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 AGRICULTURAL EXPERIMENT STATION;
C. B. WILLIAMS, AGRONOMIST.

SOIL SURVEY OF HERTFORD COUNTY, NORTH CAROLINA.

BY

E. S. VANATTA, OF THE U. S. DEPARTMENT OF AGRICULTURE,
IN CHARGE, AND F. N. McDOWELL, OF THE NORTH
CAROLINA DEPARTMENT OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]

WASHINGTON:
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1917.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., February 19, 1917.

SIR: During the field season of 1916 a soil survey was made of Hertford County, North Carolina. This work was done in cooperation with the North Carolina Department of Agriculture, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this area and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1916, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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MAP.

Soil map, Hertford County sheet, North Carolina.

SOIL SURVEY OF HERTFORD COUNTY, NORTH CAROLINA.

By E. S. VANATTA, of the U. S. Department of Agriculture, In Charge, and F. N. McDOWELL, of the North Carolina Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Hertford County lies in the northeastern part of North Carolina, about 50 miles southwest of Norfolk, Va. It is bounded on the north by the Virginia State line; on the east by Gates and Chowan Counties, from which it is separated by the Chowan River; on the south by Bertie County; and on the west by Northampton County. Its dimension north and south is approximately 21 miles. East and west it varies from 28 miles along the southern boundary to about 8 miles through the north-central part. The distance east and west along the northern boundary line is 12½ miles. The area of the county is 345 square miles, or 220,800 acres.

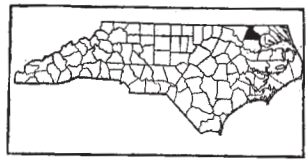

FIG. 1.—Sketch map showing location of the Hertford County area, North Carolina.

Hertford County lies in the Coastal Plain and across the boundary between the low, flat, coastal portion known as the Flatwoods and the higher, more rolling portion. A line drawn from Chowan River southwestward across the central part of the county to the Bertie and Northampton County lines will separate the Flatwoods on the south and east from the higher and more rolling country on the north and west. The level country of the Flatwoods extends as narrow belts up the larger streams into the area of rolling country, while small spurs of the higher land project into the lower area.

The Flatwoods area consists of a smooth plain, lying from 10 to 20 feet above tidewater, sloping to the east with the maximum elevation along the northwestern boundary and the minimum along the eastern. The elevation is sufficient to allow a shallow dissection along the relatively few streams which cross it. This dissection being of recent date, it extends only over the valley of the stream and a narrow belt of country bordering the valley on each side. Between the streams and their bordering belts of dissected upland lie areas of flat country in which underdrainage and often surface drainage are deficient. The valleys of the large streams are broad, as a rule, and large areas in them are poorly drained. The Flatwoods topography, therefore, described in brief, consists of flat upland belts between the

streams; contiguous belts of country with rather complete but very shallow dissection, lying along the bluff lines of the streams and the rather broad, flat stream valleys.

The topography of the more uneven portion of the Coastal Plain is undulating to rolling. It consists of an area of country from which flat upland is absent. The land surface consists of slopes, though many of them are gentle. It lies higher than the top of the Flatwoods, the elevations ranging from 20 to about 75 feet above sea level.

In the Flatwoods portion of the county the towns are located on the stream bluffs in the belts of dissected topography.

Practically all the streams in the county have relatively wide overflow bottoms. The bottom lands of the Chowan River are the most extensive, in places attaining a width of 2 miles or more. The bottoms along the Wiccacon River and its largest tributaries, Ahoskie Swamp and Chinkapin Creek, range from one-fourth mile to 1½ miles in width.

The bottom lands of the Meherrin River are most extensive along its upper course, where they attain a maximum width of about three-fourths mile. These bottom areas are predominantly flat, although occasionally small, low, islandlike areas occur. With the exception of these, an area along Cutawhiskie Swamp south of Menola, and bottom-land areas along the upper course of the Meherrin River, all the bottom areas of the county are subject to overflow and are covered with water or are in a swampy condition, except during the dry summer months. In their present condition they are of value only for their forest growth and the scant grazing they afford during the summer months.

The Chowan River flows along the entire eastern boundary of the county. The Meherrin River and its tributaries drain the northern part. Potecasi Creek and its tributaries drain the central part and the Wiccacon River and its main tributaries, Chinkapin Creek and Ahoskie and Bear Swamps, drain the southern part. Deep Swamp Branch drains the southeastern corner. In general, especially throughout the more nearly level central part of the county, there is little ramification by smaller branches, the drainage development being immature. There are large areas unreached by natural watercourses, requiring artificial drainage in order to be used for agriculture. The rivers flow throughout the year, and ordinarily the larger creeks have a continuous flow, although in protracted dry periods they may become dry. The smaller streams usually are dry during the summer.

The channels in the upper part of the Potecasi Valley and those of the other creeks and swamps are tortuous, with little fall, often consisting of a network of sloughs, so that drainage water is slow in

escaping. These valleys are shallow and often barely discernible from the adjoining uplands. The channels of the rivers and that of Potecasi Creek in its lower course are well defined and deep, as are also the valleys. The stream currents are in general slow and affected slightly by the tide, but water power adequate for the operation of grist and flour mills is developed on several streams, including Painter Swamp, Cutawhiskie Swamp, Deep Creek, Deep Swamp Branch, and Hares Branch.

Well water is available at depths ranging from 10 to 60 feet, and artesian water is obtained in parts of the county at depths of 90 to 150 feet.

Hertford County was organized in 1759 from parts of Chowan, Bertie, and Northampton Counties. Its present boundaries were established in 1779. Winton, the county seat, was founded in 1788. The date of the first settlement in the territory now included in Hertford County is uncertain, but there are in existence records of land transfers dating back to 1714. The early settlers were principally French, Irish, Scotch, and Scotch-Irish from Europe and from the older colonial provinces to the north.

Hertford County in 1880 had a population of 11,843. The population in 1910 was 15,436, of which about three-fifths were negroes. All the population is classed as rural, giving a density of 45.3 persons per square mile. Winton, the county seat, situated on the Chowan River, has a population of 624. Ahoskie, population 924, is the principal railroad center of the county. Murfreesboro, on the Meherrin River, is the next in size with a population of 809. Harrellsville, situated about a mile from the Wiccacon River, is a shipping point. Tunis, Cofield, and Earleys are small railroad towns, and Union, Como, St. John, Menola, and Mapleton are small inland trading points. Pitch Landing, on Chinkapin Creek, is the site of an abandoned town of former local importance.

The principal industry of Hertford County, aside from agriculture, is lumbering. Small mills are in operation throughout the county. The largest one, at Ahoskie, cuts an average of 30,000 feet of lumber daily. Large quantities of logs are hauled by barges down the various streams to the Chowan River, and thence mainly to Elizabeth City, in Pasquotank County. A considerable number of logs for piling are also shipped out of the county. The bulk of the lumber is manufactured from second-growth pine timber from land at one time largely in cultivation. The gum and cypress lumber, cut in the swamp areas, is utilized in various mills for the manufacture of shingles, flooring, and piling. Fishing was at one time an industry of local importance, but it has declined in recent years.

The Norfolk Branch of the Atlantic Coast Line Railroad traverses the county, giving direct rail communication with Norfolk and Suf-

folk, Va., 60 and 39 miles, respectively, to the northeast, and with Rocky Mount, Wilson, and Wilmington, N. C., 57, 72, and 181 miles, respectively, to the southwest. The Wellington & Powellsville Railroad runs south from Ahoskie, where it connects with the Atlantic Coast Line Railroad, to Windsor, the county seat of Bertie County. The Chowan, Meherrin, and Wiccacon Rivers are navigable, and freight is handled at the various wharves and landings along their banks under regular schedules. The Albermarle Steam Navigation Co. operates a mail and passenger line on the Meherrin and Chowan Rivers from Murfreesboro to Winton and Tunis, where it connects with the Atlantic Coast Line Railroad. Passenger service between Harrellsville on the Wiccacon River and Edenton on Albermarle Sound is maintained by the Edenton & Chowan River Steamboat Co.

The public roads have in the past received little attention aside from occasional grading in the spring and fall months. The use of the road drag has recently been adopted in some sections.

There are numerous grade schools, several high schools, and other educational institutions in the county.

Telephone service reaches all the towns and a small proportion of the farmhouses.

Norfolk and Suffolk, Va., and Wilson, Rocky Mount, and Greenville, N. C., are the principal markets for the products of Hertford County. The bulk of the cotton is shipped to Norfolk and the greater part of the peanut crop to Suffolk, while the tobacco is sold in the North Carolina markets. A large tobacco warehouse is planned for erection in Ahoskie to be ready in time to handle the 1916 tobacco crop.

CLIMATE.

In the absence of a local Weather Bureau station, the following climatological data are compiled from the records of the station at Weldon, Halifax County, about 40 miles west of Winton. The data are fairly representative of the climatic conditions in Hertford County:

Normal monthly, seasonal, and annual temperature and precipitation at Weldon, Halifax County.

