

Issued April 14, 1916.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief:
IN COOPERATION WITH THE WEST VIRGINIA GEOLOGICAL SURVEY,
I. C. WHITE, STATE GEOLOGIST.

SOIL SURVEY OF M'DOWELL AND WYOMING COUNTIES, WEST VIRGINIA.

BY
W. J. LATIMER.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

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



WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1916.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., August 15, 1913.

SIR: In continuation of the cooperative work in West Virginia a soil survey was made of Preston County during the field season of 1912. The selection of this area was determined upon after a conference with Dr. I. C. White, State geologist of the West Virginia Geological Survey, which office is cooperating with the bureau in a study of the soils of the State.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1912, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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MAP.

Soil map, McDowell and Wyoming Counties sheet, West Virginia.

SOIL SURVEY OF M'DOWELL AND WYOMING COUNTIES, WEST VIRGINIA.

By W. J. LATIMER.

DESCRIPTION OF THE AREA.

Wyoming and McDowell Counties are situated in the southern part of West Virginia. They are bounded on the north by Logan and Boone Counties, on the northeast by Raleigh County, on the southeast by Mercer County, on the south and southwest by the State of Virginia, and on the northwest by Mingo and Logan Counties. They embrace an area of 1,046 square miles, or 669,440 acres.

The counties lie within the Allegheny Plateau and consist of a region thoroughly dissected by a series of widely branching streams which reach every part of their area. The depth of dissection attains a maximum of more than 2,000 feet and locally is rarely less than 500 feet. The ridge tops, while narrow and uneven because of numerous low gaps caused by the erosion of adjacent ravine heads, form an even sky line, and the surface they represent lies at an elevation ranging from somewhat over 3,000 feet in the eastern part of the area to about 2,000 feet in the western part. The valleys are generally but little wider than the stream channels, though in places a width of half a mile is attained.

A few areas of flat upland surface, representing, apparently, insignificant remnants of an original smooth plateau surface, occur in the eastern part of the area. The largest one lies in the extreme northeast corner of McDowell County.

Wyoming County is drained by the Guyandot River and its tributaries, and McDowell County by Tug Fork of Big Sandy River and its tributaries. The line separating the two counties is located upon the ridge which forms the divide between these drainage systems.

The first settlements in the area were made within the first decade of the nineteenth century, mainly by hunters and trappers from Virginia and North Carolina. As new immigrants arrived, settlement gradually spread along the valleys and farming was engaged in. Wyoming County was formed from Logan County in 1850, and McDowell County from Tazewell County, Va., in 1858. Agriculture has never been extensively developed, and even at present

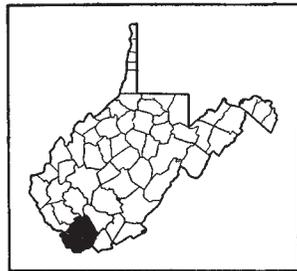


FIG. 1.—Sketch map showing location of the McDowell and Wyoming Counties area, West Virginia.

it is comparatively unimportant. Most of the country up to about 20 years ago was a wilderness with a scattered population. Lumbering was the first industry developed, logs being rafted down the streams in large numbers. This is still an important industry in Wyoming County.

According to the 1910 census, McDowell County has a population of 47,856 and Wyoming County 10,392, making a total of 58,248 for the area.

Welch, the county seat of McDowell County, has a population of 1,526, and is the center of the coal trade. Keystone, with 2,047 people, is the largest town in the area. Kimball and Iaeger are smaller towns on the Norfolk & Western Railway. Gary, Berwind, Maybeury, and West Vivian are mining towns. Pineville is the county seat of Wyoming County, and the largest town.

The development of the coal fields in the two counties began with the building of the railroads. In 1892 the Norfolk & Western was extended along Tug Fork of Big Sandy River and up Elkhorn Creek to Coaldale, Mercer County. The Dry Fork or Canebroke Branch, the Gary extension, the Coalwood extension, and the North Fork extension of this road were completed at later dates. These roads have helped to develop the largest and most productive coal fields in the State. In 1912 there were 15,809,289 tons of coal, valued at \$15,384,767, mined in McDowell County. The Virginian Railway extends through the eastern part of Wyoming County, and the coal fields along this line are being rapidly opened up. The Winding Gulf extension of this line from Mullens runs a short distance in the county before entering Raleigh County. A large part of Wyoming County, comprising the best agricultural section and a large area of good coal land, is still without railroad facilities.

The public-road system of the area is fairly good, considering the character of the topography. Along the main streams and some of the main ridges the roads are passable by wagons. Over much of the country trails or bridle paths are found. In McDowell County a considerable mileage of graded surface road has been completed and the work is being rapidly pushed by the county road department. Very few bridges are found in Wyoming County, but in McDowell County the main roads are quite well provided.

Norfolk, Richmond, Lynchburg, Roanoke, and Bluefield on the east; Huntington, Columbus, and Cincinnati on the west, and Charleston on the north are the principal markets for the produce of the area. The coal-field settlements furnish excellent local markets.

In Wyoming County wild turkey, quail, rabbit, and squirrel are plentiful, and the streams are well stocked with fish. In McDowell

County practically all the fish have been killed, owing to the pollution of the streams by the mines.

CLIMATE.

The climatic conditions are fairly uniform throughout both counties. The ridge tops in the eastern part of the area, owing to their elevation, have a slightly lower range of temperature than the valleys or even the uplands in the western part. The climate is comparatively mild throughout the year. The mean temperature for the winter months is 36° F., and the temperature rarely falls below zero. The average depth of snowfall for the year is 30 inches, and this is so distributed and moderating changes are so frequent that it remains upon the ground for but relatively short periods.

The summers, as a rule, are not oppressive. The mean temperature for the summer months is about 71° F. Periods of hot weather occur, but are of short duration. The nights are cool. The highest recorded temperature is 95° F., in July.

The average date of the last killing frost in spring is April 29 and of the earliest in fall, October 13. This indicates an average growing season of five and one-half months.

The date of the latest recorded killing frost in spring is May 28 and of the earliest in fall, September 14.

The average annual precipitation of 43.48 inches is well distributed throughout the growing season. About 26 inches of it falls during the spring and summer, when needed by the growing crops.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau station at Elkhorn, McDowell County:

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

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.....	37.5	68	- 6	3.16	2.50	8.97	5.4
January.....	36.2	70	-10	2.89	1.62	3.77	8.0
February.....	34.5	75	-12	3.23	1.00	1.16	7.6
Winter.....	36.1			9.28	5.12	13.90	21 0
March.....	47.1	83	3	4.48	2.45	3.96	4.4
April.....	52.9	87	19	3.49	5.50	5.89	1.6
May.....	63.0	91	32	4.65	7.07	7.89	Tr.
Spring.....	54.3			12.62	15.02	17.74	6.0

Normal monthly, seasonal, and annual temperature and precipitation at Elk-horn—Continued.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
June.....	68.5	94	38	5.12	1.95	10.82	0.0
July.....	72.4	95	42	5.12	2.79	3.48	0.0
August.....	71.3	94	46	3.62	1.52	5.98	0.0
Summer.....	70.7			13.86	6.26	20.28	0.0
September.....	66.5	94	33	2.61	2.50	2.04	0.0
October.....	55.4	84	22	2.33	0.61	0.90	0.2
November.....	46.0	77	9	2.78	4.18	1.27	2.9
Fall.....	56.0			7.72	7.29	4.21	3.1
Year.....	54.3	95	-12	43.48	33.69	56.13	30.1

AGRICULTURE.

Farming was begun in the relatively broad valleys of Wyoming County about 1840 and spread very rapidly to the adjacent lower slopes of the hill lands, which in many places were not too steep or rocky for the production of crops, and to the broad, flat-topped ridges in the eastern part of the county.

