

Issued November 4, 1914.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.
IN COOPERATION WITH THE UNIVERSITY OF MISSOURI AGRICULTURAL
EXPERIMENT STATION; F. B. MUMFORD, DIRECTOR.

SOIL SURVEY OF STODDARD COUNTY, MISSOURI.

BY

A. T. SWEET AND FLOYD S. BUCHER, OF THE U. S. DE-
PARTMENT OF AGRICULTURE, AND H. H. KRUSEKOPF, H. G.
LEWIS, J. E. DUNN, E. C. HALL, AND L. V. DAVIS,
OF THE UNIVERSITY OF MISSOURI.

HUGH H. BENNETT, INSPECTOR SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]



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WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 1, 1914.

SIR: During the field season of 1912 a soil survey was made of Stoddard County, Missouri. This work was done in cooperation with the Missouri Agricultural Experiment Station, F. B. Mumford, director, and the selection of this area was made after conference with State officials.

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

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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MAP.

Soil map, Stoddard County sheet, Missouri.

SOIL SURVEY OF STODDARD COUNTY, MISSOURI.

By A. T. SWEET and FLOYD S. BUCHER, of the U. S. Department of Agriculture, and H. H. KRUSEKOPF, H. G. LEWIS, J. E. DUNN, E. C. HALL, and L. V. DAVIS, of the University of Missouri.

DESCRIPTION OF THE AREA.

Stoddard County lies in the southeastern corner of Missouri. It is bounded on the north by Bollinger and Cape Girardeau Counties, on the east by Scott and New Madrid Counties, on the south by New Madrid and Dunklin Counties, and on the west by Butler, Wayne, and Bollinger Counties. The county has an area of 815 square miles,

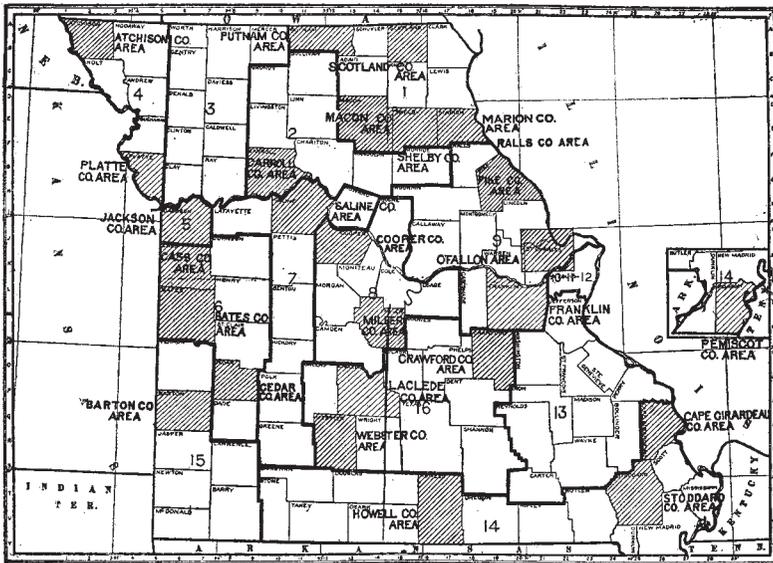


Fig. 1.—Sketch map showing areas surveyed in Missouri.

or 521,600 acres. It is wholly within the lowland region of southeastern Missouri. This lowland region begins a short distance below Cape Girardeau and extends south into Arkansas and Louisiana. Its general appearance and topography are those of a broad river flood plain. On the west this lowland is bordered by a sharp, steep bluff similar to the bluffs which in many places border the narrow flood plain of the Mississippi River north of Cape Girardeau. Perpendicular limestone ledges are common, and the bluff as a whole has a regular swing or curve from Cape Girardeau southwest, and south through Poplar Bluff, Butler County, and beyond the State line. The

distance from Poplar Bluff due east to the present course of the Mississippi is over 60 miles, and practically all this land is lowland or river flood plain.

