or soy beans after a small grain, may be grown in one season. The mild climate is favorable to the growth of winter crops, such as crimson clover, vetch, and small grains, and the hardier vegetables.

AGRICULTURE.

Agriculture has always been the principal industry of this territory. The early settlers made use of the numerous canebrakes in the swamps and the growth of wild pea and various grasses in the uplands, which furnished pasturage for cattle and other live stock. The county was originally heavily forested with longleaf pine. As this was cut for building purposes, small fields were cleared and put

in cultivation. Corn, rye, and flax were the principal crops. Some indigo, wheat, and barley were also produced. The crudest of agricultural implements were in use, and crops were grown only in sufficient quantity for home use. As the fertility of a field was depleted new ground was cultivated.

The income of the earliest settlers was derived largely from the sale of cattle, hogs, and sheep. Considerable wool also was marketed. As the county became more thickly settled and outside markets more accessible a greater proportion of the grain crops was marketed. The longleaf pine trees, rich with resin, were tapped, and turpentine became an important source of income. The lumber industry was next developed, but both lumbering and turpentining long ago reached their maximum, and at present there are only a few sawmills and turpentine stills in operation. With the invention of the cotton gin cotton became the leading crop, and it has since held first place.

The type of farming existing before the Civil War was an expansion of the early plantation system. Large areas of the forest lands were cleared, and when the fertility of the fields deteriorated to a point where they no longer produced profitable crops they were abandoned and fresh land brought under cultivation. Little attention was given to maintaining the productiveness of the fields or to improving them, other than canalling and ditching the poorly drained areas. These early plantations were largely self-supporting. All the meat, milk, butter, and food consumed were produced on the farm and much of the clothing was home-made. Leather was tanned for the making of shoes and harness, and most of the farm implements used were manufactured and kept in repair by the plantation carpenters and blacksmiths. Every farm had its horse-operated cotton gin and screw compress, and flour and meal were ground by water power either on the farm or at mills on neighboring streams.

The agriculture of this section, in common with that of the whole South, suffered through the demoralization of labor conditions and the loss of capital attendant upon the Civil War. In the reconstruction period following, the present system of agriculture began to develop. The need for ready money resulted in an increased production of cotton and tobacco and a consequent decline in the production of the grain crops and live stock. The one-crop system was gradually developed, principally by tenants, since the average farmer's whole attention was given to the production of cotton, and outside sources were largely depended upon for foodstuffs and feed. The production of the small grains especially was neglected. In the last few years, owing to the demand for subsistence products, Hoke County has once more become largely self-supporting. The acreage in cotton has been slightly diminished. Tobacco has become

an important cash crop, especially in the sand-hill section. The acreage in corn, small grains, and the legumes has been increased.

Cotton is the principal cash crop of the county, notwithstanding production decreased from 16,019 bales in 1911 to 8,092 bales in 1916. A gradual increase in the growing of tobacco has had some slight influence in the reduction of the cotton acreage, but the increase in food crops has had by far the greater influence. Corn is the most important of the food crops. It is fed to the work stock and hogs and ground into meal for table use.

Oats have been very successfully grown during the last few years. The crop is largely fed in the sheaf to work stock. Wheat, in normal times not a particularly profitable crop, is being grown successfully by a great number of farmers.

Hay and forage crops have always proved a problem, as very few of them are adapted to the sandy soils of Hoke County, and most of these demand attention at the time of cotton picking. The leaves are pulled from the corn plant and cured, and frequently the stalk is topped to provide roughage for the work stock. Oats and wheat straw are also used. Soy-bean and cowpea hay, as well as oats and vetch hay, are grown by some farmers. Rye and the other small grains are often sown with vetch or rape for pasturage. A few farmers have been successful in producing alfalfa, although the expense incurred in fertilization is considerable. Up to the present time (1918) it has been found necessary to import considerable hay.

Sorghum is grown in small fields by many farmers for the manufacture of sirup on the farm.

The excellent returns obtained from peach orchards in neighboring counties in the sand-hill region have induced several farmers to set out a considerable acreage in peaches. The Mayflower, Carmen, Georgia Belle, and Elberta, all producing early, firm-fleshed fruit, are the most popular varieties. The fruit is shipped to northern markets. The chief hindrance to an extensive development of the orcharding industry throughout the sand-hill section of the county is the inadequate shipping facilities. The commercial production of dewberries has recently been taken up.

Crops of minor importance are sweet potatoes, Irish potatoes, early apples, pears, cherries, Muscadine grapes, soy beans, cowpeas, velvet beans, vetch, rape, crimson clover, rye, peanuts, tomatoes, and other vegetables.

There are several farms in the county on which stock raising is an important adjunct to the growing of cotton and other crops. Throughout the sand hills there are a number of extensive areas fenced in for pasture, one such inclosure being said to contain 7,000 acres. Cattle are grazed through the growing season and kept

through the winter on the available hay and forage crops, supplemented by cottonseed meal and hulls. There are no purebred beef herds in the county, the herds consisting of scrub cows, headed usually by purebred or high-grade Aberdeen-Angus and Hereford bulls. Practically all the work stock is imported, at a cost of thousands of dollars annually.

Most of the farmers fatten pork for home use, usually preferring to buy the pigs at weaning time, so that there is a good market for those who are equipped to raise pigs. Duroc-Jersey and Berkshire are the prevailing breeds.

Dairying and the poultry industry are carried on only to a sufficient extent to meet the local demands. Most farmers keep one or more milk cows, and a number of them sell butter.

Although the farming methods and crops grown are comparatively uniform throughout the county, they vary in some localities with the soil and topography. Cotton is grown throughout the county. In the flatwoods section it is planted on any of the well-drained soils, while in the sand-hill section slopes and other areas underlain by a clay subsoil are used. Tobacco is confined mostly to the sand hills, where it has been found that the crop does equally well on the sandy ridges or on slopes with a deep sandy soil. In the flatwoods section corn and small grains give the best results on the artificially drained soils in the depressions. Much better yields of corn, small grains, and cotton are obtained in the flatwoods section, while on the contrary the high sand and sandy loam ridges of the sand hills are especially adapted to peaches and dewberries.

Fall breaking of land is not practiced to any great extent, unless a winter cover crop is to be grown. While a number of the better farmers are breaking the land deep and making use of the various winter cover crops, most of them prefer to break in the spring with light one or two horse turning plows. Cultivation of the intertilled crops is generally shallow, sweeps and shovels being used. The preliminary cultivation of cotton—that is, the siding-off process—is frequently done with turning plows. The interrow tillage of corn is frequently too deep, the middles often being plowed late in the growing season in such a way as to break many of the roots.

Owing to the easy handling qualities of the soils, light-running farm implements and small work stock may be used. There are a number of large farms operated on an extensive scale on which modern farm machinery, such as manure spreaders, grain drills, harvesters, heavy plows, and two-horse cultivators, are used, but the greater part of the farming is done by tenants and small landowners, and light implements and small work stock predominate. The use of tractors, while quite feasible from the standpoint of soil character and topography, is not common.