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	40.8	77	− 5	3.53	2.61	1.70
January	39.4	80	− 9	3.53	4.58	3.80
February	41.1	81	− 3	3.74	1.81	4.86
Winter	40.4	81	− 9	10.80	9.00	10.36

Normal monthly, seasonal, and annual temperature and precipitation at Weldon, Halifax County—Continued.

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.
March	48.5	96	10	4.12	1.65	8.30
April	57.3	94	27	3.41	3.22	3.34
May	68.1	100	34	4.31	2.30	9.34
Spring	58.0	100	10	11.84	7.17	20.98
June	75.6	103	44	4.10	1.40	4.13
July	79.4	107	52	5.40	3.94	5.78
August	77.2	107	49	5.45	5.12	8.79
Summer	77.4	107	44	14.95	10.46	18.70
September	71.4	98	36	3.74	2.13	1.37
October	59.3	95	27	3.44	1.01	6.10
November	48.5	83	15	2.45	.41	2.07
Fall	59.7	98	15	9.63	3.55	9.54
Year	58.9	107	− 9	47.22	30.18	59.58

The mean annual temperature is about 59° F. The mean annual rainfall is reported as 47.22 inches, with a range from 30.18 inches in the driest year to 59.58 inches in the wettest year. The rainfall is well distributed throughout the growing season. The snowfall is light and of short duration.

The ground freezes only to very shallow depths, but the periods of freezing weather are of sufficient frequency to have a beneficial effect on fall-plowed land. The latest recorded killing frost in the spring occurred May 11, and the earliest on record in the fall October 10. The average date of the last killing frost in the spring is April 12, and of the first in the fall October 24. This gives a normal growing season of 195 days, which is ample for the maturing of the common general-farm crops. Under favorable conditions two crops of certain kinds, such as oats and corn, may be grown in one season. The mild winter climate is favorable for growing cover crops, hardy vegetables, and pasturage crops, and in general for raising live stock.

AGRICULTURE.

Agriculture has been the principal interest of Hertford County since its settlement, over 200 years ago. The early farmers settled on the well-drained sandy lands along the rivers, and grew corn, wheat, potatoes, and garden vegetables. Hogs and beef cattle were intro-

duced at an early period. Flaxseed, pork, beef, rice, flour, indigo, butter, various lumber products, and other commodities produced for export were sold at various points along the navigable streams. With the invention of the cotton gin, cotton became the principal money crop.

The plantation system of farming prevailed until the Civil War period. The plantations were practically self-supporting. All the corn meal, flour, meat, milk, and butter needed were produced on the farm, as well as the pork, and much of the clothing, leather, and farm implements required. The Civil War had a disastrous effect upon agriculture through the demoralization of labor conditions and the unusual drain on capital. Between the sixties and the early seventies a complete readjustment of farm conditions was necessary. Crops that required the least labor and those which were most readily converted into cash were grown. Cotton was the chief crop. The change during this period from the general production of subsistence crops to the growing of cash crops is illustrated by the decrease in corn production between 1850 and 1870 from 288,805 to 189,079 bushels and the increase in cotton production in this period from 270 to 2,686 bales.

Until about 1900 cotton was the leading cash crop. In 1889 this staple occupied 15,059 acres, and peanuts, which had only recently been introduced, 1,688 acres. Peanuts proved a successful crop, and at the time of the 1900 census they occupied 10,408 acres, about 2,000 more than cotton. In 1909 they were grown on 20,591 acres, more than double the area devoted to cotton. The increase in the peanut acreage has been mainly at the expense of the area formerly devoted to cotton, but to some extent of that previously used for corn, the acreage in the latter crop having decreased from 23,343 acres in 1899 to 19,293 acres in 1909. New land brought under cultivation has helped to maintain the acreage of both cotton and corn. Tobacco has been an important cash product for some time, and in recent years the area planted to this crop has been greatly increased.

The system of agriculture now prevailing in Hertford County is that common to the northeastern part of the State, consisting of the growing of peanuts, cotton, and tobacco as the principal money crops. The agricultural and commercial standing of the county is based mainly upon the prospective cotton crop and the live stock and the prosperity of the county varies to a large extent with the price of cotton, which is still considered the staple farm product.

According to the census, there were 20,591 acres devoted to peanuts in 1909, yielding approximately 33.35 bushels per acre. This yield is considerably higher than the average for the peanut-growing section of the South. The North Carolina Bunch and Virginia

Bunch are the principal varieties grown. The area devoted to cotton in 1909 was 8,886 acres and the production amounted to 3,741 bales, or 0.42 bale per acre, slightly more than the average yield of the Cotton Belt. Tobacco occupied 269 acres, producing about 619 pounds per acre. The area devoted to tobacco the present year (1916) is locally estimated at 500 acres. Bright-leaf tobacco, used mainly in the manufacture of cigarettes, is grown exclusively.

Corn is the most important subsistence crop. In 1909 there were 19,293 acres devoted to corn, with a production of 174,944 bushels. This is only about two-thirds of the quantity required for feeding purposes. It is estimated that about 51,500 bushels of corn and 23,750 bushels of cornmeal are shipped into Hertford County annually. In 1909 there were 700 acres in oats, grown for feeding in the sheaf to work stock. Rye is grown on a small total acreage as a winter cover crop to be pastured in the spring, the sod being turned under. Only 21 acres of wheat were reported in Hertford County in 1909. Approximately 10,620 barrels of flour are imported into the county annually, in addition to about 11,820 bushels of mixed feed. The 1910 census reports an expenditure of about $35,000 in the county for feed in 1909.

According to the census, hay was cut in 1909 from 124 acres of tame grasses, 76 acres of wild grasses, and 241 acres of green grain. Coarse forage was grown on 51 acres. The total hay and forage production amounted to 630 tons. Cowpeas are grown in many fields as a soil-improving crop. The tops usually are mowed for hay. Estimates of local dealers place the annual importation of hay at about 2,185 tons, in addition to which several carload lots are annually shipped in directly to consumers.

The most important of the minor crops, grown exclusively or in part for home use or to improve the soil, are sorghum, sweet potatoes, Irish potatoes, cantaloupes, watermelons, tomatoes, and other vegetables, soy beans, red clover, vetch, crimson clover, Bermuda grass, and orchard grass. All these crops have succeeded. The production of Irish potatoes is far from sufficient to supply the county. Alfalfa is grown successfully in a small way on one farm near Union. The principal fruit crops are early apples, peaches, Scuppernong grapes, and strawberries.

The county at present produces sufficient beef to supply local needs, with a small quantity for export. The quality of the cattle is in general poor, owing largely to the prevalence of the cattle tick and to the lack of a stock law. Practically all the cattle kept are grade dairy types. At least one cow is kept on every farm to supply milk for home use. A large quantity of butter is annually imported. According to local estimates, about 166,650 pounds of pork and 186,750 pounds of lard are imported annually. The census reports

15,845 hogs sold or slaughtered in the county in 1909. These are mainly grade bacon types, requiring from 18 months to 2 years to reach a marketable condition. In 1909 there were 296 sheep and goats in the county, owned in small flocks. Nearly every farm produces sufficient poultry products to supply home requirements and a small surplus for the local market. Nearly all the work stock used is brought in from northern markets.

A study of the soils of the county leads to the belief that all the meat, lard, hay, corn, cornmeal, and much of the flour imported could be produced without any large increase in the acreage now cultivated. With the same attention to the preparation of the seed bed for small grain, the cultivation of corn, and the fertilization of these crops as is given to peanuts and cotton, there should be an important increase in yields, and with the raising of more beef cattle, hogs, sheep, and work stock, the larger supply of barnyard manure would result in a further increase. The 1910 census reports about 32 per cent of the total area of the county as being improved land, leaving approximately 150,000 acres in forested tracts, woodlots, and fields lying idle. The greater part of the unused area is covered with a second growth of pine. Practically all of it could be brought under cultivation and all of it is suitable for pasture. With canalling and clearing the bottom lands along the Ahoskie and Cutawhiskie Swamps and the upper course of Potecasi Creek would easily produce as much corn and hay as is shipped into the county, and probably furnish subsistence for enough hogs to produce the county's meat supply. One of the greatest needs of the county is more farmers to use the idle lands.

There is little specialization of crops from place to place as a result of soil influences. Tobacco growing is mainly confined to the southeastern part of the county. In general, the subsistence crops are grown largely on the Norfolk, Orangeburg, and Ruston soils, and the farms here are more nearly self-supporting and more highly improved than those on the Coxville and Portsmouth soils. This condition exists in spite of the fact that the Coxville and Portsmouth soils are well suited to corn, small grain, and grasses, and is the result largely of the fact that there is a larger proportion of farms operated by tenants on these soils than on those of the Norfolk, Orangeburg, and Ruston series.