McDowell County, rougher in topography, containing less bottom land and fewer flat ridge tops, and being altogether less well adapted to farming, was slower to develop as an agricultural section. In 1892, with the building of the Norfolk & Western Railway and the beginning of the development of the coal fields, farming declined rapidly in this county. Most of the land is underlain by valuable coal beds and was quickly bought up by coal companies. The stream valleys, forming natural highways, were selected for farming in preference to the coal lands. When the farmers were forced from the valleys, the only remaining lands suitable for agriculture, consisting of the occasional flattish ridge tops, were occupied, the hill-sides, in general, being too steep and rocky for cultivation. The aggregate area of these ridge tops in the western half of McDowell County is very small, but in the eastern part it is more extensive. A few of these areas had been used for farming by some of the early settlers. Many of the farmers on these lands, as well as upon the few remaining patches of unoccupied bottom land, are profitably engaged in supplying the demand of the mining towns for truck crops and fruits. Only a few, however, grow these crops on a large scale.

General farming and stock raising are engaged in by a few farmers. Most of the stock, which consists of cattle, hogs, and a few sheep, is grazed upon the open range, where the wild vegetation affords some good pasturage. Small quantities of corn and hay are grown to feed stock during the winter. The farms devoted exclusively to general farming and stock raising are located at considerable distances from the mining towns.

In Wyoming County the conditions are different. The coal fields have not been extensively developed, and while large tracts of land are owned by the coal and lumber companies, most of the farms are still owned and operated by the native inhabitants. This is especially true of the bottom lands. Most of the farmers are engaged in general farming and stock raising. A large acreage is in pasture, and an open range affords good grazing during much of the year. The distance from markets prevents economical commercial trucking, except over a strip of country adjoining McDowell County and in the southeastern corner of the county. Some of the farmers along the Guyandot River and Clear Fork grow melons, potatoes, beans, and other vegetables in small quantities and haul them over the mountain roads to towns along the Norfolk & Western Railway. The roads are so rough and the distance is so great that this is barely profitable.

The following table, compiled from the census reports, gives a comparison of the acreage and production of the principal crops grown in Wyoming and McDowell Counties in 1889 and 1909:

Acreage and production of principal crops grown in Wyoming and McDowell Counties in 1889 and 1909.

Crop.	Wyoming County.				McDowell County.			
	1889		1909		1889		1909	
	<i>Acres.</i>	<i>Bushels.</i>	<i>Acres.</i>	<i>Bushels.</i>	<i>Acres.</i>	<i>Bushels.</i>	<i>Acres.</i>	<i>Bushels.</i>
Corn.....	8,737	135,320	11,832	195,698	5,257	80,576	5,555	90,871
Oats.....	2,883	25,161	1,333	11,937	1,704	14,185	750	7,042
Irish potatoes.....	249	16,348	792	58,397	199	10,067	518	34,519
Sweet potatoes.....	111	9,703	154	13,572	35	2,573	67	5,627
Vegetables.....			941				1,129	
		<i>Tons.</i>		<i>Tons.</i>		<i>Tons.</i>		<i>Tons.</i>
Hay.....	1,721	1,289	3,719	3,268	440	435	929	989

From this table it will be seen that McDowell County has made very little progress in general farming since the census of 1890, which was taken before the coal operations were begun, but has advanced in truck farming, while Wyoming County shows a general increase in agricultural activities.

Some wheat was formerly grown in these counties, but the production of this crop was practically discontinued about 20 years ago,

with the building of the railroads. After this, flour was shipped in from the West and the acreage of wheat in the area decreased from 1,308 acres in 1899 to only 17 acres in 1909. Oats are not grown so extensively now as formerly. Buckwheat made a decided decrease in McDowell County from 1879 to 1889 and has not been grown to any appreciable extent since then. In 1909 only 6 acres were sown, producing 98 bushels. In Wyoming County 192 acres were sown in 1879, producing 1,285 bushels, and 149 acres in 1909, producing 1,697 bushels. The crop is confined to the ridge-top land in the eastern part of the county, where the climatic conditions are very favorable to its growth.

Corn has always been grown on an acreage slightly larger than that occupied by all the other cultivated crops. The yields on the uplands are usually small, ranging from 10 to 15 bushels per acre in dry seasons and from 20 to 25 bushels in good seasons. On the bottom lands the yields are much higher, averaging about 40 to 50 bushels per acre. Corn is planted on the uplands in rows running with the contours. Cowpeas are sometimes planted in corn fields at the last working, but this is not a common practice. The recognized varieties in common use are Reids Yellow Dent, Boone County White, and Hickory King. By far the greater part of the corn is yellow and white dent of no special variety but known merely as mountain corn. Yellow and white flint varieties are grown for sale in the mining towns as green or "sweet" corn for table use.

Sorghum is grown in nearly all sections of the area, usually in fields containing not more than 1 or 2 acres. Most of it is planted on alluvial terrace land. A fair grade of sirup is made. Many farmers make only enough sirup for their own needs, while some manufacture it to sell at the mining towns, where good prices are obtained. Sorghum cane is used very little for forage. In 1909, 352 acres were devoted to sorghum in Wyoming County and 125 acres in McDowell County, producing 1,393 and 413 tons, respectively.

On most of the soils in the area grasses do not thrive. Bluegrass does not come in naturally in sufficient growth to form a lasting sod, although good sod can be obtained by seeding. Where the sod gives out in the course of 5 or 6 years it is best to reestablish it by using the land for cultivated crops before reseeding. Lime or manure is beneficial. About 1 ton per acre of burned lime or twice this amount of crushed limestone is applied to washed spots to establish grass.

Timothy is sowed most extensively for hay, and the ordinary yield is about four-fifths ton per acre. In 1909, 1,900 acres were sowed to timothy in Wyoming County and 421 acres in McDowell

County. Clover is sowed alone to a very small extent, but the production is increasing. The area sowed to clover and timothy mixed for hay is over half as large as that sowed to timothy alone and seems to be increasing. The ordinary yield is slightly less than 1 ton per acre. Millet is sowed for hay when there is a shortage in the other hay crops, as it can be sowed after the hay harvest, or at least when the yield can be estimated with a fair degree of accuracy.

Cowpeas are grown to some extent for hay and usually are harvested with the volunteer crop of crab grass. This combination makes good hay and the yield is heavy. Wild grass is cut for hay on "glade" land and other stream bottoms. This grass does not make a very good quality of hay in ordinary seasons, but in dry seasons, when its growth is not so rank, the quality is much better, and it makes a fair substitute for timothy and redbtop, of which there is usually a shortage in dry weather. Very little forage or grain is used for hay. Lespedeza grows luxuriantly in abandoned fields where the soil is not too sandy or the drainage too poor, and gives some pasturage.

Tobacco is grown to a small extent for home consumption and small yields are obtained. This probably could be made a paying crop on the small farms, as it is grown successfully upon the same soil types in other parts of West Virginia at elevations nearly the same as in this area.

Irish potatoes are grown for the local markets by nearly all the farmers in the area, but are not produced on an extensive commercial scale. They could be made one of the best paying farm crops in this section, as the climatic conditions and soils are favorable to the development of a good tuber and to the production of heavy yields. Commercial fertilizers are used by those who grow potatoes for market, usually at the rate of about 400 to 600 pounds of an 8-5-5¹ or 8-5-7 fertilizer per acre.

Sweet potatoes are grown to a small extent upon the sandy bottom land. The yields are fair, but the potatoes are not of the best quality.

The vegetables grown most extensively for local markets are beans, peas, cabbage, turnips, beets, tomatoes, onions, parsnips, kale, carrots, spinach, radishes, squash, and cucumbers. The better truckers usually produce more than one crop on the same field during a season. An early truck crop may be succeeded by corn or after a late crop a volunteer growth of crab grass may be allowed to take possession of the field to be cut for hay. This practice is followed upon the sandy bottom lands.

Strawberries and raspberries are grown to a small extent for the local markets. Brier berries and huckleberries are found in abundance growing wild.

¹ Stated in the order, phosphoric acid, nitrogen, potash.