Within this lowland there are two low sand ridges, the Sikeston Ridge, which begins near Morley, Scott County, and extends south to New Madrid, New Madrid County, and thence southwest to Portageville, New Madrid County, and the Dunklin County sand ridge, which begins near Bernie, in Stoddard County, and extends south to Kennett, and thence southwest beyond Senath, Dunklin County. There is also a high ridge or detached portion of the uplands which has been cut into two parts by a broad valley or lowland between Oran, Scott County, and Bell City, Stoddard County. The northern part of this ridge is called the Benton Ridge or Commerce Hills; the southern part is known as Crowleys Ridge. The small, high hills or "islands" between the ends of Benton Ridge and Crowleys Ridge are also parts of the old upland. On the southeast Benton Ridge and Crowleys Ridge terminate in a steep bluff somewhat similar to that which bounds the lowlands on the west, but not so high. The two ridges may be regarded as detached portions of a general ridge which has a uniform swing or trend from Commerce, Scott County, through Benton, Scott County, and Idalia and Dexter, Stoddard County, to the southwest.

From Cape Girardeau, Cape Girardeau County, southwest to the mouth of Mingo Creek the lowland belt bordered on one side by the main body of upland and on the other by Benton Ridge and Crowleys Ridge has a width which varies from $2\frac{1}{2}$ to more than 6 miles. White Water or Little River and Castor River, the only streams of importance which enter this lowland belt, flow almost directly across it. The St. Francis River enters the lowland at Wappapello, Wayne County, and follows it to the State line.¹

The lowland region in southeast Missouri embraces Scott, Stoddard, Mississippi, New Madrid, Dunklin, and Pemiscot Counties, and parts of Butler, Wayne, Bollinger, and Cape Girardeau, having a total area of about 3,600 square miles. Benton Ridge and Crowleys Ridge comprise an area of about 350 square miles, including about one-third of Stoddard County and somewhat less than one-third of Scott County. The remainder of the region is lowland, and the greater part of it requires artificial drainage. Stoddard County lies in the northern part of this region.

Crowleys Ridge constitutes the central part of Stoddard County. Beginning near Advance, in the northern part of the county, it extends south and southwest, leaving the county a few miles west of Bernie. This ridge is widest at the north, with a maximum width of

¹ For a discussion of the origin of the lowlands of this region see "Evolution of the Northern Part of the Lowlands of Southeast Missouri," by Curtis F. Marbut, University of Missouri Studies, vol. 1, No. 3.

over 20 miles near Bloomfield. South of Bloomfield it narrows rapidly, having a width of only about a mile where it passes out of the county. On its east side and also on the northwest the ridge ends abruptly in a steep, often precipitous bluff, which varies in height from 50 to over 75 feet. There are a few ledges of limestone, and near Bell City some large masses of quartzite, but the bluff usually consists of steep, chert-covered or sandy and gravelly slopes. On the west and southwest there are no steep slopes or rock ledges, and the descent is so gradual that it is often difficult to determine where the ridge stops and the lowlands proper begin. The drainage divide for the greater part of the ridge is near its extreme eastern edge. Nearly all of the small streams which drain Crowleys Ridge flow west and southwest and occupy very broad, gently sloping valleys. Castor River, however, flows across the ridge to the east. The town of Puxico is located on a westward extension or lobe of Crowleys Ridge, which is entirely cut off from the remainder of the ridge by Duck Creek Valley.