Little attention has been given to the adaptation of the different soils to certain crops. It is recognized that tobacco of the best quality is produced on the sandy Norfolk soils where the sandy clay stratum lies 14 to 20 inches below the surface. The other cash crops, peanuts and cotton, are grown throughout the county. Peanuts grown on the Coxville very fine sandy loam and Portsmouth fine sandy loam are said to be of lower quality than those produced on the other lighter soils and to bring a correspondingly lower price. Corn is

grown on all the soils, small depressions, low stream slopes, and new land generally being utilized for this crop.

The clearing of land as ordinarily done is not very difficult or expensive. It usually consists simply of removing the merchantable timber and better firewood and of burning the limbs and undergrowth when the land is ready for breaking and immediate cultivation. Clearing is done mainly in the winter.

Land usually is broken in the early spring to a depth of 4 to 8 inches. One-horse and two-horse turning plows, ranging from light to moderately heavy, are used for this purpose, the light one-horse plow predominating. It is only on the better operated farms that the deeper plowing with heavier implements and teams is done. Peanuts, cotton, and corn are planted both on ridged and unridged seed beds, the latter practice having gained in favor in recent years. Peanuts and corn are planted in hills 6 to 10 inches apart. Cotton is drilled in and later thinned to the desired stand with hoes. When planted on beds, these crops are first side harrowed or "barred off" with a turning plow, which throws the soil away from the row. Subsequent cultivation consists of plowing along the plants and through the middle with sweeps and shovels, the earth being gradually worked back to the row. In flat cultivation small-toothed cultivators only are used. Grass is removed from between the plants with hoes. The crops usually are "laid by" on a more or less prominent ridge.

The peanut crop is harvested by running a special plow, or an ordinary turning plow without the wing, under the plants at just sufficient depth to cut the tap root and loosen the vine. The vines with the peanuts attached are lifted from the loose soil and allowed to wilt, after which they are piled around stakes set along the rows. When the vines and nuts are dry the latter are picked off by machinery and bagged in 4-bushel to 5-bushel sacks. The vines are either stored for use as stock feed or returned to the land as manure. They make rich feed, and rank high as fertilizer. The fields are usually gleaned by hogs. Pork thus fattened and then finished on corn is of high quality.

In harvesting corn, the leaves are generally picked from the stalk just as they are beginning to turn brown, tied in bundles, and hung on the stalk until cured, when they are stored as forage. After the grain has ripened the ears are broken from the stalk and husked as fed, the husk being used as roughage.

Tobacco is sown in covered beds and transplanted to the row in the latter part of May. It is set out either by machinery or by hand. The crop is given frequent shallow cultivation and hoeing and is laid by on a slight ridge. The matured crop is "flue cured" on the farm and shipped to various warehouses for storage.

The seed bed for small grains, grasses, and clovers is not prepared so thoroughly as in parts of the United States where these crops are more important. Much of the grain and clover is sown broadcast by hand, on rough, inefficiently prepared land, and the lack of care in this respect is obviously responsible in large part for the prevailingly low yields. Clover, oats, rye, and a part of the wheat crop are mowed and cured for hay. A part of the wheat is thrashed and ground into flour for local use.

There are many large, well-kept farm homes in the county, although the numerous tenant houses are small. The barns usually are small, though of sufficient size to house the work stock and store the various crops. The custom prevails of storing each farm product under a separate roof, rather than using one large barn for all. Fences are good, the woven-wire type prevailing. Some grain drills and harvesters are employed. Riding plows and plows carrying more than one share have not yet come into general use, but there is a growing demand for heavier turning plows, and the farmers gradually are changing from the one-horse to the two-horse plow. The implements used in cultivation are generally of simple pattern, although a new type of one-horse cultivator that tills both sides of a row at one operation is becoming quite popular, especially on sandy land. The work stock consists mainly of mules of light to medium weight.

Two or more general forms of crop rotation are followed by the better farmers. Where tobacco is grown, a rotation consisting of corn or cotton for 1 year, peanuts 1 year, and tobacco 1 year commonly is practiced. Cowpeas frequently are drilled or sowed broadcast in the cornfield at the time of the last cultivation. Through the remainder of the county it is the practice of the better farmers to grow corn or cotton 1 year and peanuts 1 year, followed by clover, soy beans, or cowpeas on a part of the land, a part being devoted again to cotton. Peanuts are rarely if ever planted in the same field for two successive years, as it is customary to grow them following a fertilized crop. Winter cover crops (rye, oats, vetch, and crimson clover) frequently are sown after clean-cultivated crops.

In 1909 commercial fertilizers were used on 78.2 per cent of the farms in the county, the total expenditure being reported in the 1910 census as $123,027. Tobacco is the most heavily fertilized crop, normally receiving acreage applications of 800 to 1,200 pounds of preparations ranging in analysis from 8–5–6 to 8–3–3.[1] Cotton and corn land is treated with 200 to 600 pounds per acre of fertilizers analyzing from 8–3–3 to 8–2–2, corn usually receiving the lower grade mixture. Cotton and corn ordinarily are given applications of 50 to 100 pounds and 75 to 150 pounds, respectively, of nitrate

[1] Figures express respective percentages of phosphoric acid, nitrogen, and potash.

of soda. In some cases this is all applied at the time of planting, but more frequently one-half the quantity to be used is placed under the seed at the time of planting and one-half is given as a side application after the young plants are about 6 inches high.

Peanuts receive no regular fertilization, but follow a fertilized clean-cultivated crop. They receive about 600 pounds per acre of burnt lime at planting time and a later side application of 200 to 300 pounds of land plaster (calcium sulphate). Without the use of the latter, it is said, the pods do not fill, and there is a large proportion of "pops" in the case of all varieties except the Spanish, of which only a very small acreage is grown. The greater part of the commercial fertilizer used is ready mixed, although a number of farmers mix their own fertilizer. Acid phosphate, kainit sulphate of potash, bone meal, tankage, nitrate of soda, cotton seed, and cottonseed meal are the materials most commonly used. Barnyard manure is generally saved and applied to the land, but the quantity produced is small. In recent years there has been a more extensive production of the legumes for use as soil improvers, to increase the nitrogen content of the soil.

There is an adequate supply of farm labor throughout the county. On many of the smaller farms most of the work is performed by the family of the operator. Practically all the farm laborers are negroes. When hired by the year they receive from $17 to $25 a month, together with the use of a house, a garden, and firewood.

The pay for day labor ranges from 90 cents to $1.25 for men, and from 60 to 75 cents for women. Ordinary day labor is used for harvesting corn, peanuts, and tobacco. Cotton pickers receive from 65 to 90 cents a hundred pounds. The 1910 census reports a total expenditure of $160,733 for farm labor in this county in 1909.

The census of 1910 reports the average size of farms in Hertford County as 81.5 acres. There are many farms that contain 200 to 300 acres, and some holdings comprise 1,000 acres or more. Of the 2,258 farms in the county, owners operate 45.4 per cent, tenants 54.4 per cent, and managers 0.2 per cent, according to the 1910 census. There has been a steady decrease in the percentage of farms operated by owners. A number of different forms of leasing are practiced. In some cases the tenant pays a cash rental of $3 to $10 an acre for the tillable land, receiving free use of a house, other buildings, pasture, etc. Under one share system the owner furnishes the land, improvements, one-third the fertilizer, and one-third the seed, while the tenant furnishes the work stock, implements, and labor, and the remainder of the fertilizer and seed, and the owner receives one-third the crop produced. In some instances the owner furnishes the land and improvements thereon, the work stock, implements, and

one-half the fertilizer and seed, the tenant furnishes the labor and one-half the fertilizer and seed, and the crop is divided equally.

There has been a general advance in the price of farm land within recent years. The prevailing prices range, according to character of soil, acreage cleared, farm improvements, and location with reference to market, from $25 to $100 an acre. The selling price of the uncleared areas varies largely with the quantity and quality of the timber growth.

SOILS.

Hertford County lies wholly within the Coastal Plain province of North Carolina. It has a prevailingly flat to undulating surface, and a low elevation, from a few feet to about 100 feet above sea level. It is composed in part of the flat, pine wood section and in part of the higher, more rolling, interior section.

The soils are derived from unconsolidated sands and clays of sedimentary origin. This material was brought down from the Piedmont Plateau and Appalachian Mountain regions as the weathered product of crystalline and fragmentary rocks and deposited on the sea floor when this part of North Carolina was under water. After the recession of the sea, or 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 streams have cut rather deeply into the deposits, and the 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 material, giving rise to the bright reds and deep yellows of the Orangeburg and Norfolk soils, respectively. Throughout the broad, flat, poorly drained areas of Coxville and Portsmouth soils oxidation of the iron compounds has largely been prevented through lack of aeration and drainage, and consequently the subsoils are of mottled rather than uniform colors.