A number of the better farmers of the county are adopting comparatively regular rotations, of which the most popular consists of corn the first year; a small grain the second year, followed by cowpeas or soy beans; and cotton the third year. An increasing number are planting the legumes, such as cowpeas, soy beans, velvet beans, crimson clover, oats, rye, and vetch, as soil improvers and as winter cover crops. The essential feature of a large number of rotations that have proved beneficial is the growing of legumes and winter cover crops in rotation with the clean-cultivated summer crops. The North Carolina Experiment Station recommends the following three-year rotation for this section: First year, corn; second year, oats and vetch or crimson clover, with cowpeas; third year, cotton with crimson clover.

In all parts of the county heavy applications of commercial fertilizer are made on all the farm crops. Before the world war complete fertilizers of high grade were used on the different crops, as well as large amounts of nitrate of soda. At the present time (1918), owing to the scarcity and high price of nitrate of soda and potash in particular, there has been a marked change in the composition of the fertilizers used. The use of potash has been practically discontinued in the growing of all the general crops except tobacco, and to date there has been apparently little reduction in the crop yields. Tobacco is given an acreage application of 800 to 1,200 pounds of a mixture generally analyzing 8–3–3.[2] For the other general crops the farmers are either buying ready-mixed fertilizers analyzing 6–4–0 to 8–4–0, or are using home-mixed 16 per cent acid phosphate and 7½ per cent cottonseed meal in such proportion as to give approximately these analyses. Acreage applications of 600 to 800 pounds are commonly made on cotton, and 500 to 600 pounds on corn, and a later top dressing of 75 to 100 pounds per acre of nitrate of soda is generally given both crops. Wheat and oats are commonly given from 300 to 400 pounds of the same mixture, and 75 to 100 pounds of nitrate of soda as a top dressing. Soy beans usually receive 250 to 300 pounds of fertilizer. The commercial peach crop of this and the adjoining counties is commonly fertilized with a 6–4–0 or 8–3–3 mixture. The fertilizer is usually applied around each tree at the rate of 6 pounds per tree. All the barnyard manure produced is saved and applied to the different crops, but the quantity is small.

In recent years there has been an increasing use of the legumes as soil improvers, as it has been found that the expenditure for nitrogen can be materially reduced by plowing under winter cover crops. This practice at the same time makes the soil more retentive of moisture and less inclined to blow or to erode. There remains much

[2] Fertilizer formulas are given in the order of phosphoric acid, nitrogen, and potash.

to be done in ascertaining the best fertilizer for the different types of soil.

Normally the supply of farm labor is sufficient, but under the present war-time conditions it is scarce. Practically all the hired hands are negroes. Most of the farm work is performed by the tenant and his family, the women joining in field work with the men.

Farms in Hoke County in general range in size from 25 to 2,000 acres, but a few are much larger and one comprises about 14,000 acres. These largest farms, however, are in the sand-hill section, where the percentage of cultivated land is low. By far the greater part of the farms are worked by tenants, on a share basis. Cash rentals vary from $5 to $10 per acre. Probably 75 per cent of the tenant farms are rented under a system in which the tenant furnishes only his labor, the landlord furnishing the equipment, seed, and fertilizer. Under this system the tenant receives one-third of the crop. The other most popular form of rental is the crop-share rental system, in which the renter furnishes the work stock, tools, feed, and half the fertilizer, and gets half the crop.

There has been a general advance in the price of farm lands in recent years. Through the flatwoods section the prevailing prices range from $20 to $200 an acre, according to the soil, farm improvements, and location, while in the sand hills the price ranges from $5 to $25 an acre.

SOILS.[3]

Hoke County lies near the western edge of the Coastal Plain province. The geological formation which covers the area is the Columbia, of Pleistocene age, whose sands and clays have weathered into the present soils. This material was brought down from the Piedmont Plateau and Appalachian Mountain regions as the weathered product of crystalline and fragmentary rocks and deposited in the ocean while this region was submerged. Since the elevation of the land above sea level, these sediments have been more or less altered and weathered through the agencies of erosion, oxidation, drainage, and animal and plant life. In many places the streams have cut deeply into the deposits, and erosion has considerably modified the texture of the soils. Oxidation of the iron compounds and thorough aeration and drainage have changed the color of much of the ma-

[3] Hoke County lies adjacent to Robeson County and Harnett County, soil surveys of which were made in 1908 and 1916, respectively. Hoke County was formed subsequently to the earlier survey and includes the northwest corner of the original Robeson County. In the 10 years elapsing between the Robeson and Hoke surveys the advance in soil classification has been so considerable that the two maps do not conform along the boundary. Along the Harnett-Hoke County line the agreement is somewhat better, but the Hoffman sandy loam and Norfolk sand of the latter abut on areas of the Norfolk sand, sand-hill phase, of Harnett County. This results from a closer differentiation of types, made possible by a fuller understanding of these soils gained since the earlier survey was made. In a revision the Harnett soils will be made to conform to the later classification.

terial, giving rise to the bright reddish yellow and yellow of the Ruston and Norfolk soils, respectively.

Though of the same geological origin, there is a wide difference existing between the soil composition and the topography in the sand-hill and flatwoods sections. The sand hills form a belt extending along the Atlantic coast, at a distance of about 100 miles inland, across the southeastern part of the State and into South Carolina. They represent a former beach line which was dry land, subjected to wave and wind action, while the present flatwoods section was still under water. The soils of the sand-hill section consist chiefly of medium to coarse sand more or less modified by weathering, drainage, erosion, and other soil-forming agencies. The original character of the surface material was probably very similar to that of the present subsoil. In the more rolling areas, where the depth of the sandy mantle has been lessened by surface and stream erosion, sandy clay is found near the surface, where it has been more completely oxidized by atmospheric agencies, as is shown by its reddish or mottled red color. With the exception of scattered depressed areas of Portsmouth soil, the soils of the sand hills are thoroughly drained.

The flatwoods division was probably a shallow sound or arm of the ocean whose waves washed up the materials to form the present sand hills. The materials have been exposed to the various soil-forming agencies for a shorter time than the materials of the sand-hill section. Stream action and erosion have as yet played only a minor rôle in the formation of the flatwoods; in other words, its topography is immature. The scattered sand ridges and knolls included were probably thrown up at about the time the region was emerging.

There has been a considerable development of alluvial soils along the various streams, where additional sediment is constantly being deposited by overflow water. These soils represent Coastal Plain material reworked and redeposited. They have a large content of organic matter.

Along the streams flowing through and bordering the sand hills there are some small strips of second-bottom or stream-terrace soils, representing old alluvium which was deposited when the streams were flowing at higher levels than at present.

The soils are classified into types, or textural units, such as sands, sandy loams, and loams, according to the content of sand, silt, and clay. The types are grouped into series, based upon origin, topography, drainage, and color.

The Norfolk series is mapped through both the sand-hill and flatwoods sections of the county. These soils are light gray and loose textured in the surface portion and yellow and friable in the subsoil. The surface is undulating to rolling and drainage is good.