There are very few commercial apple orchards, but nearly every farm has a small orchard, mainly of summer varieties. As a rule, little care is given it and the fruit is of poor quality and brings a low price. Where the orchards are properly cared for the returns are good. The principal varieties of apples grown are the Rome Beauty, Grimes Golden, York Imperial, Ben Davis, Yellow Transparent, Fallawater, and Maiden Blush. A few other, less popular varieties are grown, most of them summer apples. In 1909, according to the census, there were 47,852 apple trees in Wyoming County, which produced 115,357 bushels of fruit, and 20,550 trees in McDowell County, producing 19,693 bushels.

Peach orchards are rare, and contain only a few trees, generally seedlings. In 1909 there were 8,851 trees in Wyoming County and 4,356 in McDowell County. Pears, plums, and grapes are not grown on a commercial scale, and hardly in sufficient quantity to meet the home demand.

No cultivated nut groves were seen, but in the forests there are many yielding chestnut, chinquapin, walnut, and hickory trees.

A large number of persons devote all or a part of their time to gathering wild medicinal herbs and roots, such as ginseng, golden seal (yellow root), black snakeroot, bloodroot, wild ginger, spike-nard, and May apple. Ginseng brings a good price and is the most sought for, but is very scarce.

There are more beef cattle raised in the area than any other stock. Most of these are Shorthorn grades and scrub stock, the latter predominating in the rougher sections. The Shorthorn was introduced about 15 years ago near Oceana in Wyoming County, and was the first improved strain of cattle to be introduced. It has gradually spread over the area, until now many of the cattlemen have purebred or good grade bulls. Herefords were introduced near Pineville, Wyoming County, about 5 years ago.

The sheep raised are used for mutton, and are mainly scrub stock, little attention being paid to breeding.

Nearly all the farmers have hogs, most of which run wild on the range. The Poland China and Berkshire were introduced some years ago, but only a few of the best farmers who keep hogs in fenced fields make any effort to keep breeds up to the standard. Many farmers keep purebred boars and breed to grade or native-stock sows. The Poland China crossed with the native mountain hog produces a type that is a good ranger and can be fattened when confined.

Very little attention is given to breeding horses or mules, not enough being raised to supply the local farms, and large numbers are imported for use in the lumbering and mining industries.

There are a few small dairies in McDowell County which supply milk to mining towns. Many miners also keep their own cows, which are allowed to graze upon the open range or upon the land of the coal companies. In Wyoming County the number of milch cows reported by the 1910 census is 2,976, or an average of 3 cows per farm. There are no large dairies in the county, and nearly all the farmers own cows. Most of the milch cows are Jersey or grade Jersey, Shorthorn or Holstein.

The following table gives the numbers of the principal domestic animals in the counties as reported by the 1910 census:

Stock.	Wyoming County.	McDowell County.	Stock.	Wyoming County.	McDowell County.
Dairy cows.....	3,066	1,765	Horses.....	1,139	597
Calves.....	839	488	Mules.....	425	308
Yearlings.....	1,762	766	Swine.....	7,792	3,431
Other cattle.....	1,871	797	Sheep.....	7,398	3,163

Poultry is kept in small numbers on practically every farm. Little attention is paid to breeds.

Bees are kept by a few farmers. The number of hives is usually small, and they are not carefully managed. In many sections bee trees are still depended upon to furnish honey.

Little attention is paid to the adaptation of the various soils to particular crops. A considerable part of the corn crop is grown on soil that produces, under prevailing practices, not more than 10 bushels per acre, and that would give much better returns if put in grass and grazed. Heavier yields of corn are produced upon bottom land, but the acreage of upland in this crop is probably greater. Leguminous crops are not generally grown, although, with the exception of the "glade" land, which represents a small percentage of the total tillable land, Rough stony land excluded, cowpeas, soy beans, and vetch do well on all the soil types in the area. Sweet potatoes thrive on the sandy bottom land and could be grown more extensively both for market and for fattening hogs. Peanuts also do well on the sandy bottom land. They could be grown to advantage as a field forage crop for hogs. The ridge soils are well suited to Irish potatoes and good yields can be obtained by using, in moderately heavy applications, good grades of commercial fertilizer. Although there is a large area of good fruit land, fruit growing has not been developed as an important industry.

Most of the soils of the area are in need of lime. The "glade" land is decidedly acid. Owing to the nearness of the limestone val-

leys of Virginia, lime is within easy reach of the farmers of this area.

In 1910 only 56 farms in Wyoming County and 28 in McDowell County reported the use of fertilizers, with a total expenditure of \$685 and \$592, respectively. Their use is confined mainly to trucking. Since the 1910 census was taken the use of fertilizers has increased somewhat. Manure hauled from the mine stables is used by some farmers. The best farmers turn under grass sod occasionally as a means of maintaining productiveness. Some allow old grass land to grow up in weeds and shrubs and clear new land, and this continual use of virgin land assures good yields. The present conditions, with large areas of virgin land, favor this practice, but some substantial method of building up and maintaining the productiveness must be resorted to eventually. By practicing good crop rotations, especially those including the legumes at frequent intervals, and by maintaining a good supply of organic matter in the soil, relatively good yields can be obtained.

No special form of rotation is practiced. Corn is sometimes followed by grass or grass may be turned under and the land sowed to wheat and grass, but even this is done with no definite system. Some farmers grow one crop year after year in the same field. A rotation which has proved successful in other counties of West Virginia under similar soil and climatic conditions is: (1) corn, (2) oats followed by cowpeas, (3) wheat, timothy, and clover, (4) hay, (5) hay, (6) buckwheat. If pasture is desired, bluegrass may be sowed with wheat, following buckwheat.

The farm machinery in use, even upon the best farms, is not of the latest and most improved type. Very little labor-saving machinery is used. The rough topography and the stony character of large areas of land are largely responsible for the lack of modern implements. Most of the planting is done with single-draft plows, and cultivation with the hoe and light plows. Mowers are in use on some of the valley farms. Cultivators, sulky plows, corn harvesters, improved hay rakes, hay loaders, and manure spreaders are used to a very small extent, only a few being found in each section. The spring-tooth harrow is in common use on the stony farms.

Farm labor is scarce, owing to the great demand for labor and the higher wages paid in other industries, and most of the work is done by the farmers and their families. The coal miners are paid by the ton and earn \$4 or \$5 a day, while other laborers around mines, lumber camps, and public works receive from \$1.50 to \$2 a day.

The table below gives the relative percentage of farms operated by owners and tenants in Wyoming and McDowell Counties at the last 4 censuses, showing the steady passing of the management from

owners to tenants. The percentage of farms reported operated by managers is negligible.

Percentage of farms operated by owners and tenants in census years, 1880-1910.

Census year.	McDowell County.		Wyoming County.	
	Owners.	Tenants.	Owners.	Tenants.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
1910.....	42.4	57.5	52.1	47.1
1900.....	52.9	46.3	69.6	30.2
1890.....	66.78	33.22	72.74	27.26
1880.....	81.8	18.2	91.3	8.7

In McDowell County tenants operate only a little over half the entire number of farms and about half the entire acreage of improved land in the county, but they occupy three-fourths of all land in farms, and tenant farms have a value five times that of the farms operated by owners. In Wyoming County owners operate in the aggregate only a little more acreage than tenants, but have twice as much improved land. Practically all the tenants are native whites. Much of the land that is tenanted is leased from coal companies for one or more years, the terms of lease varying considerably. The usual rental is \$1 per acre a year. Some land is rented on a share basis, the usual arrangement being for the owner to furnish the land and receive one-half the crops produced.

According to the census there were 1,462 farms in Wyoming County in 1910, of an average size of 108.5 acres, representing 49.4 per cent of the total land area of the county, while in McDowell County there were 880 farms, averaging 146.3 acres in size and embracing only 37.8 per cent of the entire land area.