East of Crowleys Ridge a broad lowland belt extends entirely across the county from north to south. North of Bell City this belt has a width of about 3 miles. At Dexter it is 14 miles wide, and along the southern line of the county it attains a width of 19 miles. The northern and extreme eastern portions are very low and poorly drained. They are forested largely with cypress and tupelo gum and are inundated throughout the greater part of the year. South of the Castor River the western portion of this lowland is slightly higher, the low, partly submerged area being confined largely to a strip about 5 miles wide along the eastern side of the county. The remainder of this lowland consists of broad strips having a slight elevation alternating with slightly lower lying strips or belts. In many places the line of separation between the higher strips and the adjoining lowland, although these differ but a few feet in elevation, is quite distinct. In other places they merge gradually. Sluggish drainage courses usually follow the lower belts. In some places rather deep, well-developed sloughs or bayous with natural levees extend for long distances through the lowland. In other places, away from these drainage courses, there are narrow but well-defined ridges which seem to be the remnants of natural levees. Beginning about 2 miles south of Dexter and extending due south there is a broad terrace which is separated from the lowland on the east by a rather steep slope, which varies in height from 10 to about 30 feet. On the west the slope to the foot of Crowleys Ridge is very gradual. The surface of this terrace is prevaillingly flat, although there are alternating low, broad, faint elevations and lower, poorly drained areas. The terrace represents the northern part of the Dunklin County sand ridge, sometimes called Rosebrier Prairie.

South and west from Crowleys Ridge another broad lowland extends west to the uplands at Poplar Bluff, Butler County. The St. Francis River flows through this lowland belt and forms the western boundary of Stoddard County. The lowland east of the St. Francis River has at the mouth of Mingo Creek a width of only 2 miles. It widens rapidly to the south, extending into the lower part of Duck Creek Valley. Five miles north of Dudley it has, including this Duck Creek extension, a width of over 10 miles. At Dudley it is 8 miles, at Bradyville $3\frac{1}{2}$ miles, and at Powe only 2 miles wide. The line which separates this lowland from Crowleys Ridge is not clearly defined, the lowland extending back into the ridge along the streams, and the upland extending out as low, broad, gentle slopes between the small stream valleys. The lowland proper is more nearly level and uniform than is the eastern lowland, though it includes meandering sloughs with small natural levees and low, broad, slightly elevated areas. In the western part of this lowland, and especially in that part of it west and northwest of Dudley, there are small swells or elevations from 1 to 2 feet or more in height. These vary from a few yards to a few rods in width and from 10 to 40 rods or more in length. They occur almost entirely in the western half of this lowland and increase in number as the river is approached. About 3 miles south of Asherville they are so numerous that they cover approximately one-half of the surface. Along the St. Francis River and Mingo Slough there are narrow, natural levees. The general slope of this lowland, like that on the east side of Crowleys Ridge, is to the south and west.

Northwest of Crowleys Ridge there is a long, narrow lowland, the lower part of which has a width of about $2\frac{1}{2}$ miles and is drained by the Mingo Slough. This lowland widens gradually, and at Advance has a width of over 6 miles. Northeast of Advance it passes beyond the Stoddard County line. South of this point only about one-half of it lies within the county.

The extreme southern portion of this low region resembles very closely the main body of the west lowlands. Farther north it is low and wet, and forested with cypress and tupelo gum, resembling more nearly the lower part of the east lowland. This is known as the Mingo Swamp. Farther north broad, low ridges alternate with strips of lowland, and the region is more nearly like that of the better drained portions of the east lowlands.

The permanent settlement of Stoddard County began over three-quarters of a century ago, the settlers coming largely from North Carolina, Tennessee, and Kentucky. The land was either homesteaded or bought for a few dollars an acre, and settlement was largely confined to Crowleys Ridge. Few of the settlers owned slaves, and clearing was slow. The land was cultivated largely with home-made

implements, and oxen were the principal work animals. Owing to the abundance of game, little attention was given to live stock except hogs, and these ran at large and were often hunted like wild game.

The development of the lumber industry stimulated interest in the lowland region. This entire region was originally forested with a splendid growth of white oak, hickory, cypress, walnut, ash, sweet gum, and other trees of value for lumber. Large tracts were acquired by lumber companies at a merely nominal price and quickly and wastefully cleared. During the past 25 years the greater part of the timber has been removed, but some forested areas remain in the lower portions of the county. These are being reduced in extent year by year.

Immigration increased with the development of the lumber industry. Small settlements grew up around the mill sites, and in this way all of the towns of the lowlands became established. Near many of these mill towns there were small areas which could be farmed without drainage. These were often cleared and farmed in an indifferent way.