The Coxville soils appear to consist of the least weathered or altered material in the county. The position of the Portsmouth soils has favored the growth of vegetable matter, and the decay of this and its incorporation in the soil are responsible for the dark-gray to black color characteristic of this series.

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

Beds of marl outcrop along the lower slopes bordering the Wiccacon River near its mouth and also along Potecasi Creek. This formation consists mainly of soft, white shell marl, containing about 40 to 50 per

cent of lime. In places it is dug out and applied to near-by fields. This deposit has had no direct influence upon the development of the soils.

The classification of the soil material into types is based upon texture; that is, the relative contents of coarse sand, sand, fine sand, silt, and clay contained. The types having common characteristics of topography, drainage, color of the surface soil and subsoil, structure, and process of formation are grouped together in series.

The soils of Hertford County are classed with the Coxville, Norfolk, Portsmouth, Orangeburg, and Ruston series. In addition to these series, the miscellaneous type, Swamp, is mapped. The soils of the Coxville and Norfolk series comprise more than 90 per cent of all the cultivable land.

The surface soil of the types in the Coxville series ranges in color from light gray or dark gray to light brown. The subsoil is a mottled gray, yellow, and red plastic clay. Two types, the fine sandy loam and the very fine sandy loam, are mapped in Hertford County. They occur mainly in the southwestern, central, and northeastern parts of the county and occupy extensive flats and undulating areas.

The Norfolk series includes types with light-gray to yellowish-brown surface soils and a yellow, friable subsoil. Three types, the fine sand, the coarse sandy loam, and the fine sandy loam, are mapped. These soils occur mainly in the northwestern and southeastern parts of the county.

The surface soils of the Portsmouth series are dark gray to black in color and high in organic-matter content. The subsoils are light gray to mottled gray and yellow, and as developed in this county are moderately friable. The soils of this series were probably deposited under much the same conditions as the Norfolk soils, but they have since been subjected to poor drainage conditions, resulting in the accumulation of the high organic-matter content. One member of this series, the fine sandy loam, is mapped in this county. It occurs in association with the Norfolk soils.

The Orangeburg series is marked by gray to reddish-brown surface soils and a friable, red clay subsoil. It comprises the most thoroughly oxidized material in the county. One type of the Orangeburg series is mapped in Hertford County, the fine sandy loam. It occurs on small ridges, mainly in the central and southwestern parts.

The Ruston series includes types with brownish surface soils and friable clay subsoil, the latter intermediate in color between those of the Norfolk and the Orangeburg series. One type, the Ruston fine sandy loam, is mapped. It occurs principally in the central and southwestern parts of the county.

The large 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 the various soil types are described in detail, and their relation to agriculture is discussed. The accompanying map shows the distribution of the soils. In the following table their actual and relative extent are shown:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk fine sandy loam	65,472	34.1	Norfolk fine sand	4,160	1.9
Deep phase	9,792		Norfolk coarse sandy loam	2,560	1.2
Coxville very fine sandy loam	56,320	25.5	Orangeburg fine sandy loam	1,664	.8
Coxville fine sandy loam	38,144	17.7	Ruston fine sandy loam	1,408	.6
Brown phase	896		Total	220,800	.....
Swamp	33,664	15.2			
Portsmouth fine sandy loam	6,720	3.0			

COXVILLE FINE SANDY LOAM.

The Coxville fine sandy loam consists of a light-gray to light brownish gray or yellowish-gray fine sandy loam, underlain at a depth of 6 to 8 inches by a pale-yellow, compact though moderately friable silty clay to clay. This stratum passes at an average depth of 20 inches into a pale-yellow, plastic clay, heavily mottled with light gray and red. There is considerable variation in the depth at which the heavy, plastic layer is encountered, this ranging from 12 inches in the flatter and poorer drained areas to 28 inches or more on some of the more undulating ridges. The color of both the surface soil and subsoil commonly is somewhat lighter in the broader, poorer drained areas than in the better drained situations. The soil is quite compact in structure. It becomes miry and soft when wet and upon drying out is inclined to harden and pack. Upon exposure, the subsoil, locally known as "pipe clay," checks and cracks like "joint clay."

The Coxville fine sandy loam occupies ridges, slightly elevated above the surrounding flats of Coxville very fine sandy loam, throughout the more nearly level central part of the county. It occurs most extensively in St. Johns, Ahoskie, and Winton Townships and in the northern and western parts of Harrellsville Township. Areas of local importance occur in the northern and central parts of Mannys Neck Township and the northeastern part of Murfreesboro Township. It is distributed in large to small, irregularly shaped areas throughout the southern two-thirds of the county. The type occurs in close association with the Norfolk fine sandy loam, some ridges and knolls of which, too small to be separately mapped, are included.

The topography of the Coxville fine sandy loam is undulating or very gently rolling. The surface drainage of the narrower areas is good or fairly good, but that of the broader, plateaulike areas is poor. Owing to the impervious character of the subsoil, the internal movement of moisture and air is very slow, and the soil during the rainy season is wet and water-logged. Usually cultivation can not be performed for several days after long periods of rain, as the soil dries out slowly.

The Coxville fine sandy loam is an extensive and important soil. Probably 80 per cent of it is in cultivation. The unused land is mainly forested with a second growth of pine and various oaks. Peanuts and cotton are the principal crops. Some tobacco is grown in the areas of deeper surface soil where the topography is gently rolling or ridgy. A number of farmers produce enough corn for the work stock and hogs, but the majority of the farms are not self-sustaining in this respect. Some oats are grown and cut for hay. Cowpeas are grown on a rather small acreage for hay and as a soil-improving crop, and some are grown for seed. Among the other crops grown for use on the farm or in a small way for soil improvement are sweet potatoes, a variety of other vegetables, rye, vetch, crimson clover, and soy beans. Bermuda grass and other native grasses grow luxuriantly. White clover and wild strawberries apparently are indigenous to this soil. Stock raising is not well developed. Most farmers keep one or more cows and raise a few hogs for home use, as is the case throughout the county.

Under ordinary conditions peanuts yield from 40 to 70 bushels per acre, cotton from one-third to 1 bale, tobacco 600 to 800 pounds, and corn from 15 to 50 bushels.

Under the prevailing system of seed-bed preparation the land is broken flat in the spring to a depth of 4 to 8 inches with turning plows drawn by one mule or, in some cases, by two mules. Cultivation is given at frequent intervals with shallow implements, such as sweeps, shovels, weeders, and harrows. Crops are often planted on a hastily and imperfectly prepared seed bed with an abundance of clods. Commercial fertilizers are universally used. Ordinarily an 8–3–3 mixture is applied to cotton land, 200 to 600 pounds per acre being distributed at the time of planting, with a later side application of 50 to 100 pounds of nitrate of soda. Corn land receives about the same fertilization, except that the nitrate of soda is applied at the rate of 75 to 150 pounds per acre. Tobacco land ordinarily receives 500 to 600 pounds per acre of an 8–3–3 to 8–3–4 mixture. Peanuts, which usually follow either cotton or corn, receive no fertilization, but an acreage application of 600 to 1,000 pounds of burnt lime (calcium carbonate) is made at planting time and another of 200 to 300 pounds of land plaster (calcium sulphate) at about the time the plants are

coming into bloom. A number of farmers make side applications of tankage, as a source of nitrogen. Cowpeas are grown more extensively each year, and occasionally a crop is turned under to replenish the supply of organic matter. The percentage of farms operated by tenants is relatively large on this type.

The present selling price of land of this type ranges from about $30 to $75 an acre, varying with the soil, drainage conditions, farm improvements, and location with reference to shipping points.

Good methods are practiced by a number of farmers on the Coxville fine sandy loam, but in general much might be done in the way of improving farming conditions. The two principal needs of this soil are better drainage and the incorporation of organic matter. Much of the land is water-logged during the rainy winter months and is slow to come into a proper tillable condition in the spring. Except in the more ridgy areas of deeper surface soil the type is a week to 10 days later than the sandier, better drained Norfolk soils. Owing to the impervious character of the lower subsoil, water percolates downward very slowly; much of the rainfall is lost through evaporation. The lateral movement of moisture in the lower part of the soil section is shown by the seepage spots and wet areas that occur on slopes and in depressions. Outlets for drainage ditches are available in most places.

By growing more legumes and winter cover crops, such as soy beans, vetch, cowpeas, crimson clover, oats, and rye, either alone or in combination, and with the turning under of an occasional crop, the organic content of the soil may be quickly and economically increased. The raising of live stock on pasturage and feed furnished by these crops, with the return of the manure to the land, is an effective means of improving the soil, and considerable nitrogen might be produced in this way, instead of being bought in the form of commercial fertilizers. With an increase in the organic-matter supply, plowing should gradually be deepened.

More care should be given to the pulverization of the seed bed. Under the prevailing practice a part of the land is broken when either too wet or too dry, resulting in a cloddy condition in parts of the field. In other regions it has been found profitable first to disk fields to be plowed, this operation reducing evaporation, breaking up the system of minute channels which allow the escape of soil moisture, and largely preventing the formation of clods.