The average value of farm land in Wyoming County as reported in 1910 is \$29.78 and in McDowell County \$33.42 per acre, as against \$6.72 and \$8.40 per acre, respectively, reported in 1900. Land values in general show a wide variation. Hillside land remote from towns and industrial centers is valued at \$1 to \$5 an acre, and hilltop land at \$5 to \$30, depending upon the topography. Exceptionally good farming land and land located near towns is much more valuable. Bottom land along the larger streams, exclusive of town sites and rights of way, is valued at about \$50 to \$75 an acre. Where rights of way, town sites, or industrial purposes are involved it is held for as much as \$500 an acre.

SOILS.

Twelve distinct soil types are mapped in Wyoming and McDowell Counties, including seven upland, or residual, types; two terrace, or old alluvial, soils; and three first-bottom, or recent alluvial, soils. These are grouped into series, the members of each series resembling one another in color, origin, and general characteristics, but differing in texture.

The upland soils are derived from sandstone and shale formations of the lower Pottsville.¹

The highest hills along the northwestern border of Wyoming County are capped by the Charleston sandstone, which supports a few small, flat-topped ridges, occupied by residue from formations which at one time existed above this horizon. This residue gives rise to the Dekalb loam. The rocks outcropping in the area dip to the northwest, bringing to the surface successively a series of alternate gray shale and sandstone strata, which outcrop over about 90 per cent of the entire upland of the area. Upon the steep slopes these formations give rise to the Dekalb stony silt loam, the predominant soil type of the area. On the gentler slopes and the more rounded hills and ridge tops, where erosion has been less active and weathering has taken place to a considerable depth, the Dekalb silt loam is developed. This type is found in large areas in Wyoming County to the northeast of Bartley and along the ridge tops in the eastern part of the county. In McDowell County it is found upon the flattened ridge tops in nearly all sections, but occurs in slightly larger areas in the eastern half of the county. Where gray and yellow shale is exposed, not influenced by other formations, the Dekalb silty clay loam is the resultant soil type. This type is encountered in small areas scattered along the eastern border of the area. Where fine-grained gray sandstone strata weather, the Dekalb fine sandy loam is found. This soil occurs in small areas upon the ridge tops in the southeastern part of Wyoming County, extending over a short distance into McDowell County, the largest area being found upon Bear-town Ridge.

In the valleys of the southeastern part of McDowell County the Mauch Chunk shale, a red to Indian-red shale formation, interbedded with thin strata of gray shale, impure limestones, and fine-grained sandstone, gives rise to the Upshur stony clay loam. Weathering has not taken place to a great depth, as is usually the case with the Upshur soils, and sandstone fragments are numerous.

The hard, massive sandstone strata outcropping in the area play an important part in the distribution of the soils, other than those

¹ See U. S. Geol. Surv., Pocahontas and Tazewell folios, and W. Va. Geol. Surv. (county reports), Wyoming-McDowell Counties.

directly derived from them. A resistant sandstone stratum known as the Lower Gilbert sandstone supports the bed of a wide valley along Clear Fork of Guyandot River from Sun Hill to above Oceana. This valley is one of the most prominent topographic features of the area. A thick, resistant sandstone supports the flat-topped ridges in the eastern part of the area, reaching its maximum development upon Flat Top Mountain, where it is over a mile wide. Here only a residue of the overlying formation is left, giving rise to the Dekalb loam. Along the outcrop of this sandstone the greater part of the Dekalb stony loam, a type of small extent included with the stony silt loam, is found. The steep slopes formed by the cliffs of the rock are occupied by this soil type.

The Rough stony land in this survey occurs along the steep slopes to streams.

The terraces, or second-bottom land, and the first-bottom, or overflow land, are alluvial in origin and are derived from the same character of material. The formations upon which the drainage basins lie consist almost entirely of alternate strata of gray shale and sandstone, the red shale outcropping in such small areas as to be almost negligible in its influence upon the bottom soils. The difference in texture and distribution seems to be due more to the condition of deposit than to the character of the material from which each individual soil type is derived, the fine sandy loam being laid down by a more rapidly moving current than the silt loam.

The terrace soils differ from the first-bottom soils in that they represent the old flood plains of the streams when they flowed at a higher level, while the first bottoms represents the present overflow land. The terrace soils are represented by the Holston fine sandy loam and silt loam. The former is found scattered along all the larger streams of the area, while the silt loam is most prominently developed along Clear Fork of the Guyandot River and only in a few widely scattered areas along other streams.

The bottom-land soils are the Huntington fine sandy loam and silt loam, and the Holly silt loam. The Huntington fine sandy loam is the most widely distributed, occurring in the first, or overflow, bottoms along nearly all the streams in the area. The silt loam occurs only in a few places along Clear Fork of the Guyandot River and its tributaries. The Holly silt loam is found in the "glades" scattered over the eastern two-thirds of Wyoming County, where the streams have cut to a temporary base level. The streams are sluggish, and drainage is poorly established. Accumulation of vegetable matter and deoxidation have played an important part in establishing the character of the soil.

The following table shows the origin of the various soil types:

Origin of various soil types.

Group.	Origin.	Soil type.
Upland, or residual, soils.....	Sandstone.....	Dekalb fine sandy loam.
	Sandstone and gray shale, sandstone predominating.	Dekalb stony silt loam.
	Sandstone and shale.....	Dekalb loam.
	Gray shale.....	Dekalb silty clay loam.
	Sandstone and shale, shale predominating..	Dekalb silt loam.
	Indian-red shale and sandstone.....	Upshur stony clay loam.
Terrace, or old alluvial, soils.	Chiefly sandstone.....	Rough stony land.
	Wash from upland soils derived chiefly from shale.	Holston silt loam.
	Wash from upland soils derived chiefly from sandstone.	Holston fine sandy loam.
	Wash from upland soils derived chiefly from sandstone.	Huntington fine sandy loam.
First-bottom, or recent alluvial, soils.	Wash from upland soils derived chiefly from shale.	Huntington silt loam.
do.....	Holly silt loam.

The following table gives the names and the actual and relative extent of the various soil types mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Dekalb stony silt loam.....	482,816	72.1	Holly silt loam.....	2,432	0.4
Dekalb silt loam.....	108,160	16.2	Dekalb fine sandy loam.....	2,176	.3
Huntington fine sandy loam..	28,288	4.2	Huntington silt loam.....	1,472	.2
Rough stony land.....	26,368	3.9	Holston silt loam.....	1,344	.2
Upshur stony clay loam.....	6,336	1.0	Dekalb loam.....	832	.1
Holston fine sandy loam.....	4,608	.7	Total.....	669,440
Dekalb silty clay loam.....	4,608	.7			

DEKALB SERIES.

The Dekalb series includes types having gray to brown surface soils and yellow to yellowish-brown subsoils. They are derived from the weathering in place of gray sandstone and gray and yellow shales and argillaceous sandstone of Silurian to Carboniferous age. The soils are found scattered over the Appalachian Uplift and have a surface relief varying from gently rolling table-land to hills and mountains.

DEKALB FINE SANDY LOAM.

The soil of the Dekalb fine sandy loam is a grayish-brown loose fine sandy loam in the surface few inches, grading quickly into yellowish-brown fine sandy loam. This passes at about 8 or 10 inches into a yellow heavy fine sandy loam which is slightly compact and friable.

This type is developed in scattered spots in the eastern part of the area. The topography is almost level to gently rolling, affording ample drainage. Owing to the porous nature of the subsoil and underlying material, the type has a low water-holding capacity and crops sometimes suffer for lack of moisture in dry weather.

The native forest growth is mainly chestnut, chestnut oak and other oaks, poplar, and pine. Some of the larger areas of this type are cleared and cultivated. The principal crops grown are corn, oats, rye, buckwheat, and potatoes and other vegetables. Corn, oats, and vegetables form the bulk of the crops produced. Very little of the type is in sod, bluegrass not holding very well, even where seeded. Some of the type is in forage, consisting mainly of millet and cow-peas. Corn yields about 20 to 40 bushels, oats 20 to 30 bushels, wheat 10 to 12 bushels, Irish potatoes 100 to 200 bushels, sweet potatoes 100 to 250 bushels, and hay about 1 ton per acre. Practically all the fruits grown in this section of the United States can be produced successfully on this land, and the topography is suitable for orchards. Brier berries and strawberries thrive. The soil is well adapted to light and early truck crops, as plants mature earlier than upon adjoining heavier land. Manure is hauled from the mine stables for use on vegetables. In addition, some high-grade fertilizer could be used to advantage.

