



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

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SOIL SURVEY OF ALLEGHANY COUNTY,  
NORTH CAROLINA.

BY

R. T. AVON BURKE, OF THE U. S. DEPARTMENT OF AGRICULTURE,  
IN CHARGE, AND H. D. LAMBERT, OF THE NORTH CAROLINA  
DEPARTMENT OF AGRICULTURE.

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W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]



WASHINGTON:  
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1917.

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,  
*Washington, D. C., July 7, 1916.*

SIR: Under the cooperative agreement with the North Carolina Department of Agriculture a soil survey of Alleghany County was completed during the field season of 1915.

The accompanying report and map cover this survey and are submitted for publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as authorized by law.

Very respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

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

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MAP.

Soil map, Alleghany County sheet, North Carolina.



## SOIL SURVEY OF ALLEGHANY COUNTY, NORTH CAROLINA.

By R. T. AVON BURKE, of the United States Department of Agriculture, In Charge, and H. D. LAMBERT, of the North Carolina Department of Agriculture.—Area Inspected by W. EDWARD HEARN.

### DESCRIPTION OF THE AREA.

Alleghany County lies in the northwestern part of North Carolina, bordering the Virginia State line. It is bounded on the north by Grayson County, Va.; on the east by Surry County, N. C.; on the south by Wilkes County; and on the west by Ashe County. The county is irregular in outline. Its greatest length, about 24 miles, is east and west along the Virginia boundary, and its greatest width, about 13 miles. The county comprises an area of 209 square miles, or 133,760 acres.

Alleghany County lies in the Appalachian Mountain and Plateau Province. Its southern and eastern boundaries follow the crest of the Blue Ridge Mountains. Physiographically, the area represents a high plateau which has been dissected and eroded by streams. The topography is hilly to mountainous. Most of the country consists of rounded mountain knobs and ridges which are prevailing smooth in surface, although the slopes may be comparatively steep. The intervening valleys are narrow.

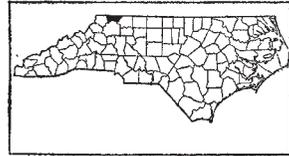


FIG. 1.—Sketch map showing location of the Alleghany County area, North Carolina.

The Blue Ridge, lying in the southern and southeastern parts of the county, is the most extensive mountain chain. The surface is generally smooth on the west and north and rougher on the east and southeast slopes. On the south the topography is rough and broken, the land consisting of rocky walls and steep valley slopes, especially near the headwaters of Roaring River. The altitude of the Blue Ridge is greatest in the south-central and southwestern parts of the county, where certain peaks attain a height of 4,000 feet above sea level. The elevations decrease toward the east and northeast to approximately 3,200 feet. One of the most important and most conspicuous outliers of the Blue Ridge, occupying a position to the north and east, is the elevation known as Bullhead Mountain, which reaches 3,800 feet above sea level. Another important outlier, Stone

Mountain, occurs on the south side of the Blue Ridge chain. This is a conspicuous peak of granite rising 2,500 feet above sea level.

The next most important mountain chain, known as the Peach Bottom Mountains, extends from north of Laurelsprings in a north-easterly direction toward the Virginia State line. It includes peaks that attain an elevation of 4,200 feet. A smoother ridge, known as Bakers Ridge, in the northwestern part of the county, has an average elevation of about 3,500 feet above sea level. With the exception of the mountain ridges mentioned, the general elevation of the county ranges from 2,500 to 3,000 feet above sea level. The streams have trenched their valleys deeply, from 100 to 600 feet below the general upland level. Bordering the streams in many places are narrow strips of comparatively flat land. These are flanked by smooth, gentle slopes which become steeper as the elevation increases.

The general slope of the county is toward the north and northeast. The drainage is effected chiefly by the New River and its tributaries. The New River forms the boundary of the county in the western part. The most important tributaries of the New River are its South Fork, Piney Creek, Potato Creek, Elk Creek, Rock Creek, and Little River. These streams and their branches are actively deepening their channels and cutting still farther back into the uplands. The drainage of the extreme southwestern part of the county is into the Roaring River. The headwaters of Mitchell River drain the extreme southeastern part.

The various creeks and branches extend to all parts of the county and afford good drainage outlets for every farm. The sources of many of the streams are mountain-side springs, which furnish the water supply of many of the farms. The run-off finds its way quickly to the streams, which rise and fall rapidly. All the streams flow swiftly and along the larger watercourses there are numerous rapids where much power could be developed, and the power available in some of the smaller streams could be used to a considerably greater extent than at present.

Alleghany County was established in 1858-59 and the boundaries have not been changed since that time, except along the Wilkes County line. The early settlers were chiefly of English, Scotch-Irish, and French descent.

The population of Alleghany County, as reported by the census of 1910, is 7,745, all classed as rural. Settlement is in general rather uniform over the county, and averages 33 persons to the square mile. Over 95 per cent of the population consists of native whites and 4.4 per cent is negro.

There are a number of small villages scattered through the county. The largest towns are Sparta, the county seat, with a population of 199; Piney Creek, Ennice, and Laurelsprings.

Alleghany County lacks railroad facilities. There is no railroad line reaching the county and produce and freight are hauled to and from Galax, Va., 21 miles from Sparta, or to Doughton, N. C., 17½ miles distant. Construction work has been partly completed on an extension of the Elkin & Alleghany Railroad from Doughton to Sparta.

Alleghany County has a large number of public wagon roads. Most of these follow the watercourses. Few of the roads are properly maintained and no permanent improvement work has been done. The roads are said to be almost impassable during the winter. There is only one steel bridge within the county limits and after heavy rains it is not uncommon for travel to be delayed 12 to 24 hours by floods in the larger streams.

Telephone service is available in all parts of the county. Churches and schoolhouses are established in convenient locations. The farmers are served by rural delivery of mail. Star mail routes serve farmers living along the line of travel, and in addition carry pouch mail from station to station.