The Hoffman and Guin soils are confined to the sand hills. The Hoffman series includes light-gray, loose soils underlain by mottled red, yellow, pink, and white, micaceous, greasy sandy clay or brittle sandy clay. The topography is rolling to broken, and the soils are in many places subject to damaging erosion.

The Guin series represents a heterogeneous mixture of Coastal Plain soils, consisting of patches of the Greenville, Ruston, Hoffman, and Norfolk soils so intricately mixed as to preclude their separation on the map. The topography is rough and broken, and some of the highest elevations in the county are included.

The Ruston soils are light gray in the surface portion and reddish yellow or mottled red and yellow in the subsoil. The drainage is good to excessive.

The Plummer series is characterized by gray soils, rather heavy in texture, with a mottled gray and brown, sticky sandy clay subsoil. The drainage is deficient.

The Portsmouth soils are dark gray to black in the surface portion, with a mottled gray and yellow or brown subsoil. They occupy rather depressed areas and in their natural state are poorly drained and swampy.

The Kalmia soils occur on the second bottoms, or stream terraces, and are no longer subject to overflow. The material is derived from old alluvium. The surface soils are light gray and the subsoil yellow and friable. Drainage is fairly well developed.

The areas mapped as Swamp include alluvial soils constantly being added to by material brought down, reworked, and redeposited by the streams.

In the following pages of this report the various soil types of Hoke County are described in detail, and their relation to agriculture discussed. The accompanying map shows the distribution of the soils. In the following table the name and the actual and relative extent of each are shown:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sand	91,904	35.6	Kalmia sandy loam	8,704	3.3
Slope phase	3,200		Plummer sandy loam	7,232	2.7
Hoffman sandy loam	64,320	24.1	Ruston sandy loam	4,480	1.7
Norfolk sandy loam	35,136	20.0	Portsmouth sandy loam	4,160	1.5
Deep phase	18,176		Guin sandy loam	1,024	.4
Swamp	18,752	7.0			
Portsmouth loam	9,792	3.7	Total	266,880	

NORFOLK SAND.

The Norfolk sand as mapped represents areas throughout the county in which the upper 3-foot section consists of sand. The immediate surface to a depth of about 1 inch in the wooded areas or 3 to 5 inches in cultivated fields consists of a light-gray loamy sand, this color being due to the decay of leaves and grasses in the former areas and cultivation in the latter. Extending from this layer to the bottom of the 3-foot section the soil consists of a pale-yellow sand. Patches occur throughout the type in which the underlying clay comes close to the 3-foot section, as evidenced by the loamy character of the sand in the lower section. Over the greater part of the type, however, the sand extends to a depth of 6 to 8 feet, and in some places it is even deeper.

This type is mapped in all parts of the county, but principally in the northern or sand-hill section, where it occurs along the crests and on the more gentle slopes of the ridges or stream divides, and here and there as low-lying areas bordering the larger streams. Throughout the southern section of the county it occupies narrow ridges of slight elevation. The surface of the type ranges from gently undulating to gently rolling or rolling, and the drainage is everywhere thorough.

The original growth on the Norfolk sand consisted of forests of longleaf pine. These have been cut off to a large extent, only a small clump here and there remaining. The present growth on the uncultivated area consists mainly of "forked-leaf oak," a variety of scrub oak, and some scattering second-growth pine, with an undergrowth of wire grass, some huckleberry, and a species of wild vetch. The variety of oak referred to is practically the only oak that grows on this soil, and areas supporting it are considered very poor land.

Probably 50 per cent of the Norfolk sand in the southern part of the county is in cultivation, while probably not more than 5 per cent of it in the sand-hill section is cultivated. Until recently very little attempt was made to farm this land, but there are several crops to which it is adapted and with which it has given profitable results, namely, tobacco, peaches, and small fruits, particularly grapes and dewberries.

While the acreage in peach trees in Hoke County is small, the large profits obtained from commercial orchards in the neighboring counties, particularly Moore, are resulting in a general planting in Hoke County. Several large orchards were set out last spring, and more will follow this fall (1918). During the period required for the trees to reach bearing age crops of tobacco, cotton, or corn are grown between the rows and in some cases soy beans have been grown in the rows between the trees. The Mayflower, Carmen, Georgia Belle, and

Elberta, all good shipping varieties, are the most popular. Ready-mixed fertilizer analyzing 8–3–3, and 16 per cent acid phosphate and 7½ per cent cottonseed meal mixed half and half, applied at the rate of about 6 pounds to the tree, are the most common fertilizers. The crop is shipped to northern markets. Probably the main drawback to orcharding in Hoke County would be the freight costs incurred in moving the crop to a main-line railroad. Under present prices the profits in the neighboring counties are said to range from $100 to $200 an acre. The growing of dewberries and grapes, which has been profitable in the adjoining counties on this type of soil, has up to the present received little attention in Hoke County. Bright-leaf tobacco is being successfully grown on this soil by a number of farmers. Commercial fertilizer, generally analyzing 8–3–3, is applied at the rate of about 1,000 pounds per acre. Yields averaging about 800 pounds per acre are obtained. A considerable acreage of the type is devoted to cotton. Prior to the war commercial fertilizers with a good percentage of potash were used, but at present ready-mixed goods or home mixtures of acid phosphate and cottonseed meal analyzing about 6–4–0 are used, in applications of 600 to 800 pounds per acre. A top dressing of 75 to 100 pounds of nitrate of soda per acre is applied during the growth of the plants. Yields range from one-third to two-thirds bale per acre. The same quality of fertilizer, but in smaller amount, is given corn, which yields 5 to 20 bushels per acre. The small grains, oats and wheat, are little grown on this soil, as most farms contain small areas of soil with a clay foundation, and these are generally used for the small-grain crops. Cantaloupes, watermelons, sweet potatoes, and other vegetables yield well when heavily fertilized. A considerable area of this soil is fenced for pasture land. By burning the pasture over in the late winter all the dead grass is destroyed, and as the wire grass starts growth it makes good grazing for about a month, or until it becomes tough and unpalatable. The other scattering vegetation and the grasses along the included stream heads or "slashes" furnish some grazing throughout the growing season.

The selling value of this land ranges from $5 to $30 an acre.

In many sections of the South the Norfolk sand is used for special crops, such as extra early sweet potatoes, Irish potatoes, watermelons, cantaloupes, cabbage, radishes, garden peas, and other vegetables. It is naturally a poor general-farming soil, but such crops as those mentioned can be profitably grown with the use of commercial fertilizer. By plowing under cowpeas, velvet beans, or other legumes, the productiveness of the soil can be materially increased.

Norfolk sand, slope phase.—The slope phase differs from the typical Norfolk sand only in topography, the entire soil section being composed of medium to coarse sand. The phase is encountered only

in the northern and southeastern parts of the sand-hill section, where it occurs in irregular areas along the slopes of several streams, principally Tuckahoe, Horse, Nicholsons, Beaver, Puppy, and Rockfish Creeks. It represents areas of Norfolk sand so rolling as to be difficult of agricultural development. Practically none of the phase is in cultivation. It supports a stunted growth of "forked-leaf" scrub oak and a second growth of shortleaf and longleaf yellow pine and dogwood, with a surface covering consisting principally of wire grass, wild vetch, partridge pea, and huckleberry. The land has no especial agricultural value and is held at $5 to $10 an acre.