Clover does not do well, but such legumes as cowpeas and vetch thrive. These legumes, the former sowed with corn and the latter with rye, make good hay and help to build up the land. Where this type is so located that the hauling of manure is impracticable the growing of legumes can be resorted to to help maintain the productivity and increase the moisture-holding capacity of the soil. The soil is easily worked, requiring only light draft power and light implements.

This land is valued for agricultural purposes at about \$25 to \$50 an acre.

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

Mechanical analyses of Dekalb fine sandy loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
221503	2 miles south of Herndon.	Fine sandy loam, 0 to 6 inches.	0.0	0.6	0.6	36.2	18.6	32.0	11.9
221504	Subsoil of 221503 . . .	Heavy fine sandy loam, 6 to 36 inches.	.0	.2	.6	32.7	18.7	30.7	16.8

DEKALB STONY SILT LOAM.

The Dekalb stony silt loam, where typically developed, is a gray or grayish-brown friable silt loam. This grades at 6 to 8 inches into a subsoil of yellowish heavy silt loam to silty clay loam, slightly compact and friable. The rock material consists of fragments of sandstone and shale in varying quantities. In places there is only a scattering of these over the surface, but typically they are thickly strewn over the surface and disseminated throughout the soil section. The parent rock is usually encountered within the 3-foot section. Small areas of Dekalb sandy loam, fine sandy loam, and loam, and of Rough stony land are included with the type as mapped. In the extreme eastern part of the county, on Barkers Ridge north of Barkers Creek, there are a few strips of Dekalb stony loam extensions of areas in Raleigh County, but the total area is so small that it was not considered necessary to map the stony loam type in the McDowell-Wyoming area.

The Dekalb stony silt loam is the most extensive soil in the area. It covers a large part of the upland. It is found in all parts of the area, but is less extensive in the east-central part, where the hilltops are comparatively broad and flat and mainly occupied by the Dekalb silt loam type. Over the western half of the area it covers almost the entire upland. The topography is predominantly steep and broken. Where the steeper slopes are cleared and cultivated erosion becomes very active.

The forest growth is heavy, consisting of chestnut, chestnut oak, and other oaks, poplar, pine, and walnut. Large areas are still in their original forest, but most of the type has been cut over.

Much of the land affords fair grazing, but sod land begins to wash after a few years when the grass ceases to grow and the roots that hold the soil in place begin to decay. The steeper areas are most profitably left in forest and used as an open range, the underbrush being first cleared out to give the native grasses a chance to grow.

A very small acreage of the type is under cultivation. Corn is the principal crop, yielding about 10 to 40 bushels per acre, according to local topography and to soil treatment. Such crops as wheat, buckwheat, oats, and hay are not grown to any important extent, for the reason that the surface is too steep for the use of mowing machines, harvesters, and similar implements. Only upon the smooth areas as found on benches and in coves could orcharding be successfully carried on. There are many small orchards that produce an excellent quality of fruit, but only a few may be classed as commercial orchards. Brier berries grow wild in abundance. They undoubtedly could be very successfully grown under cultivation. Vegetables, consisting principally of cabbage, beans, beets, sweet corn, and turnips,

are grown in gardens, and in some small patches for sale at local markets. Tobacco is grown in small patches for home use. This soil is used for growing Burley tobacco in other counties in West Virginia, producing a leaf of excellent quality.

The type is best utilized for grazing cattle, sheep, and hogs.

The present value of land of this type, without timber or coal, ranges from about \$5 to \$20 an acre.

DEKALB LOAM.

The soil of the Dekalb loam varies considerably in depth in different localities. In the northern part of the area it is about 12 to 14 inches deep, and in the eastern part about 8 to 10 inches. It consists of a brown to yellowish-brown mellow loam. The subsoil is a yellowish-brown to yellow, friable silt loam, grading into compact silty clay loam near the bottom of the 3-foot section. In places both soil and subsoil contain small fragments of partly decomposed sandstone and shale.

This type occurs on flattish ridge tops with nearly level to undulating topography. The drainage in general is good, but spots occur where water collects in small depressions, or "bear wallows," as they are locally known. The type is found in small areas, the largest being that on Flattop Mountain, above Crumpler. Other areas are scattered along the top of the ridge dividing Wyoming County from Boone and Logan Counties.

The original forest growth consists of oak, hickory, chestnut, and pine. Most of the land is cleared and under cultivation.

The crops grown are corn, oats, hay (timothy, millet, clover, and cowpea), and vegetables, including potatoes, cabbage, beans, beets, and turnips. The soil is mainly used for growing truck crops, of which good yields are obtained. Very little manure or fertilizer is used, owing to the elevation of the type, which makes hauling difficult. Apples do exceptionally well, but few orchards, even for home use, are found. Peaches, plums, and cherries do fairly well. Small fruits, brier berries, and strawberries would succeed and might prove to be paying crops. Tobacco is successfully grown for market on this type in other parts of the State. It is grown in small patches in this area and does well. The type affords good grazing and some of it is used for pasture. Hay yields about 1 ton to 1½ tons per acre and corn about 30 to 45 bushels. Vegetables make exceptionally good yields where stable manure or commercial fertilizer is used or cover crops turned under. The soil is also benefited by the use of small quantities of lime. This type has a slightly higher value than most of the other upland types.

Results of mechanical analyses of samples of the soil and subsoil of the Dekalb loam are given below:

Mechanical analyses of Dekalb loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
221505	1 mile east of Crumpler.	Loam, 0 to 8 inches.....	0.1	0.6	1.6	33.6	4.8	39.4	19.9
221506	Subsoil of 221505....	Loam, 0 to 36 inches.....	.0	.4	1.8	33.6	5.1	37.4	21.5

DEKALB SILTY CLAY LOAM.

The Dekalb silty clay loam consists of a grayish silt loam which quickly passes into yellowish, slightly compact silty clay loam, underlain at about 6 to 10 inches by a yellow, moderately friable silty clay loam.

The type is inextensive, occurring on ridge tops along the eastern boundary of the area. The topography is level to gently rolling. The drainage in general is good, but flat spots are found where the underdrainage is imperfect. If the soil is plowed or cultivated when in a soggy condition, clodding results.

Most of the land is cleared and either in pasture or cultivated crops. Corn, wheat, oats, buckwheat, hay (timothy, clover, and cowpea), and potatoes and other vegetables are grown. Corn yields about 20 to 40 bushels, buckwheat 15 to 20 bushels, oats 20 to 30 bushels, wheat 12 to 20 bushels, potatoes 100 to 200 bushels, and hay 1 ton to 1½ tons per acre. Vegetables are grown in large quantities for market and give good returns. Beans, cabbage, turnips, and beets do exceptionally well. Fruits, especially apples, succeed. The apples are grown in small orchards and are of good color and quality. Brier berries and strawberries bring good returns. The former are found growing wild in abundance.

Stable manure is used by the best farmers to increase the productivity of the soil. Very little commercial fertilizer is used, even by truckers. Where a cover crop or sod is turned under, moderate applications of lime have been found beneficial. Where good farm practices are followed, good yields may be expected. Bluegrass comes in naturally and furnishes good pasturage. Grass does well, and clover also, where the soil is properly limed.

The natural forest growth includes oak, walnut, beech, poplar, hickory, chestnut, and pine, the heavier hardwood growth predominating.