Galax, Va., the terminus of the Norfolk & Western Railway, is the most important market and shipping point for Alleghany County, although considerable freight is handled through Doughton, N. C. Most of the cattle, sheep, and turkeys sold are driven to Galax. The cattle are generally shipped as feeders to points in Maryland, Virginia, and Pennsylvania. Galax is the chief distributing point for the vegetable product known as galax leaves, which grow so abundantly in this region, as well as for ginseng and other roots and herbs. Tanbark is hauled to both Galax and Doughton and shipped to various near-by tanyards.

#### CLIMATE.

Alleghany County has a climate that favors the prevailing types of agriculture, viz, stock raising and general farming. The winter months are cold and little farm work can be done between December and April, but the summer months are cool and pleasant. The rainfall is abundant and well distributed. There is usually quite a heavy snowfall, although in some winters the fall is light. Some of the highest mountains are snow covered during much of the winter season. A large part of the winter precipitation is in the form of rain or sleet, and heavy fogs are frequent along the rivers and the slopes of the Blue Ridge.

There is no Weather Bureau station in Alleghany County, and the nearest station in a region of similar characteristics, is at Linville, about 75 miles southwest of Sparta. The records compiled at this station probably represent, in a general way, the climatic conditions

in Alleghany County. Differences in climate even within Alleghany County may be expected from place to place with differences in elevation and topographic situation.

The average date of the last killing frost in the spring is about April 1 and that of the first in the fall about October 1. The normal growing season is thus about 180 days in length. Occasionally such crops as corn, sorghum, and pumpkins are injured by frost.

The water supply of Alleghany County is good. There are springs in all parts of the mountain areas and the quality of the water is excellent.

The following table, compiled from the records of the Weather Bureau station at Linville, in Avery County, gives the normal monthly, seasonal, and annual temperature and precipitation:

*Normal monthly, seasonal, and annual temperature and precipitation at Linville, Avery County.*

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	32	60	- 7	5.7	3.9	3.4	5.4
January.....	31	61	-15	3.4	1.7	4.4	5.4
February.....	30	63	-15	5.3	8.9	0.9	7.0
Winter.....	31	63	-15	14.4	14.5	8.7	17.8
March.....	40	75	- 4	6.1	3.9	3.7	3.6
April.....	46	79	15	1.6	2.3	3.0	2.0
May.....	58	83	26	3.7	4.2	2.6	.....
Spring.....	48	83	- 4	14.4	10.4	9.3	5.6
June.....	63	83	33	5.3	7.5	4.6	.....
July.....	66	89	38	6.1	3.7	9.3	.....
August.....	65	85	38	5.2	3.0	8.5	.....
Summer.....	65	89	33	16.6	14.2	22.4	.....
September.....	59	82	27	5.6	7.1	9.6	.....
October.....	49	74	14	5.3	3.9	18.5	0.2
November.....	40	67	0	3.9	3.6	2.5	1.2
Fall.....	49	82	0	14.8	14.6	30.6	1.4
Year.....	48	89	-15	60.2	53.7	71.0	24.8

#### AGRICULTURE.

A few settlers came to Alleghany County before the Revolutionary War, and made their homes in the western part of the county. No permanent settlement was made in the eastern half until many years

later, when people from neighboring counties and from the central part of the State settled in the Glade Creek country.

The early settlers, handicapped by the lack of equipment, did little farming. They cleared small fields and produced merely enough wheat, rye, buckwheat, corn, flax, and vegetables to supply their immediate needs. The virgin soils were productive and good yields were obtained, even with the superficial methods of tillage employed.

In addition to work stock, the early settlers brought with them a few head of cattle, sheep, and hogs, and produced enough beef, mutton, and pork to meet the home demands. Owing to the isolation of the county, there was at first no commercial exchange of products. Hides were tanned and made into shoes, harness, and other necessities, and wool and flax were converted into cloth on the farm.

Originally there were extensive forests in the county, the growth consisting largely of chestnut, oak, walnut, poplar, beech, elm, and maple. Spruce pine is said to have been very abundant in the western part of the county along some of the watercourses. Laurel, rhododendron, and turkey-pea vines formed a thick undergrowth throughout the uplands. As the cleared land declined in productivity with uninterrupted cropping, patches of fresh land were brought into cultivation and grass took possession of the abandoned fields.

The marked adaptation of the soils to grass and small-grain crops was soon recognized and the live-stock industry was developed at an early date. The number of cattle, sheep, and hogs, especially of hogs, increased rapidly. The stock for market was driven to Winston, Salisbury, Statesville, Raleigh, and other points in the eastern part of the State. Wytheville and Marion, Va., were points of exchange for such products as tallow, hides, butter, and cheese. The same economic conditions prevailed as late as the census year 1880, when the population of the county had increased to 5,486. The 1880 census reports 7,201 acres in corn, 5,006 acres in hay, 3,121 acres in rye, 1,933 acres in oats, 1,760 acres in wheat, and 755 acres in buckwheat. The production of apples, cherries, peaches, plums, and nuts reached a value of \$5,114 in 1880. At this time there were 2,287 milch cows, 3,459 other cattle, 1,542 horses and mules, 7,522 hogs, and 6,738 sheep in the county.

By 1890 marketing conditions were somewhat changed. The railroad line now forming part of the Southern Railway was extended to North Wilkesboro. The nearest point on this line was 33 miles from the county seat, but nevertheless its construction meant much to the farmers. It did away with the necessity of driving live stock to points in the eastern part of the State. By 1890 the area in hay had increased to 12,679 acres and that in corn to 9,188 acres. Oats occupied 3,858 acres, and wheat 2,138 acres. The land in rye was

reduced, on the other hand, to 2,921 acres and that in buckwheat to 186 acres. The number of milch cows had increased to 3,090, that of other cattle to 6,124, horses and mules to 1,991, and sheep to 8,937, while the number of hogs had decreased to 7,022.

In the census year 1900 the population was 7,759. Ninety-six per cent of the total area of the county was then in farms, and 58.5 per cent of the farm land was improved. Hay was still the leading crop, occupying 10 per cent of all the improved farm land, or 9,315 acres. Corn, the second crop in acreage, occupied 8,895 acres, and oats 3,680 acres. The other crops maintained the same relative importance they held 10 years previously, with the exception of buckwheat. This cereal occupied 2,016 acres in the 1900 census year, ranking as the fourth crop in point of acreage. Wheat was reduced to 1,324 acres. The census of 1900 showed small decreases in the number of cattle and hogs and increases in the number of horses, mules, and sheep.