About 1900 the drainage of large areas in southeastern Missouri by means of dredged ditches was begun. This work has progressed rapidly, and at present a large part of the lowland has been drained and cleared and is being brought into a high state of cultivation.

With this increased agricultural development there has come a rapid increase in population. According to the census, while the counties of central and northern Missouri have decreased in population, that of Stoddard County has increased from 24,669, reported in 1900, to 27,807, reported in 1910. During the same period the population of the lowland town of Essex has increased from 163 to 548, that of the town of Advance from 221 to 621, and that of Bernie from 333 to 742. The population of Puxico, on the upland, has increased from 413 to 814, and that of Dexter from 1,862 to 2,322. The new settlers, especially those interested in agriculture, are largely from Illinois, Indiana, Ohio, and the northern part of Missouri.

Dexter is the largest town in the county. It has important timber manufacturing industries, a cotton gin, and a large flour mill, and is the center of a large merchandising business. Bloomfield, the county seat, has a population of 1,147, according to the 1910 census. Other towns of some importance are Bell City and Idalia on the St. Louis Southwestern Railway, Dudley, Hunterville, and Grayridge on the St. Louis, Iron Mountain & Southern Railroad, and Brownwood, Powe, Aid, and Zadock on the St. Louis & San Francisco. Asherville and Frisco are small villages lying away from the railroads.

The center of Stoddard County is about 180 miles from St. Louis, and is somewhat nearer to Memphis, the two most important markets

of this region. Transportation facilities are good. The St. Louis & San Francisco, or "Frisco," system extends across the northern part of the county, passing through Cape Girardeau, Cape Girardeau County, and Poplar Bluff, Butler County. Another line of this system extends from Brownwood through Bloomfield and Dudley and south to Kennett, Dunklin County, connecting with the main line. A third line crosses the southeast corner of the county. The main line of the St. Louis Southwestern, or "Cotton Belt," Railway extends diagonally across the county from northeast to southwest, and the St. Louis, Iron Mountain & Southern Railroad, extending from Poplar Bluff to Cairo, crosses it from east to west near the center.

The old "Chalk Bluff Road," which was located by the pioneers along the crest of Crowleys Ridge, is still in use. The roads of the county are in fair condition and are being constantly improved, especially those in the lowlands. An abundance of good road-building material is available in many places on and along the edge of Crowleys Ridge. The Coastal Plain gravel mixed with the coarse, red, sticky, sandy clay, when used on roads, becomes compact and forms a hard, smooth surface. Good material for building sand-clay roads is also available throughout the lowlands.

The rural free delivery of mail reaches all of the more thickly settled parts of the county. The county is well supplied with telephone service, even the remotest lumber camps having telephone communication.

On the uplands a good water supply is usually obtained from wells 40 to 60 feet deep. In the lowlands driven wells with pumps are used. The drainage of the lowlands is generally attended by decided improvement in the healthfulness of the region.

CLIMATE.

There are no striking climatic differences between the lowland region of southeast Missouri and the central and northern parts of the State. There are, however, differences in the amount and distribution of rainfall and in temperature which are of especial importance to the farmer. These differences permit of the successful growing in Stoddard County of certain crops which can not be grown farther north, the growing of two crops in certain rotations during the same season, and the placing of certain crops on the market earlier than in the northern part of the State. They also prolong the use of pastures, so that the storing of large quantities of hay, ensilage, and roughage is unnecessary. Although stock requires protection, mainly from the rain, the winters are much less severe than they are a short distance farther north.