This land, exclusive of mineral rights, is valued at about \$25 to \$50 an acre.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the Dekalb silty clay loam:

Mechanical analyses of Dekalb silty clay loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>				
221517	3 miles south of Maybeury.	Heavy silt loam, 0 to 8 inches.	0.6	1.1	1.0	5.9	12.1	56.7	22.1
221518	Subsoil of 221517....	Silty clay loam, 8 to 36 inches.	.7	.8	.8	4.3	8.4	54.1	30.7

DEKALB SILT LOAM.

The Dekalb silt loam consists of a grayish to yellowish-brown friable silt loam, which grades at a depth of about 6 to 10 inches into a yellowish-brown to yellow, friable silt loam to silty clay loam. The soil contains a few small, partially disintegrated fragments of the underlying sandstone and shale. The parent rock is encountered at a depth of 3 to 6 feet.

This type occurs upon the hilltops and ridges over the eastern half of the area, and in small strips in the western half. It is an extensive upland type. The topography is nearly level to rolling, and drainage is good. The soil is easily cultivated, requiring only comparatively light draft stock and equipment.

The Dekalb silt loam is not an exceptionally strong soil, but it is readily susceptible of improvement. The native forest growth, consisting of oak, poplar, chestnut, chestnut oak, and hickory, has been cleared from most of the type, and a large part of it is in cultivated crops, only a relatively small acreage being used for pasture. The principal crops grown are corn, oats, wheat, buckwheat, hay (timothy, redtop, clover, cowpea, and millet), sorghum, and vegetables, including Irish and sweet potatoes. It is upon this soil that most of the truck sold in the mining towns is grown. Practically all the vegetables grown in this section are produced more or less successfully upon it. Cabbage, beans, turnips, beets, and sweet corn constitute the principal produce grown for market.

Fruits, especially apples, do well. Apple orchards are numerous, but very few of them are of commercial size. Small fruits thrive. Brier berries and strawberries are grown successfully on this soil in

other parts of the State, as is also Burley tobacco, which produces, with the aid of commercial fertilizer, good yields of an excellent grade of leaf. A larger acreage is devoted to corn than to any other cultivated crop. It yields from 20 to 40 bushels per acre, the average being about 25 bushels. Oats yield about 20 to 30 bushels per acre, wheat 10 to 12 bushels, buckwheat 12 to 18 bushels, potatoes 100 to 250 bushels, and hay about 1 ton.

A considerable acreage of this land is in grass. Bluegrass does not come in naturally on most of the land and even where seeded it does not grow luxuriantly. Weeds spread rapidly over the sod land.

Very little commercial fertilizer is applied. Stable manure hauled from the mine stables is used on this type in McDowell County. There seems to be sufficient stable manure available to meet the present needs, but with the constant production of heavy crops of vegetables, the use of commercial fertilizers probably will become necessary eventually.

Land of this type has a wide range in value. Farm land generally is worth from \$15 to \$40 an acre, while land lying close to towns or coal fields brings \$75 to \$100 an acre.

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

Mechanical analyses of Dekalb silt loam.

No.	Locality.	Description.	Fine gravel.		Medium sand.	Fine sand.	Very fine sand.		Silt.	Clay.
			P. ct.	P. ct.			P. ct.	P. ct.		
221519	3 miles east of Leckle.	Silt loam, 0 to 8 inches.....	0.9	4.1	6.2	14.2	11.5	47.8	14.9	
221520	Subsoil of 221519.....	Heavy silt loam, 8 to 36 inches.	.9	4.6	5.9	12.8	8.8	48.8	17.7	

UPSHUR SERIES.

The types of the Upshur series have grayish-brown to reddish-brown or Indian-red soils and red to Indian-red subsoils. They are derived from the weathering in place of red sandstone and red to Indian-red shales, frequently calcareous in nature. In this area some gray sandstone and shale are mingled with the soil material.

UPSHUR STONY CLAY LOAM.

The soil material of the Upshur stony clay loam is a dark-brown to reddish-brown clay loam to a depth of about 6 or 8 inches, where it grades into a subsoil of Indian-red clay loam to clay. Both soil and subsoil are friable when dry and plastic when wet. The lower part of the subsoil is very tenacious when wet. In places the surface soil contains a few scattered fragments of rock, while in others it is covered with fragments and boulders, sometimes approaching

the character of Rough stony land. The steeper slopes are usually most thickly strewn with rock. The rocks are largely derived from strata of Pottsville sandstone occurring on higher slopes, and their presence on this type is the result of slumping. The soil material is derived largely from the red shales of the upper Mauch Chunk shale formation.

This type occurs in the southern part of the area, where it occupies the lower slopes of the stream valleys. The parent Mauch Chunk shale is brought to the surface by the Dry Fork Anticline, and is found usually about 1 mile on either side of the axis, the distance varying with the depth that the streams have cut into the formation.

The topography is sloping to steep. Agriculturally this soil is not important, owing to its steep topography and large content of stones. A large part of it is in pasture. In the less stony areas and those where the rocks occur only upon the surface and can be removed the soil is easily cultivated. For efficient cultivation moderately heavy implements and tools are required.

Corn is the principal crop grown and good yields are usually obtained. Oats are grown to a small extent, but the topography is unfavorable to the growing of crops that are harvested by reaping. Wheat and buckwheat do fairly well, but harvesting is difficult. Fruit trees do not seem to thrive upon this soil. The location is unfavorable for commercial fruit production. Small fruits and brier fruits could be successfully grown. Nearly all vegetables common to this region are grown in gardens on this type, but not on a commercial scale.

This soil can best be utilized for stock raising. It supports a good bluegrass sod. Clover does well and where sowed with timothy produces good hay.

The natural forest growth consists largely of oak, hickory, poplar, and walnut. Most of the type is cleared and in pasture.

Mechanical analyses of samples of the soil and subsoil of the Upshur stony clay loam gave the following results:

Mechanical analyses of Upshur stony clay loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
221515	½ mile northwest of Squire Jim.	Clay loam, 0 to 6 inches.....	4.4	3.5	1.7	9.5	10.8	50.5	19.0
221516	Subsoil of 221515....	Clay loam, 6 to 36 inches....	3.6	4.6	2.1	9.0	8.5	51.1	20.4

HOLSTON SERIES.

The soils of the Holston series have yellowish-brown to brown surface soils and yellow subsoils. They occur on second bottoms or old

alluvial terraces. These soils consist principally of material washed from gray shales and sandstones, and in places residual material is encountered in the subsoil.

HOLSTON FINE SANDY LOAM.

The soil of the Holston fine sandy loam is a brownish, light fine sandy loam, which quickly becomes yellowish and is underlain at about 10 inches by yellowish compact fine sandy loam. The structure is mellow where there is a good supply of organic matter and loose where this is lacking. The type occurs on stream terraces standing above overflow. The material has been washed largely from the Dekalb soils. The surface is nearly level. Drainage is good.

The natural forest growth consists of sycamore, beech, birch, elm, and willow. In Wyoming County the greater part of this type is cleared and under cultivation. In McDowell County most of it is occupied by towns or coal fields, although there are a few highly developed truck gardens.

Corn, wheat, oats, rye, hay (timothy, redtop, millet, and cowpea), sorghum, Irish and sweet potatoes, and other vegetables, including beans, cabbage, onions, tomatoes, beets, turnips, sugar corn, squash, pumpkins, and melons, are grown for market to a small extent. Corn yields 30 to 40 bushels, oats 20 to 30 bushels, wheat 10 to 15 bushels, Irish potatoes 100 to 150 bushels, sweet potatoes 200 to 250 bushels, and hay 1 ton to 1½ tons per acre. The type is too low lying for commercial orchards, but not for home orchards.

The soil is easy to cultivate, requiring only light draft stock and light implements. It responds readily to the use of stable manure and the growing of legumes. Fertilizers are generally used in light applications. Where stable manure is available fertilizers are not needed.

Farm land of this type is valued at about \$75 to \$100 an acre.