Within the period 1903-1905 the Norfolk & Western Railway extended its line to Galax, Va. This made the nearest shipping point for live stock and other farm products only 21 miles distant from Sparta, and the construction of this line has been an important factor in the development of the county.

The population of Alleghany County remained practically stationary between 1900 and 1910, but the 1910 census shows a gain of 13 per cent over 1900 in the total acreage of improved land, and an increase in the number of farms. The census reports the entire area of the county as being in farms and 63.8 per cent of the land as improved.

The agriculture of Alleghany County at the present time consists of the production of hay, corn, and buckwheat and the raising of beef cattle.

Hay occupies a larger acreage than any other crop. The 1910 census shows 11,132 acres devoted to tame and cultivated grasses, with a yield of about 1 ton per acre. The hay consists mainly of redtop or orchard grass or of these two grasses mixed. All the hay produced is consumed on the farm in the wintering of cattle.

According to the census, there were 8,649 acres planted to corn in 1909, the crop amounting to 189,666 bushels. Corn is grown for the feeding of work stock and the fattening of hogs, as well as for domestic use. Practically no corn is sold.

Buckwheat was sown on 3,650 acres in 1909, with a production of 51,358 bushels. Buckwheat is grown for revenue and the bulk of the crop is sold in outside markets.

Minor crops of Alleghany County include rye, wheat, oats, Irish potatoes, cabbage, dry beans, and other vegetables. The cereal crops

and Irish potatoes are used mainly on the farms, but a small quantity of cabbage and Irish potatoes is sold in near-by towns. Vegetables make good yields and the product is of excellent quality.

Of the fruits grown, apples are the most important. The principal varieties grown are the Virginia Beauty, York Imperial, Winesap, Limbertwig, and Rome Beauty. The quality of the fruit is high and indications are that with the establishment of good transportation facilities apple growing will be extended on a commercial scale. Cherries do exceptionally well in this county. A large quantity of chestnuts is gathered annually from the forests.

The raising of beef cattle is the most important and in many cases the sole source of farm income. The census reports the value of all animals sold or slaughtered in 1909 as \$398,326. There are probably 15,000 or more head of cattle in Alleghany County. Nearly every farmer raises cattle, the number on the individual farms ranging from a few head to a hundred or more. The principal breeds of cattle are the Hereford, Shorthorn, and Aberdeen Angus, with their grades and crosses. The cattle are grazed during the summer and fall. They are sold in the fall at the age of 2 or 3 years, when they weigh 900 to 1,200 pounds. Local buyers send the cattle, for finishing, to Pennsylvania or Virginia. A considerable proportion of the stock goes to Lancaster, Pa., where the animals are fed for 6 to 8 weeks. The cattle from Alleghany County compare favorably in quality with beef cattle from the Middle West.

Sheep raising is an important agricultural interest. The number of sheep in the county is more than 12,000. Sheep are raised to be sold to outside markets. Wool and mohair produced in 1909 reached a value of over \$9,000.

The 1910 census reports 4,432 hogs in Alleghany County. Hogs are raised mainly for consumption on the farm, but a few head are sold.

Poultry raising is a source of considerable farm revenue, the census reporting the value of poultry and eggs produced in 1909 as \$56,893. A large number of turkeys are raised and driven to market.

The surface configuration of the county is not favorable for the extensive cultivation of crops. The only areas that can be economically used for cropping are the bottom lands along the watercourses, the smoother slopes and foothills, and the flat-topped mountain ridges and rounded knobs. Corn and grain are grown on the hill and mountain slopes, but the proportion of land occupied by these crops is very small in comparison with that utilized for pasture.

Some recognition is given by the farmers to the adaptation of crops to the various soils of the county, but factors others than soil adaptedness govern in large measure the selection of fields. The

Porters loam and Talladega loam are recognized by the farmers as good soils for wheat, the Ashe loam as a desirable soil for corn, oats, and grass, the Chandler loam as well suited to rye, vegetables, and fruit, and the Toxaway loam as a good grass soil. The altitude and direction of slope are considerations that influence the selection of fields for some crops. The slopes facing the north and northwest are generally utilized for rye, oats, and grass, while those exposed to the east, southeast, and south are generally used for wheat, corn, and fruit. Buckwheat does not seem to be affected by topography, altitude, and slope exposure to the same extent as other crops, and it is grown in all positions from stream bottoms to the tops of the highest ridges.

Nearly all the farms are equipped with light and heavy plows, hillside plows, harrows, drags, seed drills, cradles, mowers, and rakes, while a few farmers have in addition binders and reapers, and still others have thrashing outfits. In general the seed-bed preparation is shallow. The range in depth is from 3 to 8 inches, but usually the seed bed is not more than 5 inches deep. Most of the land for wheat and rye is plowed in the early fall and dragged. The seed is mainly drilled, but a small proportion of the crop is sown by hand. Few farmers sow grass or clover with wheat or rye, but it is not uncommon to harrow in grass or clover seed on the grain crop the following spring.

Buckwheat and oats are generally sown on land prepared in the spring. Buckwheat is utilized as a nurse crop for grass and clover more generally than is any other grain. Most of the grain sowed occupies hill and mountain slopes and the crop is harvested mainly with a cradle, a binder being employed in more favored situations, such as coves and broad ridge tops. Wheat, oats, rye, and buckwheat are shocked and when cured are stacked. Thrashing is done subsequently by outfits that go from place to place, making a charge of one-twentieth of the wheat handled and one-sixteenth of the rye, oats, or buckwheat. A considerable proportion of the buckwheat grown is thrashed by hand.

Nearly all the corn land is prepared in the fall and plowing is generally much deeper than for the small grains. The cultivations given corn are shallow and frequent.