NORFOLK SANDY LOAM.

The Norfolk sandy loam consists of a light-gray to brownish-gray loamy sand to loose sandy loam extending to a depth of 5 to 7 inches, or the depth of cultivation. From this to depths ranging from 10 to 15 inches the character of the soil material is practically the same, but the color is pale yellow. The subsoil consists of a bright-yellow friable sandy clay which extends to a depth of several feet.

The differences in the color of the soil are caused mainly by the varying content of organic matter. Thus in the "worn-out" fields the lighter colors prevail, whereas in those kept in a highly productive state the color is uniformly dark. The moisture content also has an appreciable effect upon the immediate color of the soil, which appears dark gray to black following a rain. The color of the subsoil also exhibits variation, correlated with drainage conditions, there being small knolls and narrow abrupt stream slopes on which the type has a subsoil of a reddish cast, but whose area is too small to be separately mapped. Again in the flatter, depressed areas, where there is frequently a rather dark surface soil, the subsoil is frequently light yellow and often mottled with drab or gray streaks. Included in the type, especially in the southeastern section of the county, are small irregular areas of soil which closely approach the Marlboro sandy loam in character. Here the soil is of a brownish-gray color, similar to the Norfolk sandy loam, which passes abruptly at a depth of 5 to 8 inches into a rather heavy, sticky yet friable, yellow sandy clay. This soil, while very similar to the typical Norfolk sandy loam in general appearance, is heavier, stronger, and more productive, and is a better corn and cotton soil. Had it occurred in sufficient area it would have been mapped separately as the Marlboro sandy loam.

In its natural condition, the Norfolk sandy loam contains little organic matter. Owing to its loose structure it is easy to cultivate, requiring only light teams and implements.

The Norfolk sandy loam occurs in rather broken areas throughout the flatwoods and in a few small, isolated areas in the sand-hill section, especially along Drowning Creek. It is most extensive to the southwest of Raeford, southwest of Antioch, south of Dundarrach, to the east of Singletons Bay, and along the Raeford-Fayetteville Highway. This is the most extensive of the flatwoods soils, and it is the most important soil in the county, as practically all of it is in a high state of cultivation. Its topography is prevailingly gently undulating, becoming gently rolling in places as the larger stream courses are approached. Drainage generally is well established. Water percolates through the entire soil section so rapidly that cultivation can safely be done within a few hours after a heavy rain, but, nevertheless, little damage ever results from lack of moisture where a good supply of organic matter is maintained.

There are probably more highly improved farms on this type than on any other soil in Hoke County. The whole area was originally covered with longleaf pine. Uncultivated areas at present support a second growth consisting mainly of shortleaf pine, with some longleaf pine, various oaks, and dogwood.

Cotton is the principal crop. Most farmers produce sufficient corn to feed the work stock and hogs, enough of the latter usually being raised to supply the needs of the farm. Some tobacco is grown. Cowpeas and soy beans are grown to a considerable extent, and many farmers grow velvet beans for hay, as a soil improver, and to some extent for seed. Among the other crops grown for use on the farm or as soil improvers are sweet potatoes and other vegetables, cherries, peaches, pears, and early apples, Muscadine grapes, oats, rye, sorghum, peanuts, crimson clover, and vetch. Most farmers have small patches of cantaloupes and melons, and occasionally these crops are grown in a small commercial way.

This is an early soil for all crops. It is possible to produce very early vegetables, and the hardier vegetables, such as turnips, cabbage, and collards, do particularly well during the winter.

Under favorable conditions the better farmers on this soil obtain one bale of cotton per acre; the average is probably between one-half and three-fourths bale. As with cotton, there is a wide range in the yields of the corn crop, some farmers averaging 30 to 40 bushels per acre, while the general average for the type is 20 to 25 bushels. This soil is not considered especially adapted to wheat, but good yields are frequently obtained, the range being from 10 to 30 bushels per acre. Oats yield 25 to 40 bushels.

Commercial fertilizers are commonly used for the general farm crops. Mixtures generally analyzing 6–4–0, either ready made or home mixed, are applied to cotton at the rate of 500 to 800 pounds

per acre and at the rate of 400 to 600 pounds per acre on corn. Both crops are generally given a later top dressing of 75 to 100 pounds of nitrate of soda per acre. Oats and wheat are commonly given an acreage application of 200 to 400 pounds of the 6-4-0 mixture, with a later top dressing of 75 to 100 pounds of nitrate of soda. The yields of all crops are noticeably lower when no fertilizer is used. Cowpeas are occasionally grown with the cultivated crops, and turned under to replenish the supply of organic matter.

The present selling price of this land ranges from about $100 to $200 an acre, according to the location and improvements. As a whole, the farm buildings and improvements on this soil are more pretentious and substantial than on any other extensive type in the county, and the soil seems to give a better margin of profit.

Farming experience on this type has generally indicated the need of considerable potash in fertilizers, especially for vegetables. The results of analyses and experiments on the Norfolk sandy loam made at the Edgecombe Test Farm by the North Carolina Department of Agriculture show that the soil is low in nitrogen and phosphoric acid and only fairly well supplied with potash and lime. Indications are that on the average a mixture containing about 7 per cent of available phosphoric acid, 7 per cent of nitrogen, and 5 per cent of potash, applied at the rate of 400 to 1,000 pounds per acre, is most effective. Best results seem to be obtained where one-half the fertilizer is applied in the drill at the time of planting and the remainder distributed along the row about the 1st of July. In experiments with 67 varieties of cotton, the later-maturing big-boll types have given the best returns, although occasionally, in short growing seasons, the small-boll, early-maturing varieties have done well. Among the medium to large boll varieties which have given good results are the Russell, Culpepper, Cleveland, Cooks Improved, Brown No. 1, and Peterkin Improved, and among the successful small-boll varieties are the Kings Improved, Hodge, Weggs Cluster, Sugar-Loaf, and Broadwell Double-Jointed.

The most economical way to improve this soil apparently is to grow legumes more extensively in rotation with the clean-cultivated crops; to increase the supply of organic matter by occasionally plowing under a legume or a crop of vetch and oats or rye; to grow more subsistence crops, such as corn and coarse forage; and to raise more live stock, so as to use more economically the crops produced and incidentally return the greater part of the fertilizing elements to the soil in the form of manure.

Norfolk sandy loam, deep phase.—The Norfolk sandy loam, deep phase, consists of a light-gray to brownish-gray loamy sand to sandy loam grading at 5 to 7 inches into a pale-yellow loamy sand which extends to a depth of 24 to 30 inches. The subsoil is bright-

yellow in color, the upper few inches consisting of a compact sandy loam to loamy sand grading into a friable sandy clay. In its natural condition the soil contains little organic matter, but owing to its loose structure it is easy to cultivate with light teams and implements.