No weather records for any point within this county are available, but the records of temperature and precipitation kept at the United

States Weather Bureau station at Sikeston, Scott County, 6 miles east of the county line, are fairly representative of the climatic conditions of Stoddard County. The following table gives the normal monthly, seasonal, and annual temperature and precipitation recorded at the Sikeston station:

Normal monthly, seasonal, and annual temperature and precipitation at Sikeston, Scott County, Mo.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	38.3	72	- 8	3.84	4.70	1.97
January.....	37.4	76	- 8	4.47	2.02	6.46
February.....	35.0	78	-23	3.63	5.04	1.34
Winter.....	36.9	.....	.....	11.94	11.76	9.77
March.....	49.1	88	6	5.42	4.50	11.88
April.....	57.7	90	26	4.23	4.29	3.26
May.....	66.8	97	34	4.76	2.95	8.04
Spring.....	57.9	.....	.....	14.41	11.74	23.18
June.....	74.5	100	43	4.38	2.16	3.45
July.....	78.0	111	50	4.33	0.73	5.87
August.....	77.7	105	51	3.37	6.98	2.70
Summer.....	76.7	.....	.....	12.08	9.87	12.02
September.....	76.7	100	29	2.98	1.96	9.07
October.....	59.4	98	24	2.46	2.16	8.73
November.....	48.0	82	14	3.84	1.73	2.53
Fall.....	61.4	.....	.....	9.28	5.85	20.33
Year.....	58.2	111	-23	47.71	39.22	65.30

The least rainfall occurs as a rule during the months of August, September, and October, in the order named, and during the remainder of the season the precipitation is practically uniform. In the northern and central parts of the State the least precipitation occurs from November to February. The distribution indicated by the table is favorable to the lowland region because the period of least rainfall occurs at a time when dry weather is most needed for curing alfalfa and cowpea hay, for maturing cotton, and for the ripening and gathering of corn.

The average annual precipitation for Stoddard County is approximately 48 inches. This is 10 to 12 inches greater than the annual precipitation of northern Missouri, and this excess comes at a time when it does not interfere with the planting and cultivation of crops.

It is also interesting to note that while the rainfall is greater and more uniformly distributed throughout the season, the number of rainy days in this part of the State is markedly less than in the northern section. That this region seems so wet, especially during the winter season, is due to the occurrence of the heaviest precipitation at a time when absorption and evaporation are slowest, and to the level topography of the land, which makes the run-off relatively slow. With the establishment of artificial drainage little injury need be feared from excessive rainfall. Although under present methods of farming injury at times results from periods of drought following heavy rains, this is generally avoided by thorough drainage and by conserving the moisture by means of cultivation.

The average annual temperature for the lowland region is slightly higher than that for northern Missouri. It is about 58° F. for Stoddard County. The number of days, however, between the last killing frost in the spring and the first killing frost in the fall is practically the same in both regions, there being an average growing season of about 188 days. The average date of the last killing frost in the spring, according to the records at the Sikeston station, is April 10, and the average date of the first in the fall October 18. The earliest date of killing frost recorded in the fall is September 30, and the latest in the spring May 1.

The seasons in Stoddard County are sufficiently long for the growing of a crop of cowpeas following a crop of wheat or oats, and for harvesting these and resowing the ground to small grain the same fall. Corn frequently ripens and is husked before the ground is plowed and sown to winter wheat. Two crops of potatoes may be grown on the same field in a season. Although no attention has been given to the growing of truck and garden crops for the market, the climate and soils seem favorable to this industry. The climatic conditions are especially suitable for the growing of cotton. Although late frosts in the spring and early frosts in the fall occasionally injure the crop, good yields are almost always obtained, particularly from the earlier maturing varieties.

AGRICULTURE.

The agriculture of Stoddard County is of two rather distinct types. One resembles very closely that of the South, the other approaches more nearly that of northern Missouri, Illinois, and Indiana. In the first type cotton, corn, and some wheat are the predominant crops, little attention being given to pasture, hay, or live stock. The farms are small, the farm equipment light, and cultivation is accomplished largely by hand labor. In the second type corn, clover, wheat, and cowpeas have first place and cotton is of minor importance. Much more attention is given to pasture, to hay crops, and to the raising

of live stock. The farms are larger, the improvements and equipment better, and the greater part of the work is done with machinery.