It is considered by many farmers that the benefits of fall plowing on the higher slopes are more than offset by the loss of soil at the time of the heavy winds of winter and early spring. The soil covering on the south and southeast slopes is generally shallower than on the north and northwest slopes, and seems to be more readily removed by surface run-off.

The crop rotation generally followed by the farmers in Alleghany County consists of corn, a small grain, in which grass and clover are

sown, and hay and pasturage. The schedule, however, varies with the individual farmer; corn may be followed by rye, wheat, or clover, or two successive crops of rye may be produced and as many as four successive crops of wheat. Stands of clover last for 2 or 3 years and this legume is generally used as a renovation crop. A few farmers sow grass or grass and clover on the snow, while others harrow the seed in the rye or wheat fields in the spring. If the grass stand is heavy enough hay is cut the second year and the field is used as pasturage for periods ranging from 3 to 12 years. Many farmers follow corn the succeeding spring with oats or buckwheat, used as a nurse crop for grass.

The total expenditure for fertilizer in Alleghany County in 1909, as given by the census, was \$18,804, 61.3 per cent of the farms reporting the use of commercial mixtures. The fertilizer most commonly used is 16 per cent acid phosphate. This is applied in quantities ranging from 100 to 500 pounds an acre. A few farmers have experienced good results from the use of lime, and all the farmers report that stable manure is the most efficacious fertilizer used, and only the lack of sufficient animal manures makes the use of commercial mixtures necessary.

The expenditure for labor in Alleghany County aggregated \$31,927 in 1909, there being an average outlay of \$56.61 for each of the 564 farms reporting the hire of farm hands. Most of the labor employed is white. The greater proportion of the expenditure for labor is for service by the day, the rate of pay being about 75 cents a day, with board. Where hands are employed by the month they receive \$15 to \$25.

The average size of farms in Alleghany County, as given by the census is 102.3 acres. Land holdings range from a few acres to farms comprising 1,000 acres or more. Two-thirds of the farms are between 20 and 175 acres in size.

Of the 1,466 farms in the county, the census reports 84.4 per cent as operated by owners, the percentage having increased slightly since 1900. Fifteen per cent of the farms are worked by tenants, mainly on a share basis.

The value of farm land in Alleghany County ranges from \$20 to \$200 an acre, the price depending on the soil, improvements, and location. The 1910 census reports the average assessed land value as \$19.79 an acre, a gain of 103 per cent over that reported in 1900.

#### SOILS.

Alleghany County lies wholly in the Appalachian Mountain and Plateau Province. The soils of the county, except those of alluvial origin, are consequently residual, i. e., derived through the disinte-

gration and decomposition of the underlying rocks. The principal rocks are gneiss, mica gneiss, mica schist, and granite, together with hornblende and garnetiferous schist and dikes of other hard intrusive rocks.

The covering of soil material over the bedrock is generally shallow, and in many places the partially decayed rock is reached between the depths of 18 and 36 inches. Outcrops of the bedrock occur on slopes where erosion has kept close pace with soil formation. The quartz occurring in narrow bands or veins in the original rocks has resisted the agencies of weathering. The veins have merely broken up and the fragments are encountered on the surface, in the surface soil or embedded in the subsoil.

In many places mica schist and mica gneiss are associated so closely in occurrence that difficulty is encountered in distinguishing between the resultant soils.

With the range in physical and chemical composition of the underlying rocks and differences in the stage of decay and oxidation of the component minerals, soils have been derived which vary in color, structure, origin, and other characteristics, but a uniformly loamy texture and dominantly friable structure are characteristic of practically all the surface soils.

The soils are classed in series which differ in color, structure, mode of origin, or other characteristics. Five series are recognized. The upland soils are comprised in the Ashe, Chandler, Porters, and Talladega series, and the bottom-land soils in the Toxaway series.

The Ashe series is characterized by light-brown to yellowish surface soils and brownish-yellow or slightly reddish yellow, friable clay subsoils. The Ashe very coarse sandy loam and loam are encountered in Alleghany County. The loam is derived from gneiss, granite, mica-gneiss, and garnetiferous schist, while the very coarse sandy loam is derived from coarse-grained granite.

The Chandler series comprises yellow or brownish-yellow surface soils and dominantly yellow subsoils. The surface soil and subsoil carry sufficient quantities of mica to give them a greasy feel and a lustrous appearance. The Chandler soils are derived mainly from mica schist and more rarely from mica gneiss. The Chandler loam is the only member of this series mapped in Alleghany County.

The Porters series is characterized by brown to red surface soils and red or brownish-red subsoils. The members of this series are derived from hornblende schist, gneiss, granite, and granitoid gneiss, locally associated with mica schist and mica gneiss. The Porters loam is the only representative of this series mapped in the present survey.

The Talladega series differs from the Porters principally in that the surface soil and subsoil are slightly less compact, are somewhat

lighter in color, and contain large quantities of small particles of mica. The Talladega soils are derived directly from mica schist. Only one member of the series—the loam—is represented in Alleghany County.

The Toxaway series comprises brown to dark-gray surface soils and light-brown to black subsoils. The series is developed in the bottoms along streams in the southern Appalachian Mountain region. In Alleghany County it is represented by one type—the Toxaway loam.

In addition to the five series recognized in this survey, two types of miscellaneous material are mapped—Rough stony land, representing areas of rough topography which have an abundance of stone on the surface or include numerous outcrops of bedrock, and Rock outcrop, comprising an exposure of bare rock.

In subsequent pages of this report the different soil types are described in detail and their agricultural characteristics briefly considered. The distribution of the soils is shown on the map accompanying this report, and the following table shows the actual and relative extent of each type mapped.

*Areas of different soils.*

Soil.	Acres.	Percent.	Soil.	Acres.	Percent.
Ashe loam.....	68,672	51.4	Rough stony land.....	2,112	1.6
Porters loam.....	33,752	25.3	Ashe very coarse sandy loam..	576	.4
Chandler loam.....	14,336	10.7	Rock outcrop.....	192	.1
Toxaway loam.....	7,360	5.5	Total.....	133,760	.....
Talladega loam.....	6,720	5.0			

ASHE VERY COARSE SANDY LOAM.