This phase has its principal occurrence in the flatwoods section, where it occurs in numerous large but irregular bodies. There are a number of smaller areas throughout the sand-hill section. The phase is well drained. Water percolates downward through the soil so rapidly that plowing can safely be done within a few hours after heavy rains. In fields that have been largely depleted of organic matter through improvident farming, most crops suffer in protracted dry spells, but little damage results where a good supply of organic matter is maintained.

This soil is of considerable extent and the greater part of it is in cultivation. It originally supported a heavy growth of longleaf pine. The present uncultivated areas are covered with a stunted growth, mainly of oak and some longleaf pine, shortleaf pine, and dogwood. That this soil is capable of producing excellent crop yields under efficient handling is shown by results obtained on a number of the better managed farms, although the phase as a whole does not produce the heavy yields obtained on the typical Norfolk sandy loam. Cotton is the principal crop. A considerable acreage is annually devoted to tobacco, to which the soil is especially well adapted. In the sand-hill section many areas of this phase are well suited to the production of peaches and dewberries. In general, the same crops are grown as on the typical Norfolk sandy loam, and the methods of farming are practically the same. Somewhat heavier fertilization is necessary to maintain high yields, since the soil is more open in structure and deeper, so that leaching takes place more readily.

The selling price of land of this phase ranges from $25 to $150 an acre, depending upon the location and improvements.

The recommendations made for the treatment of the typical Norfolk sandy loam are applicable to the phase.

HOFFMAN SANDY LOAM.

The surface soil of the Hoffman sandy loam consists of a loamy sand about 10 inches deep. The immediate surface color is light gray, to a depth of about 1 inch in timbered areas, and of 5 to 7 inches in cultivated fields. The lower surface soil is pale yellow in color, often with a slight pinkish cast. The subsoil is a compact, gritty, highly micaceous clay of variegated colors, generally mottled yellow, red, pink, and white, with pink predominating in many places. On numerous knolls and on narrow, sharp ridges and abrupt slopes, where erosion has nearly kept pace with weathering and the soil covering is consequently shallow, the subsoil is usually a mottled

brick-red color, owing to oxidation of the iron compounds. Iron concretions and fragments of ferruginous sandstone are of common occurrence in such eroded areas and the soil material is prevailingly coarser than in the less broken areas. In the deeper road cuts a substratum of pure white, nearly gritless clay is exposed. Along some of the more gentle slopes and terracelike abutments of numerous ridges on the drainage courses the soil is frequently slightly darker colored, finer textured, and more loamy than typical, and the subsoil is lighter and more uniform in color, less gritty, and lower in mica; the soil here is consequently of greater agricultural value.

The Hoffman sandy loam occurs throughout the sand-hill section of the county, closely associated with the Norfolk sand. It occupies practically all of the rolling stream slopes and frequently reaches over the crests of the narrower ridges. It also occurs in many places on the many gradual slopes and terracelike abutments of the ridges near the larger stream courses. Its topography in general, ranges from rolling to broken, but part of the type is gently rolling. Drainage is excessive, and the run-off rapid enough to cause damaging erosion.

Originally the Hoffman sandy loam supported a heavy growth of longleaf pine. With the exception of occasional small tracts, this has all been displaced by the present growth of "round-leaf" scrub oak, second-growth shortleaf and longleaf pine, and dogwood. Wire grass, wild vetch, partridge pea, and huckleberry constitute the undergrowth.

Only a small proportion of the type is cleared and in cultivation, and there is yet a considerable uncleared area suited to agriculture. The greater part of the type, however, is subject to erosion to such an extent as to lower its value for farming, and it is not likely to be brought into cultivation until the wide areas of more productive land now lying idle have been taken up. The soil in its natural state has a low organic content.

Cotton is the principal crop on this soil. Sufficient corn is generally grown to feed the work stock and the hogs raised for home consumption. Oats and wheat yield fairly well, and rye is occasionally grown for winter grazing and as a green manure. Cowpeas and soy beans are grown to some extent for hay, as soil renovators, and for the seed. Among the other crops grown either for use on the farm or as soil improvers are sweet potatoes and the other common vegetables, early apples, peaches, pears, cherries, sorghum, peanuts, crimson clover, and velvet beans. Many farmers have small patches of cantaloupes and watermelons.

Cotton yields from one-third to two-thirds bale per acre, depending in large measure upon the quantity and quality of fertilizer used. Corn yields 10 to 25 bushels per acre with ordinary fertilization and

handling. Wheat yields about 6 to 15 bushels and oats 25 to 30 bushels per acre. Soy beans yield about 15 bushels of seed per acre and about 1 ton of hay. The yields of all crops are low where fertilizer or manure is not used.

In general, the land is broken flat in the fall or winter to a depth of 4 to 7 inches with turning plows drawn by one or two mules. Cultivation is done at frequent intervals with shallow-running implements, such as sweeps, shovels, weeders, and harrows.

Fertilizers are used on all the general farm crops. Ready-mixed fertilizers analyzing from 6–4–0 to 8–4–0, or home mixtures of acid phosphate and cottonseed meal in proportions to give the same ratios are used. Applications range from 500 to 800 pounds per acre for cotton and from 400 to 600 pounds for corn, followed by a top dressing of 75 to 100 pounds of nitrate of soda. Wheat and oats are given an average application of 300 pounds of the same grade fertilizer, followed by a later top dressing of 75 to 100 pounds of nitrate of soda. Soy beans are usually given an application of 300 pounds of a 6–4–0 fertilizer.

Land values on this type range from $5 to $25 an acre, depending largely upon the topography, location, and improvements.

Deep plowing and the growing of legumes, such as cowpeas, soy beans, velvet beans, crimson clover, and vetch, in rotation with the cultivated crops should prove successful in building up this soil. The reforestation of a great part of the type, including all areas too steep for cultivation, should prove profitable. Many of the higher ridges are suited to the commercial growing of peaches, dew berries, and grapes.

GUIN SANDY LOAM.

The Guin sandy loam, as mapped in Hoke County, consists of a heterogeneous mixture of a number of Coastal Plain soils, ranging from the Greenville, which is a red soil underlain by a friable red clay, through the Ruston and Hoffman sandy loams to the Norfolk sand, the included soils being so intricately mixed as to render their separation impracticable. Soils of the first three series named predominate. Fragments of ferruginous sandstone occur plentifully over the surface, especially on Blues Mountain, where they are often of a rather massive formation.

Areas of this soil are mapped in several places throughout the sand-hill section of the county, particularly around Sanatorium and Blues Mountain, with an area about 1½ miles south of Piny Ridge Church, one about one-half mile north of Longstreet Church, and one in the northeastern corner of the county. These areas occupy the highest elevations in the county, the peaks of various ridges, and their topography is rolling to broken and rough.

With the exception of the area occupied by the State Sanatorium, none of this type is cleared. In common with the surrounding land the type at one time supported a growth of longleaf pine, but this has been cut off and the area is now occupied by a growth of shortleaf and some longleaf pine, in addition to round-leaf scrub oak and dogwood. Wire grass, wild vetch, partridge pea, and huckleberry make up the undergrowth. The Guin sandy loam as mapped in Hoke County has very little agricultural value.