All of Stoddard County was originally forested. The early settlements were confined to Crowleys Ridge, gradually extending to small areas in the lowlands which could be farmed without artificial drainage. Parts of this ridge have been under cultivation for more than three-quarters of a century. Some of the rougher areas which were under cultivation before the Civil War have been abandoned and allowed to reforest themselves. The sand belt occurring in the vicinity of Bernie and small areas in other parts of the county have been under cultivation for many years. These older settled areas to some extent represent the southern type of farming.

During the past nine years the settlement, draining, and clearing of the lowlands proper have been pushed rapidly forward. The larger number of the settlers in these newly reclaimed regions are from the north and northeast, and follow the farm practices of the regions from which they come. There has, however, been a considerable mixing of types of farming through a recent settlement of people from the North on the uplands and the movement of old settlers from the uplands and of new settlers from Kentucky and Tennessee into the lowlands.

Owing to the wide variations in soils and crop adaptations the agriculture of Stoddard County can best be described by sections or regions.

THE UPLANDS.

On Crowleys Ridge, or the uplands, the population is comparatively dense and evenly distributed. In some parts of this region the average farm unit is probably not over 80 acres and many farms contain only 40 acres or less. These small holdings, however, are not farmed intensively and many of them, especially in the more broken sections, are poorly operated. The farm improvements are poor and the principal crops are corn, cotton, and wheat. Very little live stock is kept, and this is of low grade. There are few pastures, and the stock is allowed to run at large. Large areas of gravelly and rough land are still unfenced, but afford rather scant pasturage and are gradually being cleared and fenced. As a whole the sandy and gravelly soils are not very productive, but on many of them clover and Kentucky bluegrass do well. Where these can not be grown Bermuda grass and Japan clover may be used.

On the better portions of the upland the farm improvements are better. The houses and barns are well built, and the orchards, fences, and cultivated lands are generally kept in good condition. In these areas the farms are also usually larger. The better portions of the uplands are well suited to corn, cotton, wheat, clover, cowpeas, and

other crops common to the region. Much of this land, however, has been farmed so long and in such a poor manner that it is in a low state of tilth and productiveness.

Continuous clean cultivation has caused a reduction of the humus and the nitrogen supply and an impairment of the original friable structure of the soil, as well as favored erosion and gullyng. A decided reduction in crop yields has resulted.

The erosion or washing away of the soil is a very important problem to all farmers on the uplands, for by this process the best part of their soil is gradually being removed. The loss of good soil to the upland farmer is evidenced by the large amount of rich "made soil" along the edge of the lowlands, where the farms not only produce excellent crops but continue to increase in productiveness. The results of the rapid erosion of the uplands in Stoddard County are illustrated in the region around Bloomfield and along the old Chalk Bluff Road entirely across the county. Here some areas are so denuded and gullied that they are beyond hope of reclamation.

The natural conditions favorable to erosion are the gravel beds along the crest of the ridge, overlain by a thin, easily eroded covering of soil. The rainfall of this region is not only greater than that farther north, but a larger part of it occurs during the winter when the soil has no protecting cover crop. It is also more torrential than in the northern part of the State; that is, a much heavier rainfall occurs within a given period. A fall of from 2 or 3 to as much as 6 or 8 inches in 24 hours is not uncommon, and this greatly increases the proportion of run off. In addition to these natural causes the removal of the timber, the use of a large part of the land in growing such inter-tilled crops as corn and cotton, and shallow plowing tend to encourage erosion.

Corn is the most important crop of the uplands. The yields on much of the thinner soil are light, ranging from less than 15 to about 25 bushels per acre. On the better soils corn produces from 25 to over 40 bushels. By following a good crop rotation and better methods of cultivating and handling these yields can be greatly increased. Wheat is grown rather extensively and yields from 10 to over 20 bushels per acre. Oats are grown to a much less extent than is wheat, and the yields range from 15 to 40 bushels. Cotton is grown quite extensively on the upland south of an east and west line through Dexter, but very little of it is produced north of this line. This does not seem to be due to any marked difference in soil or climate, but rather to the low yields in the northern part of the county, where erosion has been more destructive and the soils are in a poorer condition of tilth. The yields of cotton on the uplands, as of all other crops, vary widely, depending on the condition of the soil. The yields range from one-fourth to three-fifths bale per acre.