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

Mechanical analyses of Holston fine sandy loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			Perct.	Perct.	Perct.	Perct.	Perct.	Perct.	Perct.
221501	1½ miles north of Mullens.	Fine sandy loam, 0 to 8 inches.	0.1	1.2	3.2	32.5	32.8	20.3	9.8
221502	Subsoil of 221501.....	Fine sandy loam, 8 to 36 inches.	.0	1.6	5.4	37.1	29.5	15.4	10.8

HOLSTON SILT LOAM.

The soil of the Holston silt loam is a brown, mellow silt loam, yellowish and more compact in the subsurface section. The subsoil,

beginning at about 10 or 12 inches, is a yellowish-brown to yellow, compact, heavy silt loam to silty clay loam.

The type occurs in scattered areas on stream terraces or second bottoms along the larger streams. The most extensive areas are those along Clear Fork of Guyandot River. The type lies above overflow at the present time.

The topography is characteristically nearly level, having just enough slope to give good surface drainage. The native forest growth consists of sycamore, elm, and beech. Practically all the type is cleared and in use for the production of hay and cultivated crops or for pasturage. One acre is sufficient to pasture one steer. From an agricultural standpoint the soil is one of the best in the area. The crops grown are corn, oats, wheat, hay (cowpea, timothy, and millet), sorghum, sweet and Irish potatoes, and other vegetables. Corn and hay are the principal crops, about one-half the cultivated acreage of the type being used for the former. Corn yields about 30 to 60 bushels, wheat 10 to 15 bushels, oats 20 to 30 bushels, hay 1 ton to 1½ tons, and potatoes 150 to 250 bushels per acre.

Vegetables are grown mainly for home use, but a few truckers haul produce over the mountain roads for sale at the mining towns. The soil could be advantageously utilized for trucking, as it produces good yields of nearly all the vegetables grown in this section, cabbage, onions, beans, tomatoes, beets, and turnips probably giving the best returns. A good grade of leaf tobacco is produced, but this crop is not grown for market. The type lies too low generally for fruit production, but there are home orchards, mainly of summer apples.

Fertilizers are not used, but some applications of stable manure are made. The indications are that fertilizers, particularly those of high phosphoric-acid content, could be used advantageously. Applications of 400 to 600 pounds of fertilizer per acre are made, with good results, for tobacco on the same soil in other parts of this general region, and 200 to 250 pounds for potatoes. That moderate additions of lime could probably be made to advantage is indicated by the poor results had in places with red clover. The incorporation of vegetable matter at occasional intervals has been found beneficial to this soil, as has also the growing of legumes.

This soil remains wet longer after rains than the lighter sandy soils. If plowed when too wet, undesirable clodding results.

HUNTINGTON SERIES.

The Huntington series includes light-brown to brown soils and yellow to light-brown subsoils. Frequently there is little change in color or character of material throughout the soil profile. These soils are developed in the Appalachian Mountain and Limestone Valleys regions, but in this area no limestone enters into their composition. They occur as first-bottom overflow land and represent the best drained land of the first bottoms.

HUNTINGTON FINE SANDY LOAM.

The soil of the Huntington fine sandy loam is a brown, mellow, light fine sandy loam averaging about 10 inches deep. The subsoil is slightly lighter colored than the soil and consists of yellowish-brown fine sandy loam.

The type occurs as first-bottom overflow land along nearly all the streams in the area. It represents wash from the uplands, largely from the Dekalb soils.

The surface is mainly level. The drainage is good over most of the type, but there are a few imperfectly drained swales in which the soil consists of Holly silt loam and Holly fine sandy loam, both occurring in areas too inextensive to be shown on the map.

The natural forest growth consists of sycamore, elm, beech, birch, and willow. The greater part of this type in Wyoming County is under cultivation, but in McDowell County by far the greater part of it is occupied by towns and coal mines and coal dumps, being used only to a small extent for agriculture. Corn, oats, sorghum, cowpeas, millet, melons, sweet and Irish potatoes, and other vegetables are grown. Corn, which covers a larger acreage than any other crop, occupying probably half the cultivated area, yields from 40 to 50 bushels per acre. Oats yield about 20 to 25 bushels per acre, but are grown to only a small extent. Hay yields 1 ton to 1½ tons and sweet potatoes 200 to 250 bushels per acre. Such legumes as cowpeas, vetch, and soy beans do well. Grass does fairly well, the good moisture conditions preventing injury to meadows by hot, dry weather.

The soil is easily cultivated and responds readily to applications of fertilizers and stable and green manures. Most of the type receives an occasional overflow which adds enriching sediments, but much of it is subject to overflow only every 3 or 4 years. Upon this part of the type it is necessary to add some organic matter or fertilizer, or both, to maintain crop yields.

Mechanical-analyses of samples of the soil and subsoil of the Huntington fine sandy loam gave the following results:

Mechanical analyses of Huntington fine sandy loam.

No.	Locality.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
221507	½ mile E. of Brier...	Fine sandy loam, 0 to 10 inches.	0.1	0.4	1.0	29.6	33.5	22.9	12.1
221508	Subsoil of 221507....	Fine sandy loam, 10 to 36 inches.	.0	.4	.8	28.9	33.9	23.3	12.7

HUNTINGTON SILT LOAM.

The soil of the Huntington silt loam to a depth of about 12 inches is a dark-brown mellow silt loam. This grades into yellowish-brown, heavy, slightly compact silt loam or silty clay loam. The surface soil of the type is fairly uniform throughout, but the subsoil has a lighter yellow color in some places than in others.

The soil occurs in the first bottoms of streams and is subject to overflow. The largest area lies along Clear Fork of Guyandot River and the tributaries of that stream. The material represents wash largely from the Dekalb soils, chiefly from the Dekalb stony silt loam.

The surface is generally level and the drainage is fair to good. Swales occur, usually along the foot of the uplands, where the soil is poorly drained and more nearly represents the Holly series. Such areas are too small to be mapped separately.

The natural forest growth consists mainly of sycamore, elm, beech, birch, and willow. Nearly all the type is cleared and is either under cultivation or in pasture. Probably half of it is in pasture and three-fourths of the remainder in corn. Corn yields about 40 to 80 bushels per acre. Such crops as wheat and oats are not grown, as they have a tendency to lodge. Sorghum is grown to some extent and gives very heavy yields, but the sirup is of somewhat poorer quality than that produced upon the Holston soils. Vegetables such as cabbage, onions, and tomatoes do well. Potatoes do not succeed except in the better drained places, where they yield 100 to 200 bushels per acre. Hay, consisting of timothy and redbud, yields 1 ton to 2 tons per acre. Clover and cowpeas do well, especially on the better drained portions of the type.

This is a productive soil, giving good yields without fertilization or manuring. The swales are in need of ditching. This land is valued at \$50 to \$75 an acre.

HOLLY SERIES.

The surface soils of the Holly series are gray, and the subsoils mottled gray, yellow, and brown. These soils occur in first bottoms and are subject to frequent overflow. The drainage is poor. The material is alluvial, being derived from sandstone, from the shales of the Appalachian Mountain region, and from the soils of the Limestone Valleys. In this area it is derived exclusively from gray shales and sandstone.

HOLLY SILT LOAM.

The Holly silt loam is a grayish silt loam, usually slightly mottled with yellow in the subsurface section and underlain at about 10 inches by mottled gray, drab, and yellow, compact heavy silt loam

passing into silty clay loam. The lower subsoil is a silty clay loam or silty clay. There are some included spots of Holly fine sandy loam too small, scattered, and unimportant to show on the map.

The type occurs on the first bottoms of streams. It is subject to overflow, and owing to its compact, impervious subsoil and level surface the drainage is poor. The material is derived largely from the Dekalb soils, the silt loam and stony silt loam predominating over its drainage basin. Some of the type occurs in flats near the headwaters of streams. The soil is locally known as "glade land" or "crawfish land." In its native condition it supports a thick undergrowth of alder, but after being under cultivation or pastured for some time the drainage ways frequently become clogged and bulrush spreads over the lower places. The natural forest growth consists of sycamore, elm, beech, birch, and willow.