The surface soil of the Ashe very coarse sandy loam consists of a very coarse sandy loam of a light-gray color, grading into a pale-yellow color at about 2 to 6 inches. This material extends to a depth of 8 to 20 inches. The subsoil is a yellow, friable coarse sandy clay or clay, which either extends to a depth of 3 feet or grades into disintegrated granite. The surface soil carries a large quantity of small angular quartz gravel, the particles ranging in diameter from one sixteenth to one-fourth inch.

This type is limited in occurrence to a small area in the southeastern part of the county around Miles. It occupies the lower mountain slopes, the surface being gently rolling to strongly rolling. The surface drainage and internal drainage are good.

Much of this type can be cultivated. It is used for the production of corn, buckwheat, rye, and potatoes, and a small quantity of apples.

The Ashe very coarse sandy loam is a mellow soil, easily tilled. It responds readily to the application of stable and green manures.

## ASHE LOAM.

The surface soil of the Ashe loam is a light-brown to brownish-yellow loam, having a depth of about 6 to 10 inches. The subsoil is a brownish-yellow or dull-yellow to slightly reddish yellow or buff-colored, friable, crumbly clay loam or clay, which continues downward to the underlying rock, the depth in places exceeding 3 feet. Occasionally the disintegrated rock is encountered between 2 and 3 feet below the surface, and in places immediately beneath the surface soil. Mica scales are generally present in both surface soil and subsoil, but not in sufficient quantities to give the material the greasy feel characteristic of the associated Chandler loam.

Included with the Ashe loam as mapped are two small areas of Ashe stony loam. In both cases the surface soil and subsoil are typical of the Ashe loam, the only difference being in the larger quantity of stone fragments, ranging from 2 to 5 inches in diameter, scattered over the surface and distributed to a less extent throughout the immediate subsurface stratum.

One of the most important variations in the Ashe loam occurs in the southern and southeastern parts of the county on the crest of the Blue Ridge, largely along the county line. The surface soil and upper subsoil are typical, the surface soil being generally only a little darker in color, but the subsoil, with approach to the underlying rock, at a depth of 2 to 3 feet, becomes micaceous and slightly greasy, the material being derived from garnetiferous schist. Included also with the typical Ashe loam as mapped are patches or strips of Chandler loam, Porters loam, and Talladega loam too small to separate in mapping.

The Ashe loam is the most widely distributed and the most extensive soil mapped. The type occurs in all parts of the county, but it is largely developed in three general belts. One of these extends in a northeasterly direction from the river bank opposite Sturgills Store to New River, beyond Turkey Knob School, in the northern part of the county. Another occurs in the central part of the county on the north and south slopes of the Peach Bottom Mountains, extending northeasterly from near the western county line toward Vox in the northern part of the county. The third and largest belt also extends in a northeasterly direction; it includes the southwest, southeast, and northeast parts of the county. These belts represent only the general distribution of the type, the areas of which are not continuous, but are interrupted by bodies of other soils.

The Ashe loam occupies practically all positions from the lower valley plains to the tops of the mountains, although it rarely occupies the highest crests or peaks. Part of the type is gently rolling, but

for the most part the type forms rolling intermountain country, comprising knolls and ridges which have smooth slopes.

Drainage over this type is excellent, and in spite of its position and surface relief little erosion has taken place, bald spots where the surface mantle has been removed by wash being rare.

The Ashe loam is derived from the decay in place of such underlying rocks as gneiss, mica gneiss, and garnetiferous schist, with local intrusions of mica and hornblende schist. The character of the soil from place to place bears a close relation to the geological formations, and the intrusions mentioned are in general responsible for the variations in the type.

Probably 40 per cent of this type is cleared and about one-third of the cleared land is devoted to crops, the remainder being used for pastures. The forest growth consists of chestnut, red oak, white oak, chestnut oak, maple, ash, beech, dogwood, hemlock, and poplar; the undergrowth, particularly near the stream channels, consists of rhododendron and laurel.

The chief type of farming on this soil is the grazing of beef cattle. The crops grown are mainly utilized in feeding work stock, cattle, and hogs. The favored position occupied in general by this type permits the maturity of a wide range of crops. Corn, wheat, rye, buckwheat, oats, hay, fruits, and vegetables are grown. Corn, according to the reports of farmers, yields 20 to 40 bushels an acre, wheat 15 to 25 bushels, rye 10 to 15 bushels, buckwheat 15 to 25 bushels, and oats 20 to 40 bushels. Mixed hay (timothy, redbud or orchard grass, and clover) gives yields of 1 to 1½ tons an acre. Apples, cherries, and grapes are successfully grown, and in some of the protected mountain coves peaches are a profitable crop. Such garden vegetables as Irish potatoes, lettuce, cucumbers, tomatoes, cabbage, and turnips succeed very well.

As a general practice, one to three crops of corn are grown on this type, followed by one to three crops of wheat. If wheat is not sown rye may take its place as a fall-sown crop. Oats or buckwheat sown the following spring may take the place of rye.

The small grains are usually grown on the Ashe loam as nurse crops for grass and clover, which may be sown either in the fall or spring. When hay is harvested the second summer the land is in some cases used as pasture for periods ranging from 3 to 10 years. The pastures on this type are said to be very good, particularly those on the north slopes.

The chief means of maintaining the productiveness of this type consist of turning under pasture sod and grain stubble, and growing red clover with grass. Stable manure is generally applied to corn land and 16 per cent acid phosphate to the grain crops, at the

rate of 100 to 300 pounds an acre. A few farmers report good results from the use of lime, especially where the organic content of the soil is high.

The Ashe loam has a friable structure and good tilth can be maintained easily. The type is highly adapted to the general-farming crops and fruit, as well as to Irish potatoes and cabbage. It is not so good for wheat as is the Porters loam, but pastures on it are better and more permanent than on the latter type.

The selling price of land of the Ashe loam ranges from \$30 to \$100 an acre, depending upon the location and improvements.

Plowing on this type should be deeper and other tillage operations more thorough. Crops should be rotated systematically and arranged so as to shorten the intervals between the seedings to grass. This will do much to maintain the organic content and increase the productivity of the land. Liming apparently would be beneficial.