RUSTON SANDY LOAM.

The surface soil of the Ruston sandy loam consists of a light-gray or brownish-gray sandy loam or loamy sand passing at 4 to 6 inches into a light-yellow loamy sand to sandy loam which extends to a depth of 10 to 14 inches. The subsoil is a bright reddish yellow, friable fine sandy clay, in places mottled with yellow and red. The type represents a gradation between the Norfolk and Orangeburg series, the latter having a brownish-gray soil with a deep-red subsoil, and consequently exhibits some range in the coloration of the subsoil. Included with the type are some small areas of Orangeburg sandy loam, and also one or more of the Greenville sandy loam, which consists of a brownish-red, rather heavy sandy loam to a depth of 8 to 10 inches, underlain by a red, heavy yet friable fine sandy clay. The most important occurrence of these included soils is along the lower slopes of Blues Mountain.

The Ruston sandy loam occurs in small, irregular bodies scattered through the flatwoods section of the county and in a few areas through the sand hills. Its topography varies from undulating to gently rolling, the latter condition existing along the slopes of the larger streams. Drainage is well established, but little damage results from a lack of moisture during droughts, especially when the organic content of the soil is maintained.

The total area of the Ruston sandy loam is small, but probably 80 per cent of the type is farmed, and most of it is in a high state of cultivation. The unimproved areas are covered with a growth of hickory, oak, dogwood, and longleaf and shortleaf pine.

Cotton is the principal crop. Considerable corn and small grain are also grown. Soy beans, velvet beans, and cowpeas are produced to quite an extent for forage, for hay, and for seed. Among the other crops grown are sorghum, sweet potatoes and other vegetables, the fruits common to this section, peanuts, crimson clover, cantaloupes, and watermelons.

The better farmers on this soil average 1 bale of cotton per acre, and some have made as high as 1½ bales. Corn yields 25 to 40 bushels per acre, wheat 15 to 30 bushels, and oats from 25 to 40 bushels. Soy beans yield from 1 to 2 tons of hay and 15 to 20 bushels of seed per acre.

Fertilizers analyzing from 6–4–0 to 8–4–0, either ready mixed or home mixed phosphate and cottonseed meal, are used on all the general crops. Applications ranging from 600 to 800 pounds for cotton and from 400 to 600 pounds for corn, with a later top dressing of 75 to 100 pounds of nitrate of soda, are made per acre. Wheat and oats receive from 200 to 400 pounds per acre of the same fertilizer and a later top dressing of 75 to 100 pounds of nitrate of soda. Soy beans receive from 200 to 400 pounds per acre of a 6–4–0 mixture. Cowpeas are generally sown after wheat or oats, or in the corn, and receive no fertilizer.

The present selling price of this land ranges from $75 to $100 an acre, according to the location and improvements.

PLUMMER SANDY LOAM.

The soil of the Plummer sandy loam consists of a light-gray, heavy sandy loam, often with a considerable content of coarse sand, extending to a depth of 8 to 12 inches. The subsoil consists of a mottled blue-gray and brown, sticky sandy clay. The soil appears dark gray when wet.

In its natural condition the Plummer sandy loam is comparatively well supplied with organic matter, but owing to its rather heavy structure, heavier implements and work stock are needed on it than on the lighter Norfolk soils.

The Plummer sandy loam occurs throughout the flatwoods section of the county, more particularly in the southeastern part. The areas are generally elliptical or circular. As mapped in Hoke County the type is rather intermediate between the Portsmouth and Norfolk soils, and in general is more productive than the soils heretofore mapped in the Plummer series. Its surface is prevailingly level, resembling a table-land, and the type lies higher than the Portsmouth soils, though lower than the Norfolk. Its drainage is generally deficient, owing to the level topography and the heavy subsoil.

The native timber growth consists of various species of oak, gum, and pine. The pitcher plant is a characteristic growth in many places. Only a small proportion of the type is in cultivation. Cotton is the principal crop. Corn is grown in sufficient quantity to feed the work stock and the hogs raised to supply the home with meat. Oats and wheat produce well. Soy beans and cowpeas are grown to some extent for hay and feed, and as soil-improving crops. Sweet potatoes and the various garden vegetables give good returns.

Cotton yields from one-third to 1 bale per acre. Corn yields 15 to 35 bushels, oats 20 to 40 bushels, and wheat 10 to 20 bushels per

acre. Soy beans and cowpeas yield from 1 to 2 tons of hay per acre.

The Plummer sandy loam is a rather wet and cold soil, slow to warm up and become favorable to plant growth in the spring. Ditching is necessary for bringing it into a cultivable condition.

In former years, when potash was available, commercial fertilizers relatively high in phosphoric acid and potash were used on this soil, in about the same amounts and grades as on the Norfolk sandy loam.

The present selling price of this soil ranges from $20 to $75 an acre.

Better drainage, deeper plowing, liming, and the incorporation of more organic matter in the soil are essential for the improvement of this type.

PORTSMOUTH SANDY LOAM.

The Portsmouth sandy loam, to a depth of 10 to 20 inches, consists of a dark-gray sandy loam, high in organic matter. The upper subsoil is a light-gray or steel-gray, tenacious sandy clay which becomes mottled with brown, red, and yellow at depths of 24 to 30 inches.

This type occurs scattered throughout the flatwoods section of the county, especially in the southwestern part. A few small areas are mapped in the sand hills. Patches and strips too small to be shown on the soil map are in many places included with the surrounding soil type.

The Portsmouth sandy loam occupies level and slightly depressed areas, formerly known as cypress bays or ponds. There is very little natural run-off, and all the cultivated areas have been drained by open ditches. Many of the wet, semiswampy areas could be drained by digging deep ditches to some of the natural drainage outlets.

This type is not extensive and only a small part of it is in cultivation. The unimproved areas support a forest growth of cypress, gum, and holly, with an undergrowth in many places of such water-loving plants as gallberry, cane, and huckleberry. Loblolly and shortleaf pine grow in some of the better drained areas.

This soil when well drained is suited to corn, oats, cotton, cabbage, onions, strawberries, and garden vegetables. It is considered one of the best corn soils in the county. All crops do better in a warm, dry spring, as with much rainfall crops must be planted late. Cotton is not usually planted on this land until after several crops of corn and oats have been grown, as the crop on new land goes to weed.

Corn yields from 20 to 50 bushels per acre, and oats from 25 to 50 bushels. Cotton yields vary from one-third to one bale per acre. Cowpeas and soy beans sown after a small grain produce a good crop of hay.

Cultivated areas of this soil generally occur in farms composed mainly of the higher lying Norfolk soils, and are handled and fertilized in much the same way. Under ordinary conditions, when potash is available, fertilizers relatively high in potash and phosphoric acid are used. Lime is generally considered beneficial.

PORTSMOUTH LOAM.