Since grain and grass crops do well on this soil, and since patches of the Coxville very fine sandy loam, a soil particularly well suited to grazing crops, are usually included in farms on this type, stock farming, at least as an important side line, should prove profitable. Lime could advantageously be applied at the rate of 1,000 to 3,000 pounds per acre.

Coxville fine sandy loam, brown phase.—The Coxville fine sandy loam, brown phase, consists of a grayish-brown to brown fine sandy loam extending to a depth of 4 to 6 inches, below which the material grades through a light-yellow, compact, friable fine sandy clay and passes at a depth of about 18 inches into a mottled yellow and gray, plastic, slightly sandy clay. In its lower part the subsoil predominantly is light gray in color, mottled with yellow and pinkish-red streaks. More or less medium to coarse sand and scattered fine gravel particles occur throughout the soil section. On slopes and in "gall spots" the plastic subsoil is often encountered within 5 or 6 inches of the surface, and the color of the surface soil and upper subsoil is decidedly brown. The brown phase differs from the typical Coxville fine sandy loam mainly in the color of the surface soil and subsoil and in the somewhat more plastic structure of the lower subsoil.

This phase occurs in the southeastern part of the county in one area bordering the Wiccacon River from the vicinity of Tar Ferry to the vicinity of Mount Pleasant Wharf on the Chowan River. Its surface is level to gently undulating, with steep and precipitous stream slopes. The phase lies 20 to 30 feet lower than the adjoining ridge areas and the line of separation is marked by an abrupt slope, giving the phase the appearance of a high terrace. It has a general elevation of approximately 40 feet above sea level, and is higher than a number of areas of both Coxville and Norfolk soils. Surface drainage is fairly good, but the underdrainage is deficient.

This phase is not extensive. About 60 per cent of it is in cultivation, the remainder being forested with second-growth pine, various oaks, and some hickory and dogwood. The same general crops are grown on this phase as on the typical soil. It is considered somewhat more productive than the main type.

Much of the land has been given a heavy application of marl, obtained from the outcrops occurring in places along the slopes to the Wiccacon River, and it is said that the addition of lime is not now necessary for growing peanuts. Otherwise the methods of fertilization and handling are practically the same as in the case of the typical Coxville fine sandy loam. Crops are said to be less affected by long-continued drought on this soil than on any other in the county. In wet weather the fields become soft and water-logged.

The selling price of the land of this phase varies from $25 to $40 an acre. Its valuation is considerably lowered by the distance of the greater part of it from good public roads and the general lack of improvements other than fences.

The same methods may be profitably followed in the improvement of this phase as in the case of the typical soil.

COXVILLE VERY FINE SANDY LOAM.

The Coxville very fine sandy loam consists of a gray or yellowish-gray to light-brown very fine sandy loam, underlain at a depth of 4 to 6 inches by a pale-yellow, compact, moderately friable fine sandy clay, faintly mottled with light gray. At depths ranging from 12 to 24 inches the fine sandy clay passes into a mottled yellow, gray, and red, tough, plastic clay. The immediate surface layer in places dries out to an ashy-gray or almost white color. In the flatter areas the soil is more ashy in color and often deeper than near the larger stream breaks. An accumulation of leaf mold imparts a dark-gray color to the surface layer of many of the older forested areas. In many places where the land has been cleared and subjected to leaching under clean cultivation it approaches a fine sandy loam in texture. This type is locally known as "clay land" and "heavy land" and the broader flat and wet areas as pocosons. The soil is soft and boggy during the rainy winter months, and upon drying out in the spring and summer it hardens and packs. It gives a decidedly acid reaction with the litmus-paper test.

The Coxville very fine sandy loam occurs mainly in Winton, Ahoskie, and St. Johns Townships and the northern and western parts of Harrellsville Township. A large area occurs in the eastern part of Mannys Neck Township and several smaller ones in the eastern part of Murfreesboro Township. This is the prevailing soil throughout the southern and southwestern parts of the county. In general it occupies broad interstream divides and areas in which drainage is imperfect. The topography is nearly flat, with long, gentle slopes to the smaller drainage courses. As the larger drainage ways are approached the surface in places becomes slightly undulating. The slopes to the larger streams are usually abrupt and precipitous. Both surface drainage and underdrainage are deficient. The flatter areas are water-logged and partially inundated during rainy seasons. The impervious character of the subsoil prevents the free downward movement of water.

The Coxville very fine sandy loam is one of the most extensive types in the county. Agriculturally, it is not important except as a range for live stock. Probably 90 per cent of the land is forested, mainly with second-growth pine, oak, sweet gum, black gum, holly, and maple. Mountain laurel grows in profusion along the steep slopes to the Chowan River in the vicinity of Winton.

There are very few farms composed entirely of soil of this type, the cultivated areas occurring mainly as narrow strips included in fields with higher lying soils. Corn, cotton, and peanuts are the principal crops. Peanuts yield well, but are not of good quality, owing to the tendency of the fine soil particles to adhere to the hull.

Oats give good yields. Pasture grasses thrive and cover a large acreage. Corn yields 15 to 40 bushels per acre, cotton one-third to three-fourths bale, and peanuts 25 to 50 bushels. The soil treatment and fertilization are similar to those practiced in areas of the Coxville fine sandy loam.

The value of land of the Coxville very fine sandy loam ranges from about $25 to $40 an acre. The value of the uncleared land is determined almost solely by the quality and density of the timber growth.

The same needs are encountered in farming this type as in the case of the Coxville fine sandy loam, and it should be handled under the same methods. The need for drainage improvement and the incorporation of organic matter is even more pronounced on this type. It is probable that an acreage application of about 1,000 to 2,000 pounds of burnt lime would be beneficial. The forested areas should be more thoroughly drained by ditching. There are thousands of acres of cut-over land, with no profitable tree growth, which could apparently be cleared of underbrush by the grazing of goats or some other means, and profitably devoted to pasturage.

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

Mechanical analyses of Coxville very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
234222	Soil	0.2	0.5	0.4	14.2	34.8	38.2	11.7
234223	Subsoil	.0	.2	.2	10.2	27.2	32.8	29.5
234224	Lower subsoil	.0	.1	.1	6.0	19.9	29.1	44.8

NORFOLK FINE SAND.

The Norfolk fine sand consists of a light-gray to light brownish gray fine sand, extending to a depth of 5 to 8 inches, and underlain by a pale-yellow fine sand which continues downward to a depth of 3 feet or more. As mapped, this type includes several small areas of Norfolk sand. These have an aggregate area of probably less than 200 acres, and are of practically the same agricultural value as the Norfolk fine sand.

The type also includes a number of small areas of terracelike soil occupying low, flat points jutting out into the swamps or occurring as low, islandlike mounds and ridges in areas of swampy land, mainly along the Meherrin and Wiccacon Rivers. The soil of these areas consists of a grayish-brown to brown loamy fine sand, underlain at depths of 6 to 8 inches by bright-yellow fine sand. These areas represent the Kalmia fine sand type, but are too small to be shown

satisfactorily on the soil map. Their agricultural adaptations are nearly identical with those of the Norfolk fine sand.

The largest area of the Norfolk fine sand occurs in the southwestern corner of Mannys Neck Township, across the Meherrin River from Murfreesboro. Scattered areas occur throughout Mannys Neck and Murfreesboro Townships, in western and northern Winton Township, and in western Harrellsville Township. The greater part of the type lies adjacent to the larger streams, frequently occurring in the large bends.

The Norfolk fine sand has a gently undulating to undulating topography. In detail, the surface is characteristically billowy and hummocky. Drainage is good to excessive.

This type is of relatively small extent, but the greater part of it is in cultivation. The timber consists principally of second-growth pine, with some oak, hickory, and dogwood. Peanuts and cotton are the principal cash crops. Corn is grown to some extent, but rarely in sufficient quantity to subsist the work stock and the hogs usually raised to furnish the home supply of meat. Soy beans and cowpeas are grown to a considerable extent for feed and to improve the soil, as are also rye, crimson clover, and vetch on a smaller scale. Sweet potatoes, watermelons, cantaloupes, and various other vegetables are grown for home use. Peanuts yield from 36 to 60 bushels per acre, cotton from one-fourth to one-half bale, and corn 10 to 25 bushels. Crop returns depend in large measure upon the fertilization given. The yield of all crops is low when commercial fertilizer or barnyard manure is not used.

Owing to its loose and mellow structure, this soil is easily tilled. It is handled and fertilized in practically the same way as the Norfolk fine sandy loam. Owing to the loose, incoherent structure of the subsoil and consequent leaching, the type can not be built up as readily or maintained in as productive a state as can the types having heavier subsoils, and somewhat heavier applications of fertilizer are required to maintain yields.