This type furnishes excellent pasturage and produces good grass even in very dry seasons. Probably three-fourths of it is in pasture and about one-half the remainder used for mowing, leaving a small portion for cultivation. Of the cultivated crops, corn leads in acreage and yield, producing about 40 to 50 bushels per acre. Oats yield about 30 to 40 bushels. Sorghum gives good returns. Vegetables are grown in gardens, but are not produced for market to any important extent. The drainage is too poor for orchards to succeed. Alsike clover probably would do well.

Better drainage is the first requisite in improving this soil. The application of lime and the incorporation of organic matter are usually beneficial on gray, poorly drained soils of this kind. This land is valued at \$50 to \$75 an acre.

MISCELLANEOUS MATERIAL.

ROUGH STONY LAND.

The Rough stony land in this area is confined to the steep sides of the valleys along the larger streams, usually on the concave side of the stream bends. It comprises land that is so steep and stony as to be of little or no agricultural value. Very little of the type can be used even for grazing. It is best used for forestry. The native growth is largely oak, chestnut, hemlock, pine, and beech.

SUMMARY.

Wyoming and McDowell Counties are situated in the extreme southern part of West Virginia. They contain a total area of 1,046 square miles, or 669,440 acres.

The area lies wholly within the Appalachian Plateau. The surface is broken and mountainous, the area comprising a series of irregular ridges and deep, narrow valleys. A few flat-topped ridges are found along the eastern border of the area.

The early settlers came from Virginia and North Carolina during the first decade of the nineteenth century, settling in the larger valleys, and on the flat ridge tops of the eastern part of the area. It was not until about 1840 that attention was paid to agriculture. From that time until the opening of the coal fields about 20 years ago it increased in importance. With the extension of the coal operations interest in agriculture has declined, and at present it is of relatively little importance.

The area has direct railroad connection with a number of large cities, which furnish good markets for certain farm products. The local mining towns furnish excellent markets for vegetables, fruits, and dairy products. The two counties have a total population of about 58,000, according to the 1910 census.

The climate is mild and equable and well suited to agriculture. According to the records of the Weather Bureau station at Elkhorn, McDowell County, the mean temperature for the winter months is 36° F. and for the summer months 70° F. The mean annual precipitation is 43.48 inches and the snowfall 30 inches. The average growing season is 5½ months.

Up to the beginning of mining development the methods of agriculture in Wyoming and McDowell Counties were very similar. Stock raising was the principal industry. Cattle, sheep, and hogs were raised and driven to market. Enough corn, wheat, oats, and vegetables were grown to supply local demands. The industrial development in McDowell County brought about conditions which were not adapted to the present form of agriculture, but in Wyoming County the methods of agriculture are essentially the same as 20 years ago, although farming is more extensive. With the advent of the railroads the cultivation of wheat was discontinued, owing to the low price of western flour. Oat production increased, owing to the larger numbers of stock used in the lumbering and other industries. In McDowell County truck growing has taken the place of general farming, except in a few sections, and where general farming is still followed little advance in methods has been made within recent years. Very little commercial fertilizer is used in the area, but the truck farmers use considerable manure.

Corn is the leading crop, oats and hay being next in order. A considerable acreage is in pasture. Open ranges exist over the entire area and relatively large numbers of cattle are grazed upon them. The implements used by most farmers are not of the latest or most improved type. Labor-saving machinery can not be used very extensively, owing to the uneven topography and the stony character of the soil.

The soils of the area are derived from shales and sandstones of Carboniferous age. The upland soils are residual and their dis-

tribution is governed by the outcrop of the various kinds of rock, by erosion, and by degree of weathering. The bottom-land soils are of two classes, old alluvium, and bottom land subject to overflow at the present time. Their texture and distribution are largely determined by the current of the stream which made the deposits, and their classification is also dependent upon certain changes caused by erosion and by deoxidation.

Including Rough stony land, 12 soil types, representing 5 soil series, are mapped. The Dekalb and Upshur series and Rough stony land occupy the uplands, the Holston series the terraces, and the Huntington and Holly series the bottom lands of the area. The upland soils are derived from the underlying shales and sandstones, and the terrace and first-bottom soils have been formed by wash from the upland types.

The Dekalb fine sandy loam occupies relatively small areas. It is well suited to light truck crops. It being naturally a light soil, manure or commercial fertilizer is necessary for best results.

The Dekalb stony silt loam is the most widely distributed soil type in the area, covering probably 80 per cent of the upland. The topography is steep and broken and the type is of little agricultural value. Its best use is for forestry or pasture.

The Dekalb loam occurs in very small areas. It produces good yields of vegetables and fruits, as well as of the other general crops.

The Dekalb silty clay loam is inextensively developed. It is the strongest upland soil in the area, and is better suited to grass, wheat, and clover than the other soils.

The Dekalb silt loam occupies more gently sloping areas and ridge tops, and is fairly well suited to a wide range of crops.

The Upshur stony clay loam, where properly handled, produces fairly good yields of most of the crops grown in the area. Where seeded to bluegrass, it furnishes good grazing.

The Holston fine sandy loam, while not quite so productive as the silt loam type, responds readily to the use of fertilizers, and produces good yields of certain classes of crops, such as rye, cowpeas, vetch, millet, watermelons, and vegetables.

The Holston silt loam is a strong soil type, suited to nearly all the crops grown in this section.

The Huntington fine sandy loam is not quite so productive as the silt loam type, but is an excellent soil for cowpeas, melons, and vegetables.

The Huntington silt loam is a strong soil, producing good crops of corn, hay, and sorghum without the use of fertilizers.

The Holly silt loam is poorly drained and best suited to grass, though where properly drained and limed it produces good crops of corn, hay, and vegetables.

Rough stony land is developed to a comparatively small extent, and is of little agricultural value.

[PUBLIC RESOLUTION—No. 9.]

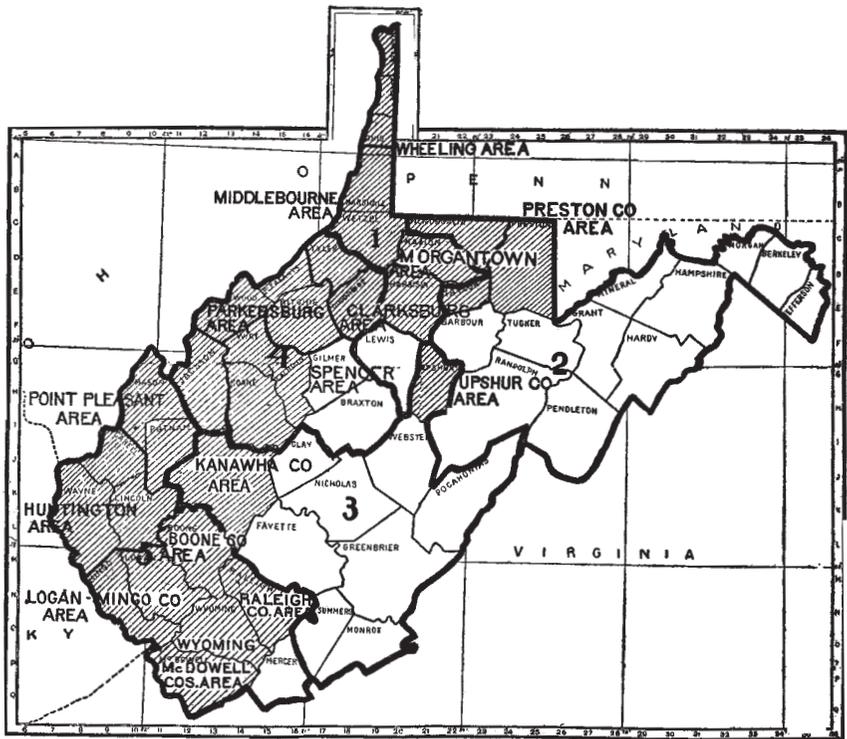
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

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.]



Areas surveyed in West Virginia.

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