#### CHANDLER LOAM.

The Chandler loam to a depth of 6 to 12 inches consists predominantly of a dull-yellow, brownish-yellow or light-brown loam which is underlain by a subsoil of yellow, brownish-yellow or faintly reddish yellow, friable, crumbly clay loam or clay. The subsoil usually grades into the partly decayed rock at 2 to 4 feet. Not infrequently the subsoil is lacking and the surface soil rests directly on the rock. Finely divided scales of mica occur in very large quantities in the subsoil and to a noticeable extent in the surface soil. These give the material a greasy feel when rubbed between the fingers and a luster when exposed to sunlight. In many places ledges of rock protrude through the soil.

Closely associated with this type are strips of typical Ashe loam and Talladega loam, too small to differentiate on the soil map. Spots of Chandler clay loam are also included on some of the steeper slopes, developed where the heavy material has been exposed by soil wash. The Chandler loam, however, is much more uniform throughout its distribution than is the Talladega loam and the variations mentioned are mainly negligible.

The Chandler loam has a wider distribution than the Talladega loam, although it is one of the less important types of the county. It occurs in scattered bodies in all parts of the county, generally closely associated with the Ashe loam. It is well developed along the county line north and south of Laurelsprings, and along Brush Creek northeast of Hooker. It is equally typical on the crest of Peach Bottom Mountains, on the slopes of Bullhead Mountain, and on the east slope to Pine Swamp Creek. It is not quite so typical on the crests and slopes of the Blue Ridge near the south and east county boundary lines, where the mica content is less than usual,

especially where the soil is derived from garnetiferous schist. The Chandler loam is largely confined to the higher altitudes, especially the crests of mountains. The drainage is thorough and generally excessive, being sufficient in places on the slopes to cause soil wash.

The Chandler loam owes its origin to the weathering in place of mica schist, mica gneiss, and, less commonly, garnetiferous schist.

About one-third of the total area of the type is utilized for agricultural purposes, the remainder supporting a forest growth consisting of mixed chestnut, white oak, red oak, chestnut oak, and white pine. In some places white pine is the most conspicuous growth. Only about one-third of the cleared land is cultivated, the remainder being used for pasturage. The crops grown consist of corn, rye, buckwheat, and hay. Wheat is seldom grown. Like the other soils of the county, this type is used in the main for the grazing of live stock and the production of subsistence crops. As the Chandler loam occupies the highest elevations in the county it is exposed to more severe winter conditions than the other types, and little fruit is grown except on south and east slopes. Here fruit can be successfully produced.

Crop yields reported for this type are: Corn, 5 to 12½ bushels per acre; rye, 8 to 14 bushels; and buckwheat, 10 to 20 bushels. The hay crop is generally very light.

Corn is usually followed by rye or buckwheat. Grass for hay or pasturage is generally sown with the buckwheat or harrowed in on rye in the spring.

Except over small areas on the tops of ridges and on the gentler slopes, improved farm implements can not be used on the Chandler loam. The soil, however, is easily worked, it warms up quickly in the spring, and crops mature early. The type is deficient in organic matter. The manure available is usually applied to corn and rarely to other crops. The small grains, however, are fertilized with an acreage application of 100 to 300 pounds of 16 per cent acid phosphate.

The selling price of land of this type ranges from \$20 to \$40 an acre.

The Chandler loam is generally less productive of grass and grain than the Talladega loam, but its productiveness can be greatly increased by the incorporation of stable manure and the plowing under of coarse forage, grain stubble, and green manuring crops. Deep plowing and thorough tillage would do much to increase the yields.

#### PORTERS LOAM.

The surface soil of the Porters loam is a dark-brown or reddish-brown loam, ranging in depth from 5 to 12 inches. The subsoil is a

friable clay loam to compact clay of a red or light-red color, generally extending to a depth of 3 feet. In places, however, the disintegrating bedrock is reached at a depth of 2 or 3 feet, and occasional ledges are exposed at the surface, especially on the steeper slopes. The surface soil in general has a mellow structure. The subsoil contains a sprinkling of mica scales, but these are less abundant than in the Talladega and Chandler loams and do not give the material a greasy feel.

Included with this type are a number of small patches of Porters clay loam, formed by the partial or complete removal of the surface soil by soil wash, and a small patch of Porters stony loam. The most important developments of Porters clay loam are encountered near the public road north of Toms Devil Knob and south of Rock Creek School, as well as near the county line in the northwest corner.

The stony loam differs from the typical loam only in having a scattered distribution of stones on the surface. A variation in the Porters loam occurs north of Edwards Crossroad, where the surface soil is intensely red in color and the subsoil is a deep-red clay. Throughout the Porters loam there are included numerous areas and strips of Ashe loam and Talladega loam too small to separate on the map.

The Porters loam is the second soil in point of extent. It occurs throughout the county, but less extensively in the southeastern part. It is largely developed in two belts, which, however, are not continuous. One of these extends from southwest of Whitehead to Ennice and beyond. The larger and more continuous belt begins southwest of Peden and extends to New River.

The Porters loam occupies the lower mountain slopes, and hills and ridges of moderate elevation. It usually occurs in an intermountain position, and never on the tops of the highest mountains. The type in general is well drained, and in places on the steeper slopes the run-off is so excessive as to have partially or wholly removed the surface soil and gullied the subsoil. On the other hand, in small areas the type adjoins the bottom lands so gradually that drainage in the lowest part of the slope is not well established.

The Porters loam is derived from the weathering or decay in place of hornblende schist, gneiss, mica gneiss, and less commonly granitoid gneiss, as well as from other igneous rocks. Slight differences in the parent rocks are largely responsible for the variations which occur throughout the type.

About 75 per cent of the Porters loam is farmed, the remainder supporting a mixed growth of chestnut, red oak, white oak, chestnut oak, maple, ash, poplar, dogwood, and cucumber tree, with a thick undergrowth in places of rhododendron, laurel, and wild grape. About 50 per cent of the cleared land is used for the production of

crops and the remainder as pastures. As on the other soils of the county, the type of agriculture consists of general farming, in conjunction with the raising of live stock. The crops grown, named in the order of their importance, are corn, hay, wheat, buckwheat, rye, and oats, with garden vegetables and fruit for home use.