Land of the Norfolk fine sand sells for $20 to $50 an acre, the price depending largely upon the location with reference to markets, the farm improvements, and the character of the surrounding soils.

Practically the same methods are needed for the improvement of the Norfolk fine sand as for the Norfolk fine sandy loam. Especially important is the growing of legumes in rotation with the clean-cultivated crops, with a view to increasing the organic-matter supply.

NORFOLK COARSE SANDY LOAM.

The Norfolk coarse sandy loam consists of a light-gray, coarse to medium loamy sand, underlain at a depth of 4 or 5 inches by a pale-yellow, coarse to medium loamy sand. This grades through a coarse

to medium sandy loam into a bright-yellow, loose-structured sandy clay, which occurs at depths ranging from 15 to 36 inches.

This type is developed mainly in the western part of Murfreesboro Township, where it occurs along some of the rolling stream slopes, in the eastern part of Harrellsville Township and in the northern part of Mannys Neck Township, where it generally occurs on low ridges. An important area is situated immediately west of Harrellsville, on the Ahoskie Road. The soil is deepest on the low ridges. The surface varies from rolling, along the stream slopes, to gently undulating and billowy on the ridges. The drainage is thorough.

This is not an extensive soil, and not more than 60 per cent of it is in cultivation. The present forest consists principally of second-growth pine, with various oaks.

Peanuts, cotton, and corn are the principal crops. Tobacco is grown in Harrellsville Township. Sweet potatoes, watermelons, cantaloupes, and other vegetables, and orchard and small fruits, are grown for home use. Cowpeas, oats, rye, crimson clover, vetch, and soy beans are grown for use on the farm and for soil improvement. This is an early soil for all crops. Peanuts yield 30 to 60 bushels an acre, cotton one-third to 1 bale, and corn 15 to 30 bushels, the yields depending largely upon the quality and quantity of fertilizer used.

Owing to its open structure, this soil is easily cultivated with light implements. It usually is broken flat with a one-horse turning plow. Shallow cultivations are given at frequent intervals. Commercial fertilizers are used on cotton, corn, and tobacco, and to some extent on the less important crops. Peanuts ordinarily receive no commercial fertilizer other than burnt lime and land plaster, but they are grown in rotation with fertilized crops. The fertilization and treatment given this soil are practically the same as in the case of the Norfolk fine sandy loam.

The present selling price of this land varies from $30 to $70 an acre, depending upon location and improvements.

This soil is naturally very low in organic matter, which may be supplied by the more general growing and occasional turning under of leguminous crops, such as cowpeas, soy beans, and crimson clover. This soil is well adapted to early truck and vegetable crops.

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam consists of a light-gray to light grayish brown loamy fine sand, extending to a depth of 4 to 6 inches and underlain by a pale-yellow fine sandy loam or loamy fine sand, which continues to a depth of 10 to 18 inches. Below this depth the subsoil consists of a bright-yellow, friable fine sandy clay to clay. The lower subsoil in the areas of shallower soil is in places quite compact, though friable,

and yellow in color, mottled in varying proportions with gray. In general, the areas of shallower soil occur in St. Johns, Ahoskie, and Winton Townships, where they are closely associated with the Coxville soils, and the deeper areas in Mannys Neck, Murfreesboro, and Harrellsville Townships. Scattered patches of Coxville fine sandy loam in the more nearly level areas, and of the Ruston and Orangeburg fine sandy loam in the more rolling areas, are included with this type as mapped. In places there is present in the soil a considerable quantity of medium sand; such areas would be mapped as a sandy loam if their extent and agricultural value warranted separation. The Norfolk fine sandy loam is mellow and easily tilled.

This is the most extensive type mapped. Its greatest development occurs in the northern and northwestern parts of the county and in the southeastern corner. Small areas are distributed throughout the county. The type occurs in large undulating to gently rolling or rolling areas in Mannys Neck, Murfreesboro, and Harrellsville Townships, and on small undulating to gently rolling ridges and knolls, slightly elevated above the surrounding Coxville soils, in St. Johns, Ahoskie, and Winton Townships. All kinds of improved farm machinery can be used on this type. Both surface drainage and underdrainage are good, although in the broader, more nearly level areas ditching is frequently necessary in order to remove the excess rain water. In some sections of the county crops on this type are said to be slightly affected by protracted droughts, owing probably in most cases to the low organic-matter content and consequent low water-holding capacity of the soil.

This is an important agricultural type. The farm homes and improvements are, on the average, the best in the county. Probably 75 per cent of the type is under cultivation. The uncultivated areas are mainly forested with second-growth pine, oak, dogwood, elm, and walnut.

Peanuts, cotton, and tobacco are the principal cash crops. A number of the better farmers produce sufficient corn to furnish the home supply of meal and to feed work stock and hogs. Cowpeas are grown to a considerable extent for hay and to improve the soil, and some seed is gathered. Oats, rye, wheat, soy beans, vetch, and crimson clover are grown for feed and as soil-improving crops. Hogs are raised in sufficient numbers to supply home requirements, with occasionally a small surplus for sale in the community.

All crops mature early on this soil. Peanuts yield from 50 to 70 bushels an acre, cotton from one-half to 1 bale, tobacco 600 to 1,400 pounds, and corn 15 to 60 bushels. Yields depend in large measure upon the kind and quantity of fertilizer used. Sweet potatoes yield 200 bushels or more per acre with liberal fertilization.

In general, the land is broken flat in the spring to depths ranging from 4 to 8 inches, one-horse or two-horse turning plows being used. Cultivation is given at frequent intervals with shallow implements, including one-horse cultivators, sweeps, shovels, weeders, and harrows. Commercial fertilizers are used for cotton, tobacco, and corn, and usually on the less important crops. Peanuts ordinarily receive no commercial fertilizer, but are grown in rotation with the fertilized crops of cotton, corn, and tobacco. The application of lime is necessary, however, in peanut growing. Burnt lime is either drilled in the row or broadcasted at the time of planting at the rate of 600 to 800 pounds per acre. Land plaster is applied along the row, about the time the plants are coming into bloom, at the rate of 200 to 300 pounds per acre. The type is well suited to tobacco production. Fertilizers ranging in analysis from 3–8–3 to about 3–6–8 are used at the rate of 800 to 1,200 pounds per acre. Cotton and corn are fertilized with mixtures ordinarily analyzing 8–2–2 or 8–3–3 but occasionally 3–6–8. Applications range from 300 to 1,000 pounds per acre. Sodium nitrate and tankage frequently are applied to growing crops as a top-dressing at the rate of 75 to 150 pounds per acre. Barnyard manure, of which only a small quantity is produced, is saved and carefully applied to the different crops at planting time. Cowpeas are being more generally grown in rotations, and occasionally a crop is turned under to replenish the supply of organic matter.

The selling price of land of this type ranges from $40 to $100 an acre, depending upon location and farm improvements. In places the farm improvements and practices are unusually good, and intensive methods of cultivation prevail.

The most economical way to improve this soil apparently is by growing 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, oats, or rye; to grow more subsistence crops, such as corn and forage; and to raise more live stock, so as to utilize more economically the crops produced and incidentally return the greater part of the fertilizing elements to the soil in the form of manure.

It is doubtful whether a more diversified type of agriculture would give better returns than the present system of growing peanuts, cotton, tobacco, and corn, but this soil is well adapted to a number of crops which are not now grown commercially in Hertford County. In other parts of the Coastal Plain region, from Virginia to Texas, the Norfolk soils are used for the production of sweet potatoes, watermelons, cantaloupes, cucumbers, cabbage, garden peas, radishes, tomatoes, Irish potatoes, asparagus, lettuce, and other vegetables for northern markets. It has been found possible to put these products on the market early, at a time when prices are usually good. These

soils are also used successfully, especially in southern Georgia, for raising hogs for market under a crop system in which peanuts, chufas, rape, and corn are grown for pasturage and feed.

Farming experience has generally indicated the need of considerable potash in fertilizers, especially for vegetables. The results of analyses and experiments on the Norfolk sandy loam and fine sandy loam at the Edgecombe Test Farm by the North Carolina Department of Agriculture show that these soils are 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 used is applied in the drill at the time of planting and the remainder distributed along the row about the first 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 Kings Improved, Hodge, Webbs Cluster, Sugar-Loaf, and Broadwell Double-Jointed.

Norfolk fine sandy loam, deep phase.—The Norfolk fine sandy loam, deep phase, consists of a light-gray to light grayish brown loamy fine sand, grading at a depth of about 6 inches into a pale-yellow loamy fine sand to fine sandy loam which extends to a depth of 18 to 30 inches. The subsoil is bright yellow in color, and varies from a heavy fine sandy loam in the areas of deeper soil to a friable fine sandy clay in those of more shallow soil. In its natural condition the phase contains but little organic matter. Owing to its loose structure, it is easy to cultivate with light teams and implements.