The Portsmouth loam consists of 6 to 20 inches of dark-gray to black silty loam or loam, underlain by a bluish-gray, heavy, sticky clay, mottled in the lower depths with brown and yellow. The organic content of the soil is always high, especially in many of the larger occurrences where the type approaches a Muck in composition. Scattered irregularly through the type are small depressed areas of soil composed of a black sand to a depth of about 20 inches, where it passes through a coffee-brown, compact, impervious sand into a white, compact sand at 30 to 36 inches. These areas really represent the St. Johns series, but are not of sufficient extent to warrant separate mapping.

The Portsmouth loam occurs through the southern or flatwoods section of the county, where it occupies uniformly level or slightly depressed areas in the uplands, frequently elliptical or round in shape. On account of its flat surface and the close structure of both soil and subsoil, the natural drainage is poor, much of the type being at present in a semiswampy condition. Its low position and flat surface have favored the growth of vegetation, through the decay of which the soil in many places has accumulated large quantities of organic matter. The forest growth in the better drained areas is mostly pine, with a few small gum and oak trees. The wetter areas support a growth of cypress, gum, bay bushes, briers, and reeds.

While most of the type has been cut over and the commercial timber removed, only a small proportion of it is in cultivation, the fields generally being located along the breaks and slashes leading to the higher lying soils. Ditching has been necessary to bring these areas under cultivation. Open ditches are used and have been found very satisfactory, as the banks stand up well. Practically all the areas have sufficient fall and outlet for successful drainage.

The Portsmouth loam is admirably adapted to corn, spring oats, and grasses. Cabbage, cucumbers, and Irish potatoes also give good results. When the planting season is early cotton does well. Like the associated types, the Portsmouth loam is naturally a wet, cold soil, and requires good drainage, liberal applications of lime, and deep plowing to fit it for the profitable production of field crops.

Land values on this soil range from $10 to $50 an acre.

KALMIA SANDY LOAM.

The surface soil of the Kalmia sandy loam consists typically of a light-gray, mellow sandy loam or loamy sand, passing at 2 to 5 inches into a pale-yellow sandy loam which extends to a depth of

about 15 inches. The subsoil is a bright-yellow, friable fine sandy clay. In texture the type is quite uniform, although there are a few small, isolated areas along lower Little River and lower Rockfish Creek in which the soil is a fine sandy loam. These areas were not deemed of sufficient extent and importance to warrant separation. Occurring in places as a narrow rim along the edge of the type adjacent to the uplands, and in a few locations along lower Crane and James Creeks, and just below the confluence of the latter-named creek and Little River, are included small bodies of Myatt sandy loam, a poorly drained gray to dark-gray soil with a mottled light-gray and brown, compact fine sandy clay subsoil. These areas, while markedly different from the Kalmia sandy loam, are not considered of sufficient extent to warrant their separation in mapping.

The largest areas of the Kalmia sandy loam occur along Little River, and James, Crane, Rockfish, Little Rockfish, Puppy, and Nicholsons Creeks. There are smaller bodies along several of the smaller streams. The type occurs on second bottoms or stream terraces, and consists of material which apparently was deposited over former flood plains at a time when the stream overflows reached higher levels than at present. The type is no longer overflowed. Surface drainage and underdrainage are usually fair except in the small included areas of Myatt sandy loam.

This type is of no general importance owing to its small extent. Probably 40 per cent of it is cultivated. Cotton, the leading crop, yields from one-third to 1 bale per acre. Corn yields 15 to 35 bushels per acre, and oats also do well. All the general crops suited to the upland section of the county produce well on this soil. With deep plowing and a proper supply of organic matter good yields are maintained with moderate fertilization. By ditching and draining the flatter, more poorly drained areas, all of this type can be used profitably.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Kalmia sandy loam:

Mechanical analyses of Kalmia 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.*	*Per cent.*
235205	Soil	2.0	12.0	7.4	39.2	23.5	12.4	3.8
235206	Subsoil	4.0	12.1	6.8	34.4	26.5	12.8	3.5
235207	Lower subsoil	.8	3.0	2.2	28.0	29.0	17.4	19.4

SWAMP.

Swamp as mapped in Hoke County includes areas lying along the stream courses, subject to overflow, and consisting of a heterogeneous mixture of soils. Along most of the larger streams, where the Swamp is broad and flat, much of the soil is composed of organic matter of a dark-brown color closely resembling Muck. The subsoil of such areas consists of beds of medium sand, coarse sand, fine gravel, and water-rounded pebbles, with little or no organic matter. Along the smaller streams, where the soil is more of a colluvial nature, it frequently consists of medium to coarse, loose sand, gray to black in color, saturated with water. The subsoil is usually a lighter-colored sand, frequently almost white.

The largest areas of Swamp occur along Little River and Cane Creek, in the northern part of the county; along Drowning Creek, on the southwestern boundary; and along Rockfish Creek, and Raft and Little Raft Swamps in the southern part. The type occurs in narrow, continuous strips along practically every creek and branch in the county.

Areas of Swamp are forested with cypress, black gum, sweet gum, holly, pine, some poplar, ash, and maple, with a dense undergrowth of gallberry, bay, reeds, and other water-loving shrubs. Practically all of the merchantable timber has been removed. In places the type affords good grazing when the land is not flooded.

A large part of the Swamp, if properly drained, cleared, and devoted to the crops to which it is adapted, would prove valuable farming land. The broad, black loamy areas are well suited to corn and oats. In its present condition the type is unfit for agriculture.

SUMMARY.

Hoke County is situated in the southeastern part of North Carolina. It has an area of 417 square miles, or 266,880 acres.

The county lies in two distinct physiographic regions, known as the sand hills and the flatwoods. The line of division runs across the county east and west. The sand-hill region is a high, rolling country, dissected by numerous drainage courses. The flatwoods section, to the south, is gently undulating, with many level, depressed areas, and drainage is in places deficient.

Hoke County was formed in 1911, from parts of Robeson and Cumberland Counties. Raeford is the county seat. The territory now known as Hoke County was first settled by the Scotch. The sand-hill section is only sparsely inhabited; the flatwoods region is

thickly settled. The present population is about evenly divided between whites and negroes.

Agriculture is the principal industry. The lumbering and turpentine industries were formerly important. There is one cotton mill and one oil mill in the county, both at Raeford.

Railroad transportation facilities are inadequate.

The climate is mild and healthful. The mean annual temperature is 61.9° F., and the mean annual rainfall is 50.47 inches. The precipitation is well distributed through the growing season.

Agriculture has always been the most important industry of Hoke County. In the early days the farms were practically self-supporting, but after the Civil War, with the resulting demoralization of labor conditions and the need for ready money, the so-called one-crop system developed. In recent years there has been a gradual return to a scheme of general farming in which more attention is given to the subsistence crops.

Cotton is the principal money crop, but tobacco is becoming an important source of income. Corn is grown in sufficient quantity to supply home and farm needs. The acreage in small grains, oats, and wheat is increasing, and hay and forage crops are becoming more important. The commercial growing of peaches, dewberries, and grapes is being taken up by a number of farmers.