Over much of this type improved labor-saving machinery can be used. Part of the land, however, is too steep and rough for the economical production of crops and is used for permanent pastures or allowed to remain in forest.

The following yields per acre are reported by farmers on the Porters loam: Corn 30 to 50 bushels, wheat 15 to 35 bushels, buckwheat 15 to 30 bushels, rye 10 to 20 bushels, oats 20 to 50 bushels, and hay  $1\frac{1}{2}$  to 2 tons.

Crops are usually grown in a succession consisting of corn, wheat or rye, oats or buckwheat, and grass and clover, the land being then pastured for a long period. As many as three or four successive crops of corn and wheat are grown. In general the Porters loam is probably farmed better than the other soils; seed-bed preparation is more thorough and the tillage given is more intensive. Commercial fertilizers are rarely used on corn land, but the small-grain crops are usually fertilized with 16 per cent acid phosphate in applications ranging from 100 to 400 pounds an acre. Stable manure, as far as available, is applied to corn land.

The Porters loam is slightly more difficult to work than is the Talladega loam or Ashe loam. The depth of plowing is usually greater, ranging from 5 to 10 inches. The type is an excellent soil for the general farming crops and gives better yields of wheat than any other type in the county. Results with oats are rather uncertain, but buckwheat yields heavily and the growing of this crop is said to improve the physical condition of the soil. The Porters loam is one of the most valuable types in the county for apples, on account of its topographic position.

Land of this type has considerable range in selling value, the farms being held at prices ranging from \$80 to \$150 an acre.

The Porters loam is inherently one of the strongest soils in Alleghany County, and it can be built up to a high and rather permanent state of productiveness. The chief means of improving the type is the systematic rotation of crops to include the more frequent growing of red clover. The use of lime is reported to be beneficial, especially where the organic content of the soil is high.

#### TALLADEGA LOAM.

The surface soil of the Talladega loam consists of a brown to reddish-brown loam, having a depth of 5 to 10 inches. This is underlain by a red or yellowish-red, friable clay loam or clay, which may ex-

tend to a depth of 3 feet or more but generally grades into decayed rock at some depth between 2 and 3 feet. In spots the rock comes to the surface. There is generally present in both surface soil and subsoil a sufficient quantity of finely divided mica scales to give an unctuous or greasy feel to the material. The mica content is usually more conspicuous in the subsoil in those places in which the parent rock is near the surface.

The Talladega loam in Alleghany County is not uniform. The subsoil varies in color from red or reddish yellow to streaked red and yellow, all of these different colors being developed in some places within areas of a few square feet. In small depressions and coves the surface soil is rich brown in color and may exceed 12 inches in depth, while, on the other hand, on the steeper slopes the color is lighter and the soil covering more shallow. Not infrequently the surface-soil material is entirely removed, exposing the underlying red or reddish-yellow clay loam. If larger these spots would have been mapped as Talladega clay loam.

The Talladega loam covers only a small total area, though it occurs in small areas in all parts of the county with the exception of the southeastern and extreme eastern sections. It is typically developed west of Nile. The largest area occurs in the bend of New River near Sibyl. Isolated areas lie in the vicinity of Laurelsprings along the western county line and on the slopes to Piney Fork. The type is encountered elsewhere in many spots closely associated with the Porters loam.

Usually the Talladega loam occupies the lower slopes of the mountains and knolls, but occasionally it is encountered on the crests of intermountain ridges. The surface is generally smooth, although in places the slope is rather precipitous. Drainage over the type is thorough and in places excessive. The run-off is rapid and occasionally the underlying mica schist is exposed by erosion.

The Talladega loam is derived from the weathering or decay in place of the underlying mica schist and mica gneiss and associated igneous rocks.

About one-half the total area of this type is used in agriculture. The remainder supports a growth of mixed chestnut oak, red oak, white oak, dogwood, maple, and poplar, with occasional pine and hemlock trees. Probably less than one-third of the land farmed is cultivated, the type being used mainly for pastures. The raising of beef cattle is the chief interest, and the crops grown are mainly used for subsistence of the stock. They consist of corn, rye, wheat, buckwheat, and oats. In addition vegetables and small quantities of fruit are grown for home use. Fuller use of this soil for cultivated crops is prevented by the rough topography.

Yields on the Talladega loam vary widely with the methods of farming pursued. Corn yields 20 to 30 bushels per acre; rye, 10 to 15 bushels; buckwheat, 10 to 25 bushels; wheat, 10 to 20 bushels; oats, 20 to 35 bushels; and mixed hay, 1 to 1½ tons. Farmers report that the type gives best yields in wet seasons as it is inclined to droughtiness. Oats are reported an uncertain crop.

The crop rotation practiced on the Talladega loam consists generally of corn followed by wheat, buckwheat or oats, and grass. Sometimes wheat is used as a nurse crop for red clover when it is desired to grow this legume for soil-improving purposes, but grass and clover are more frequently sown with buckwheat or oats than with wheat. The grass crops include timothy, redtop, and orchard grass, and red or sapling clover. After the hay is cut the land is pastured for a period of three years or more.

Plowing on the Talladega loam is generally shallow. Corn is rarely fertilized, and then only with stable manure. The small grains are usually fertilized with acid phosphate applied in quantities ranging from 100 to 300 pounds per acre.

The Talladega loam is a good soil for the general farming crops, especially wheat, under favorable conditions, but it is not so productive as the Porters loam or Ashe loam, and the pastures are not as permanent as on the latter types.

The value of land of the Talladega loam ranges from \$40 to \$80 an acre, depending on the location and the grazing afforded.

The Talladega loam is capable of considerable improvement, especially where it occupies favorable topography. Deep plowing, more thorough tillage, and adding to the generally deficient supply of organic matter will enable the soil to take up more moisture, so as to lessen the effects of prolonged droughts, and in other ways will increase crop yields. The more frequent growing of red clover in crop-rotation systems would do much to supply organic matter when the supply of stable manure is short.