Cowpeas do well on the upland, making an especially good seed crop. The yield is from half a ton to over a ton of hay and from 5 to 10 bushels or more of seed per acre. The hand-picked seed is always in demand at a good price. Soy beans are another good upland crop. Clover does well on the better upland soils and makes a good seed crop. Alfalfa can be grown where the soil is deep, rich, and well drained, although the soil usually requires inoculation and in places is benefited by the use of lime.

Tobacco was grown to a considerable extent on Crowleys Ridge before the Civil War. No tobacco is now shipped out of the county, although a small amount is still grown for home consumption.

The growing of fruit does not receive much attention in Stoddard County, and although there are a few productive, well-cared-for orchards, there are many more that are neglected. By proper attention and careful spraying an abundance of fruit for home use may be produced. The ridge soils are also well suited to the growing of small fruits and berries.

Commercial fertilizers are used to only a very small extent on the uplands and not at all on the lowlands in Stoddard County.

Land values in the uplands range from \$15 or \$20 an acre for the rough and stony areas to \$50 or \$60 an acre for the more productive and better improved land.

Much of the land capable of producing good clover, cowpeas, and Kentucky bluegrass can be bought for \$30 or less an acre, and in such areas there is a splendid opportunity for the development of a profitable live-stock business.

THE LOWLANDS.

The soils of the remainder of the county are alluvial in origin. Many of these soils are quite productive when properly drained, and approximately one-half of the lowland region is either under cultivation or fenced and used for pasture and being gradually brought under cultivation. Of this region the largest, most productive, best improved, and most thickly settled section is that east, south-east, and south of Dexter. With this may be included the area around Advance, that between the Bernie sand ridge and Crowleys Ridge, and small areas near the St. Francis River. Here the low, broad ridges of sandy loam and fine sandy loam are almost all under cultivation. Where there are clumps of timber the soil is usually either heavy or poorly drained, and often both conditions exist. These areas, however, are gradually being cleared, drained, and cultivated.

Corn is the most important crop of the lowlands. In 1912, 57,989 acres in Stoddard County were devoted to corn, with a production of 1,739,670 bushels, or about 30 bushels per acre.¹ This includes the

¹ Missouri Crop Review, 1912.

low yields on the sand and on the thin uplands, as well as the less productive parts of the lowlands. In the better part of the lowlands the average yield for a period of several years would probably be around 40 bushels per acre. Yields of 50 to 60 bushels are not uncommon. With much land that is stumpy and some thickly covered with dead trees, some that is poorly drained, and much that is poorly cultivated this is an excellent showing. Boone County White and Johnston County White are the leading varieties grown, although Reids Yellow Dent, St. Charles White, and St. Charles Yellow are also popular. Soil and climatic conditions here are such that the crop has a tendency to make a heavy growth of stalk and leaves, with the ears high on the stalk. The better farmers are improving their corn through selective breeding and thus obtaining varieties with less foliage and lower growing ears.

On account of the large yields produced on these new soils, there is great danger of the farmers making the same serious mistake made by the prairie farmers of northern Missouri in growing corn continuously until the soils are greatly injured. Best results are had where manure and green fertilizers are used to supply humus, or where the land is occasionally used for pasture. The soil shows improvement where cowpeas are drilled between the corn rows after the last cultivation and pastured to hogs and cattle after the corn has been harvested.

Cotton is the second crop of importance in the lowlands, and in some sections it is of more importance than corn. In 1910 there were shipped out of Stoddard County 3,025,625 pounds of baled cotton, 530,520 pounds of cotton in the seed, and 1,122,862 pounds of cotton seed.¹ Much of this cotton, however, was grown in the upland.