This phase occurs in comparatively small, irregular areas, mainly in Harrellsville, Murfreesboro, and Mannys Neck Townships. Its surface is undulating, and in detail billowy and ridgy. Very gently undulating areas occur in low, terracelike positions intermediate between the higher uplands and the stream bottoms along the Meherrin and Wiccacon Rivers and the lower courses of Potecasi and Chinkapin Creeks. The drainage is thorough. 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 largely been 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 phase is not extensive, but the greater part of it is in cultivation. The uncultivated areas are forested with second-growth pine, oak, elm, and dogwood. All crops mature early. It is possible to produce very early vegetables, although the tenderest of these may be injured by unusually late frosts unless means of covering the plants are available, as with pine straw or fertilizer sacks. In general, the same crops are grown as on the typical soil and the methods of farming are practically the same. Somewhat heavier fertilization is necessary to maintain high yields, since the soil is somewhat more open in structure and deeper, so that leaching takes place more readily.

The value of land of this phase ranges from $25 to $80 an acre, depending on location and farm improvements.

This soil requires the same treatment for its improvement as the typical Norfolk fine sandy loam.

PORTSMOUTH FINE SANDY LOAM.

Typically, the Portsmouth fine sandy loam consists of a dark-gray to black loamy fine sand, underlain at depths of 5 to 8 inches by light-gray or brown fine sandy loam. At a depth of about 10 inches this material grades into a light-gray fine sandy loam, faintly mottled with yellow, underlain by a mottled gray and yellowish-brown, friable fine sandy clay at depths ranging from 12 to 16 inches. Upon drying out the immediate surface soil becomes light gray in color.

The most typical areas of this soil occur in southern Harrellsville Township. As mapped, the type shows considerable variation. In the areas in the northwestern part of the county and in parts of those in Harrellsville Township the soil is intermediate between the typical Coxville and Portsmouth fine sandy loams, consisting of a light-gray fine sandy loam underlain at a depth of 6 to 10 inches by a mottled gray and yellow, moderately friable fine sandy clay. It has a typical Coxville surface soil underlain by a fairly typical Portsmouth subsoil, and is considered as more nearly approaching the typical Portsmouth fine sandy loam from an agricultural standpoint. Patches of typical Portsmouth fine sandy loam occur in places.

The Portsmouth fine sandy loam is probably derived from the same formation as the Norfolk soils, but it has been subject to deficient drainage as a result of its flat topography, and the consequent subsoil oxidation has given rise to its mottled gray and yellow color. The accumulation of organic matter accounts for the dark color of the soil.

The most extensive area of this type occurs in southern Harrellsville Township, extending southeasterly from near Harrellsville to the county line. A number of smaller bodies occur in the northern and western parts of the county, in Mannys Neck and Murfreesboro Townships. The type is encountered largely on flat interstream

divides, but occasionally on very gentle small stream slopes or in basins. The topography is uniformly level. Surface drainage is naturally slow and underdrainage is deficient, although the subsoil is not so impervious as that of the corresponding Coxville type.

The Portsmouth fine sandy loam is of comparatively small extent. Only a small part of it, mainly in Harrellsville Township, is in cultivation. Second-growth pine, oak, sweet gum, and holly constitute the principal tree growth. Gallberry is a characteristic growth, especially in the southern part of the county. The type is locally called "gallberry land."

Peanuts, cotton, and corn are the most important crops grown on this soil. Tobacco is produced to a small extent. Cowpeas and soy beans are grown for forage and to improve the soil. Sweet potatoes, other vegetables, and fruits are produced for home use. Peanuts yield 35 to 60 bushels per acre, cotton one-half to 1 bale, corn 20 to 30 bushels, and tobacco 600 to 800 pounds. This type can not be farmed as early in the spring as the better drained soils.

The land is broken flat in the spring and bedded at planting time. Shallow cultivation is given at frequent intervals. Commercial fertilizers are used on the principal crops. Cotton ordinarily receives 250 to 350 pounds per acre of commercial fertilizer analyzing 8–3–3 or 8–2–2, corn 200 to 300 pounds of the same grade, and tobacco 700 to 1,200 pounds of an 8–3–3 to 8–3–10 preparation. Cotton and corn usually receive a later side application of nitrate of soda at the rate of about 50 to 75 pounds per acre. Peanuts receive about 500 pounds of burnt lime per acre at planting time and a later side application of 200 pounds of land plaster.

This land has a value of $25 to $50 an acre, depending upon the area of cleared land, drainage, location with respect to markets, and improvements.

The methods suggested for the improvement of the Coxville fine sandy loam are applicable to this type.

ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam consists of a grayish-brown to brown, light-textured fine sandy loam, passing at a depth of 5 to 6 inches into a reddish-yellow fine sandy loam. The typical subsoil, which is encountered at depths of 10 to 15 inches, is a brick-red, friable fine sandy clay. Small gall spots occur, where the surface soil has been eroded, exposing the red subsoil. In general, the lighter colored surface soil occurs in the more nearly level areas of deeper soil and the brown surface soil in the areas of more rolling topography.

This type is inextensive. It occurs principally on small, scattered ridges in St. Johns and in western Ahoskie Townships. The largest

areas occur at Fraziers Crossroads, on the ridge on which Livermans School is located, and in western Winton Township, where the largest area is on a ridge extending south from Potecasi Creek to a point below Williamson School.

The surface varies from undulating to rolling. Just southwest of Fraziers Crossroads the type is encountered on the most conspicuous hill in the southern part of the county. The ridge occupied by this soil in Winton Township rises as it approaches Potecasi Creek, and along this stream there is a nearly perpendicular bluff over 50 feet in height. The type in general is developed on narrow ridges lying 5 to 20 feet above the adjoining uplands. Surface drainage is good and in places excessive, resulting in the occasional gall spots. The underdrainage is everywhere thorough, and the red color of the subsoil is a result of the consequent thorough oxidation.

Practically all the Orangeburg fine sandy loam is in cultivation. The timber on the unused patches consists principally of second-growth pine, various oaks, elm, dogwood, and some walnut.

Peanuts, cotton, and corn are the most important crops on this type. Very little small grain is grown. Soy beans, cowpeas, and crimson clover are grown to some extent, both as forage and as soil-improving crops. Sweet potatoes, other vegetables, peaches, and early apples are produced for home use. Peanuts yield about 50 bushels an acre, cotton two-thirds to 1 bale, and corn 20 to 40 bushels.

This soil is handled in practically the same way as the Norfolk fine sandy loam. Commercial fertilizers are used on cotton and corn, and lime on peanuts, but not in such large quantities as on the Norfolk soils. Cotton ordinarily receives 250 to 400 pounds per acre of an 8–2–2 commercial fertilizer at planting time and a later side application of 40 to 50 pounds of nitrate of soda. Corn is given the same fertilization at planting time and later a slightly heavier side dressing of nitrate of soda. Lime is used on peanuts in widely varying applications. Some farmers do not use lime on this crop, and others make applications ranging from 300 to 400 pounds per acre. Land plaster is universally used, at the rate of about 200 pounds per acre.

The Orangeburg fine sandy loam is generally conceded to be the strongest and most productive soil in the county. The land has a selling price ranging from about $50 an acre in the case of the smaller and less accessible areas to an average of $100 an acre for areas conveniently situated with reference to public roads and market.

The soil is easily brought up to a high state of productiveness and maintained in this condition. In general, leguminous crops should be grown more extensively, the organic-matter content increased through the occasional turning under of winter cover crops, a gradual increase made in the depth of plowing, and more thorough pulverization of the seed bed given. This soil is admirably suited to the pro-

duction of peaches; the Fort Valley district of Georgia and other peach-growing sections of the South have been developed on soil of this type. Heavy-leafed varieties of tobacco have proved profitable on this soil in other sections of the South.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam represents a soil similar in a general way to those of the Norfolk and Orangeburg series, but intermediate in color. It consists of a light grayish brown to light-brown loamy fine sand, underlain at a depth of 6 to 8 inches by yellowish to reddish-brown fine sandy loam, which continues downward to a depth of 10 to 15 inches. The subsoil below this is a reddish-yellow, friable fine sandy clay, grading at a depth of about 20 inches into a light-red, heavy fine sandy clay to friable clay, somewhat mottled with yellow or reddish yellow. The lighter textured areas occur largely in association with the Norfolk and Orangeburg soils, and the heavier areas with those of the Coxville series. The type includes areas of the Norfolk and Orangeburg fine sandy loams, too small to be accurately outlined on the soil map.

The Ruston fine sandy loam occurs mainly in patches in St. Johns Township, on small ridges and knolls lying 10 to 20 feet above the adjoining uplands. The surface varies from undulating to gently rolling, and the drainage is good. This is an inextensive type, but the greater part of it is in cultivation. The patches of timber include second-growth pine, various oaks, dogwood, elm, and walnut.