#### TOXAWAY LOAM.

The surface soil of the Toxaway loam is prevailingly a dark-gray to dark-brown loam, having a depth of about 6 to 15 inches. The subsoil is somewhat variable in color and texture, but in general it consists of a light-brown to black loam or clay loam extending to a depth of 3 feet. Throughout the surface soil and subsoil, in many places, there is present a sufficient quantity of small mica scales to give the material a slick, greasy feel.

Included with the type as mapped are spots where the soil is a black loam. This variation is developed particularly along Piney Fork and Meadow Fork Creek. Bordering the stream courses in

places narrow strips or hummocks of brown fine sand are encountered. Layers of gravel and fine sand occur occasionally in the subsoil. Along New River are included with the Toxaway loam a few spots of second-bottom or terrace soils.

The Toxaway loam is a soil of the first or overflow bottoms. It occurs in all parts of the county in long, narrow strips, ranging in width from 100 to 1,000 feet, bordering the rivers and streams.

The type in general has a flat and almost level surface, favoring the use of improved farm implements. There is a slight gradient toward the channel, except where low ridges of fine sand are developed near the stream course. The flats occupied by this soil in certain places near the uplands have the appearance of depressions; here the drainage is poor and the land remains wet a considerable part of the year. Drainage is fairly well established over most of the type, although all of it is subject to frequent heavy overflows, usually of short duration.

The Toxaway loam is an alluvial soil, representing material washed from the uplands and brought down and deposited by the streams in their flood plains at times of inundations. Present-day overflows continually deposit new sediments over most of the type, although in places the waters are eroding the surface soil covering instead of adding to it.

About 95 per cent of this land is cleared and farmed, the type being used principally for the production of hay, although corn is grown to some extent. The hay consists chiefly of timothy, redtop, and orchard grass, and the yields range from 1 to 2 tons per acre. Corn, without fertilization, yields 25 to 60 bushels an acre, and the type is considered the best corn and hay soil in the county. Wheat does well on the higher lying areas.

Cattle grazed upon the uplands until fall are brought to the stream bottom lands to be wintered, and the hay produced on this type is used principally as subsistence for beef stock. In places this land has been in grass for 20 years or more. Land of this type sells at \$60 to \$200 an acre.

In the wetter areas of the Toxaway loam the drainage could be improved to good advantage. The type would probably be benefited by the application of lime at the rate of about 1 ton per acre.

#### ROUGH STONY LAND.

The term "Rough stony land" is used to designate areas of rough topography which are strewn with bowlders and contain numerous outcrops of bedrock.

The type includes the rough slopes along Little River 1 mile south of the State line, the crest and north slopes of Bullhead Mountain, the tops of the highest knobs near Air Bellows Gap, the tops of

Fender Mountain and Cheek Mountain of the Peach Bottom Mountains, and areas along the south county line. Rough stony land is mapped elsewhere in isolated bodies throughout the county.

This land is unsuited for farming, though in some places it affords a little grazing. Most of the Rough stony land is forested, and the timber stand constitutes its greatest value, although lumbering could be carried on only at considerable expense.

#### ROCK OUTCROP.

The term "Rock outcrop" is applied to an extensive exposure of bare rock on the southern county line. This is a barren mass of rock, known as Stone Mountain, with slopes that have an almost perpendicular drop of several hundred feet. On the top of the elevation there is in places a very thin covering of sandy soil, but in general erosion has kept close pace with weathering and has prevented the accumulation of soil.

The sandy mantle in patches supports a sparse growth of scrubby timber, but the type has no agricultural value.

#### SUMMARY.

Alleghany County lies in the northwestern part of North Carolina, bordering the State of Virginia. It has an area of 209 square miles, or 133,760 acres. The county is included in the Appalachian Mountain and Plateau Province. Mountainous topography prevails, but there are many rounded elevations of generally smooth surface.

The general slope is toward the north and northeast. Drainage is effected by the New River and its numerous tributaries, and there is little undrained land in the county.

The population of the county, as given by the 1910 census, is 7,745. The population is entirely rural, and settlement is in general well distributed. Sparta, the largest town and the county seat, has a population of 199.

The county is not reached by a railroad line, and the nearest railroad station is Doughton, on the Elkin & Alleghany Railroad, 17½ miles from Sparta. Galax, Va., 21 miles from Sparta, on the Norfolk & Western, is the most important shipping and receiving point.

There are a number of stores and post offices in the county, and churches and schoolhouses are conveniently located.

The climate of Alleghany County is temperate and healthful. Extremes of heat and cold occur only at rare intervals. The precipitation is ample and well distributed throughout the year.

The raising of live stock constitutes the chief interest of the county. The principal crops grown are hay, corn, buckwheat, rye, wheat, and oats.

The soils of the county are derived from gneiss, and other igneous and metamorphic rocks, the relation between the soils and the associated geological formations being very close. Six soil types and, in addition, Rock outcrop and Rough stony land are shown on the map. The upland soils belong in the Ashe, Chandler, Porters, and Talladega series, and the alluvial, first-bottom soils in the Toxaway series.

The Ashe very coarse sandy loam occurs in one small area in the southeastern part of the county. It is used for general farming.

The Ashe loam is the most extensive type mapped. It is an excellent soil for the general farming crops, where the surface features are such that it can be farmed economically. The pastures on this soil are lasting.

The Chandler loam is the least productive of the upland soils for general farming, but it is an excellent type, where the surface is smooth, for light farming and truck and fruit growing, and when economic factors have become more favorable can be developed along special lines.

The Porters loam is generally considered the strongest soil in the county for the general farming crops. About three-fourths of the type is used for agriculture.

The Talladega loam is very similar to the Chandler loam in agricultural value, but it is slightly more productive for grass and wheat.

The Toxaway loam constitutes the principal hay land of the county. This soil is well adapted to grass and corn.

Rock outcrop and Rough stony land are miscellaneous types of practically no agricultural value.



[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved, March 14, 1904.

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

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