The most important of the minor crops are sweet potatoes, Irish potatoes, early apples, peaches, pears, cherries, Muscadine grapes, soy beans, velvet beans, cowpeas, vetch, rape, crimson clover, alfalfa, rye, peanuts, tomatoes, and other vegetables for home use.

Cattle and hog raising is carried on as an adjunct to general farming by a number of farmers. Dairying is only developed to a sufficient extent to supply the home demands. Poultry raising is confined to the small flocks kept on most farms.

Most of the soils of Hoke County are easily handled, and light implements and work stock are in general use.

A number of the better farmers are adopting a systematic crop rotation. The one in most general use is a three-year rotation, as follows: First year, corn; second year, a small grain followed by cowpeas or soy beans; and the third year, cotton.

All crops are heavily fertilized, and the annual expenditure for commercial fertilizer is large. Hired labor is scarce. Most of the farm work is performed by the tenant and his family.

Prices of farm land range from $20 to $200 an acre through the flatwoods, and from $5 to $25 an acre through the sand hills.

Hoke County lies in the extreme western part of the Coastal Plain province, and the upland soils are derived from old marine sediments.

The Norfolk sand, as mapped in Hoke County, represents areas in which the upper 3-foot section consists of sand. It occurs throughout the county, but especially in the sand hills. The soil is naturally unproductive and heavy fertilization is necessary for good results. It is particularly suited to bright-leaf tobacco, early peaches, dewberries, and grapes.

The Norfolk sand, slope phase, occurs only in the sand hills. Its topography is so rolling as to make it poorly suited to agriculture, and practically none of it is cultivated. It supports a growth of forked-leaf scrub oak, second-growth pine, and dogwood.

The Norfolk sandy loam is a light-colored soil underlain by a yellow, friable sandy clay subsoil. It is an extensive type through the flatwoods, and is agriculturally important. Its topography is undulating and drainage good. Cotton is the leading crop. All the general farm crops produce well, and the soil is capable of being made highly productive.

The Norfolk sandy loam, deep phase, differs from the typical soil only in its deeper surface covering of sand. It is a well-drained soil. Heavier fertilization is needed to obtain maximum crop yields than is necessary on the typical Norfolk sandy loam.

The Hoffman sandy loam occupies slopes and narrow ridge crests in the sand-hill section. It is sandy soil underlain by a greasy, micaceous clay of variegated red, yellow, pink, and white color. Erosion is frequently severe, but the more gently rolling areas produce satisfactory yields of cotton and other general farm crops.

The Guin sandy loam is a heterogeneous mixture of Coastal Plain soils, including small areas of Greenville, Ruston, Hoffman, and Norfolk soils so intricately mixed as to render separate mapping impracticable. The soil occupies some of the highest elevations in the county and its topography is rolling and broken. It is a non-agricultural soil.

The Ruston sandy loam is a light sandy soil underlain by a reddish-yellow, friable sandy clay subsoil. It is an inextensive type, but most of it is in cultivation. Its drainage is good, and it is a comparatively strong soil well suited to cotton and other general farm crops.

The Plummer sandy loam occupies broad table-land areas intermediate in elevation between the Portsmouth and Norfolk soils. Its drainage is deficient, and it is rather late in warming up for spring planting. Cotton and the general farm crops are produced.

The Portsmouth sandy loam and loam occupy depressed, flat areas, and are very high in organic matter. When artificially drained they are well suited to corn, oats, and cotton.

The Kalmia sandy loam is a second-bottom soil occurring along various stream courses in the sand-hill section. It is similar in soil section and in crop adaptation to the Norfolk sandy loam. Its drainage is fair.

Swamp includes areas along practically every stream in the county, subject to frequent overflow and during the greater part of the year in a swampy condition. It supports a growth of cypress, gum, holly, pine, poplar, ash, and maple, with a dense undergrowth of shrubs and vines.

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[PUBLIC RESOLUTION—No. 9.]

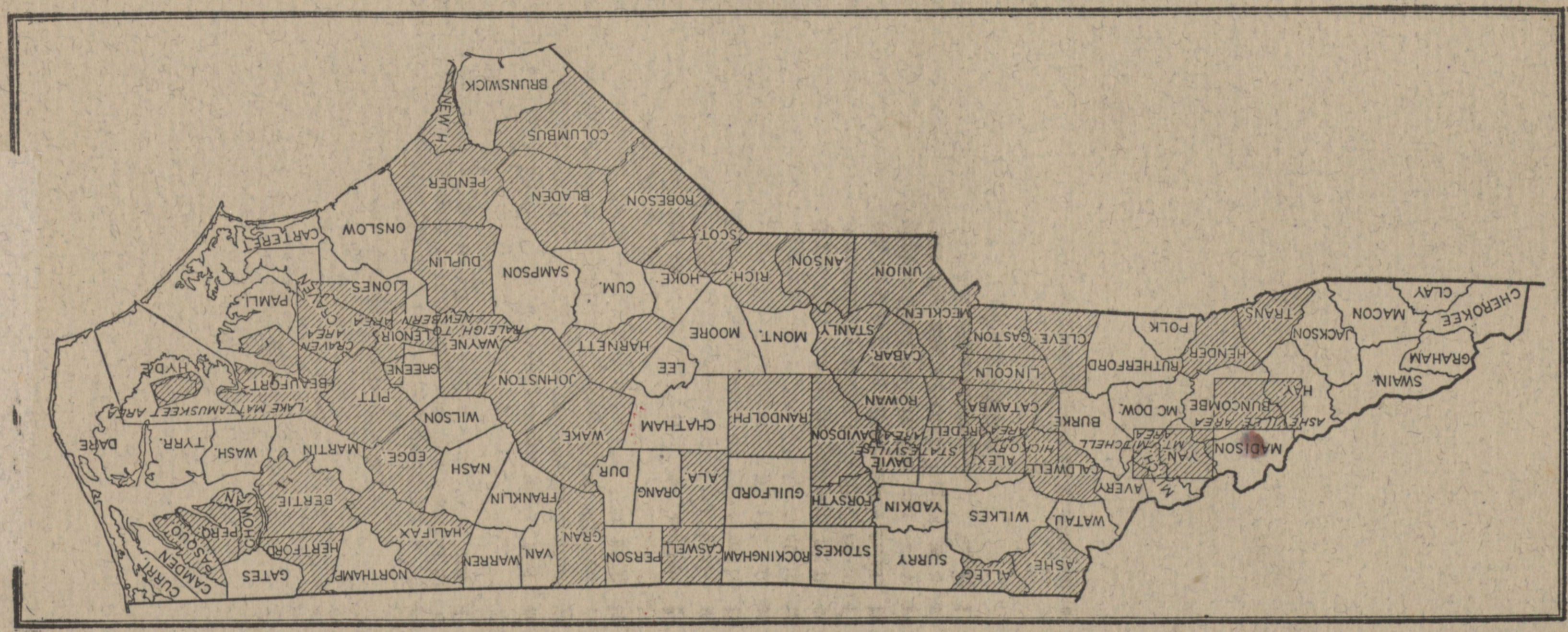
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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

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

Approved, March 14, 1904.

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



Areas surveyed in North Carolina.