Peanuts and cotton are the principal cash crops. Sufficient corn for home use is produced by the better farmers, but very little small grain is grown. Cowpeas, soy beans, and crimson clover are grown to some extent for hay and as soil-improving crops. Sweet potatoes, other vegetables, peaches, and early apples are grown for home use. Peanuts yield 35 to 70 bushels per acre, cotton two-thirds to 1 bale, and corn 20 to 40 bushels. These crops are handled and fertilized in the same way as on the Norfolk fine sandy loam.

The selling price of land of this type ranges from $30 to $80 an acre.

For its improvement this type requires the same treatment as the Norfolk fine sandy loam.

SWAMP.

The areas mapped as Swamp are alluvial lands subject to inundation and inadequately drained. In some of the wider stream bottoms the soil consists of a dark-gray to black silty clay underlain by a lighter colored, heavy clay. In other places it consists prevailingly of a dark-gray loam underlain by material of lighter color and variable texture. In some of the narrower bottoms the type is composed of a mottled light-gray and brown, loamy surface soil underlain by

a gray to gray and yellow, mottled subsoil of varying texture. Low islands, subject to overflow, occur throughout the wider bottoms. The soil of these islands consists of light loamy sand. The extremely variable character of the material mapped as Swamp and the inaccessibility of the areas, owing to their swampy condition, make it impossible satisfactorily to separate the soil into types. The dark color of the material in practically all the areas is due to the organic-matter content accumulated through the growth and decay of vegetation.

Swamp occurs in continuous areas along all the streams having overflow channels. In some places it attains a width of 1½ miles. It is confined to the first bottoms of streams. The surface is flat, with a gradual slope in the general direction of stream flow. Near the heads of the various streams Swamp has an elevation of several feet above sea level, but along the Chowan River and the lower courses of the larger streams it is but slightly elevated above tide. Several small areas, particularly along the upper course of the Meherrin River, and an area along Cutawhiskie Swamp south of Menola have an elevation slightly greater than the average and are utilized to some extent as pasture land. With the exception of these areas and the occasional small islands, Swamp is wet and poorly drained at all times, and during the wet winter months it is covered with water. Numerous sloughs meander through the areas, containing stagnant water during all but the driest fall months.

This land is not in cultivation. Aside from the few higher lying areas that are partially cleared for use as pasture, it supports a dense growth of typical swamp vegetation, consisting mainly of cypress and black gum, with some water oak and holly along the outer margins. Cane and other water-loving grasses grow luxuriantly in places. Spanish moss grows thickly in the lower places.

The selling value of this land depends upon the timber growth.

There is apparently sufficient fall along Ahoskie and Cutawhiskie Swamps and the upper course of Potecasi Creek and several of the smaller creeks to make drainage by dredge ditches feasible. Through its reclamation and clearing a considerable area of exceptionally productive soil, well adapted to corn and grasses, could be made available for crop production.

SUMMARY.

Hertford County lies in the northeastern part of North Carolina, the Virginia State line forming its northern boundary. The topography ranges from level or gently undulating to gently rolling. Drainage is mainly poor in the level to gently undulating areas, and good in the more rolling areas. The elevation of the upland

ranges from about 12 to 76 feet above sea level, with an average of 40 to 50 feet. The bottom lands are low and swampy. The county is drained by the Chowan River and its tributaries.

Hertford County was established in 1759. The population is reported in the 1910 census as 15,436, and all the population is classed as rural. The principal towns are Ahoskie, Winton, and Murfreesboro. In general, the railroad transportation facilities are not adequate for the needs of the county. The Chowan, Meherrin, and Wiccacon Rivers are navigable and furnish transportation for bordering towns and farming communities.

Norfolk and Suffolk, Va., and Wilson, Rocky Mount, and Greenville, N. C., are the principal markets for the farm products of Hertford County.

The climate is mild. The mean annual temperature is reported at Weldon, in Halifax County, 40 miles west of Winton, as 58.9° F., and the mean annual precipitation as 47.22 inches. There is a normal growing season of 195 days.

The agriculture of Hertford County is based on the production of three cash crops, cotton, peanuts, and tobacco. The county is not self-supporting with regard to subsistence crops, and there is a large annual importation of corn, cornmeal, hay, flour, meat, and lard. The number of tenanted farms exceeds that of farms operated by the owners. Light implements and work stock are generally employed in farm operations. A fairly systematic rotation of crops is followed by the better farmers. Commercial fertilizer is used in large quantities on cotton, corn, and tobacco and to some extent on the less important crops, and burnt lime and land plaster are used on land devoted to peanuts. An adequate supply of farm labor is available at moderate wages.

The farms range in size from a few acres to several hundred acres, the average size in 1910 being 81.5 acres. Farm land ranges in value from about $25 to $100 an acre.

Hertford County lies wholly within the Coastal Plain region. The upland soils are derived from unconsolidated beds of sand and clay, through the various processes of weathering. The areas of alluvial deposits along the streams, which vary widely in texture and are poorly drained, are classed as Swamp.

The Coxville fine sandy loam is an extensive and important soil, mainly under cultivation. Peanuts and cotton are the principal crops grown. The brown phase of this type is not extensive. The Coxville very fine sandy loam is one of the most extensive soils in the county, but only a small part is farmed, the type being mainly forested. The Coxville soils are in need of better drainage and organic matter.

The Norfolk fine sand is an extensive, well-drained soil, and is largely under cultivation. The coarse sandy loam is an early soil, well adapted to truck and fruit crops. The Norfolk fine sandy loam and its deep phase are mainly in use for agriculture. The typical fine sandy loam is the best improved type in the county, and it produces the greater part of the tobacco grown. In general, the Norfolk soils are in need of organic matter.

The Portsmouth fine sandy loam is of small extent, and only a small part of the land is cultivated. Drainage is not well developed.

The Orangeburg fine sandy loam is a well-drained soil occurring in small scattered areas. It is practically all in use agriculturally, and gives good yields.

The Ruston fine sandy loam occurs mainly on ridges and has good drainage. The greater part of the type is farmed.

Swamp occurs in the first bottoms of all the streams having overflow channels. It is not cultivated, but the reclamation of important areas apparently is feasible.

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[PUBLIC RESOLUTION.—No. 9.]

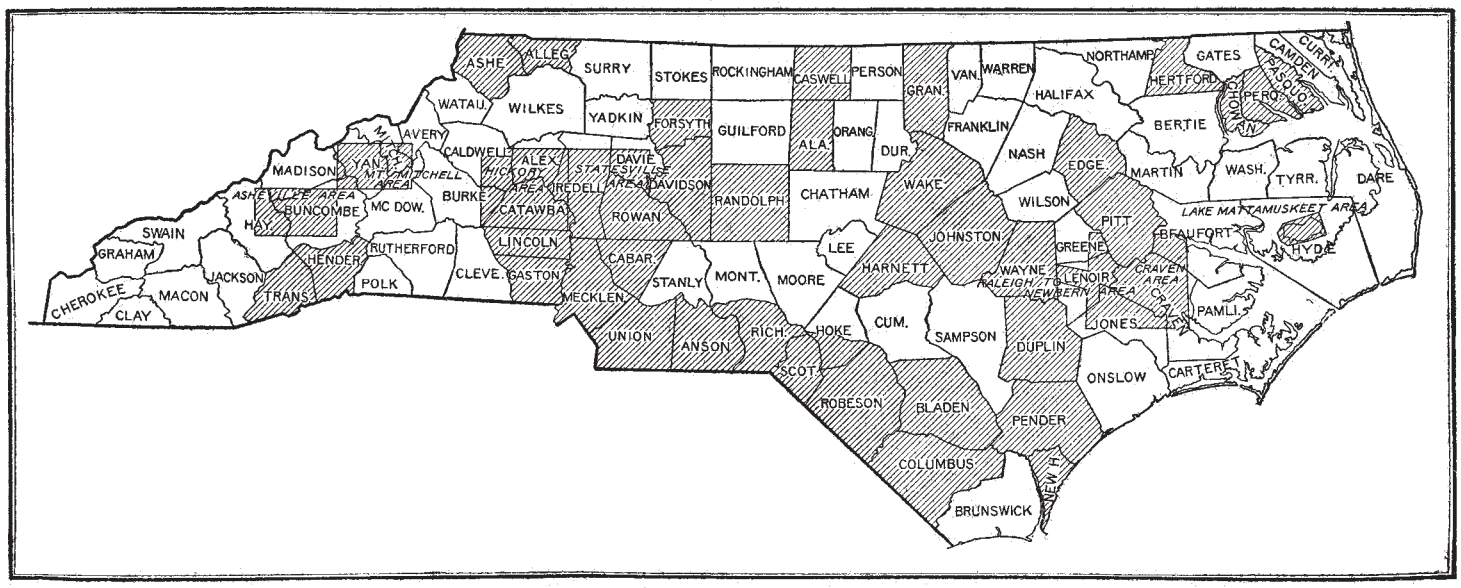
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture"

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.

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