When land is first cleared it is devoted to corn for one, two, or three years before being planted to cotton. If cotton is planted on new ground it makes such a rank growth that it does not fruit well or mature early. No fertilizers are used, and the yield on the better soils is from two-thirds to over 1 bale per acre. On account of the clean cultivation of this crop and the custom of piling and burning the stalks the organic supply of the soil is rapidly depleted. Big-boll cotton of several varieties is grown. Ridge planting and one-horse cultivation are the almost universal practice. The greater part of the cotton is sold in the seed. The best results with the cotton crop are obtained where some early-maturing variety of good fiber, scant foliage, and abundant fruiting is used, where properly drained land is selected and level cultivation is practiced, where two-horse cultivators and other modern implements are used, and the cotton is marketed in the bale.

¹ Missouri Red Book, 1911.

In 1912 wheat was grown on 13,168 acres in Stoddard County, with a production of 171,184 bushels, or an average of 13 bushels per acre.¹ The average yield on the better lowland soils is undoubtedly greater than this county average, the yields reported on some of the better farms ranging from 15 to 20 bushels per acre, with much larger yields under especially favorable conditions.

Cowpeas are grown extensively, and yield from 1 to 2 tons of hay and 5 to 10 bushels of seed per acre. Clover produces 1 to 2 tons of hay per acre, and alfalfa 3 to 5 tons where the soil is adapted to them. Timothy does well.

The uncleared land of this region ranges in value from \$30 to \$40 an acre. The cleared and improved land sells for \$50 to over \$75, and some of that which is well located for as high as \$100 an acre.

On the terrace south of Dexter the agriculture is older, the farms smaller, and the improvements usually not so good. This ridge was originally referred to as "the prairie," although partly forested with clumps of blackjack and post oak. Cotton and corn are the principal crops. Yields of one-fifth to one-half bale of seed cotton per acre and 15 to 25 bushels of corn are obtained. Cowpeas do well and produce a good seed crop. Watermelons and cantaloupes are grown to a small extent for the market. The soil seems especially suited to these crops and to sweet potatoes, peanuts, and some other truck crops. The structure and the productiveness of this soil can be improved by the use of well-rotted manure thoroughly worked into the soil and by the plowing under of green crops, provided they are given time to decay thoroughly before the succeeding crop is planted.

West of Crowleys Ridge there is a large area of light-colored soil (Waverly and Calhoun series), a large part of which is forested with willow oak, water oak, and post oak, and is known locally as "the glades." There are three or four different grades, or classes, of this "glade land," but very little of it is under cultivation and not a great deal is known about it. The results thus far obtained with crops are not very encouraging, and the soil is not considered very valuable by the older settlers. It is said to produce fair crops of corn and cowpeas when seasonal conditions are very favorable, but to be unproductive whenever the season is too dry or too wet. Sorghum grown on this soil is said to make a clear sirup of excellent flavor.

Much of this land where unimproved has been sold at prices ranging from \$35 to \$40 an acre.

Of the unfarmed areas in Stoddard County the majority are as yet unprovided with drainage ditches. Of these bodies the largest extends along the entire eastern side of the county, one occupies the southern part of the Mingo lowland and one lies near the St. Francis

¹ Missouri Crop Report, 1912.

River southwest of Dudley. The soils of the greater part of these areas are heavy, but judging from the small areas of heavy soils in the county now under cultivation they will, when thoroughly drained and cultivated, prove productive and durable. The following statement will give an idea of the extent to which drainage work has been carried on to this time:

Stoddard County has 100 miles of ditches, which cost the landowners of the districts \$575,321. The bonded area amounts to 150,960 acres, of which fully 80 per cent has been entirely reclaimed, and the remaining 20 per cent much improved. The average value of real estate in these different districts before being drained was \$7 an acre; the same land now is worth \$40 an acre. Fully 140,000 acres in this county are yet subject to drainage and improvement.¹

In general, the greatest present need of the Stoddard County farm is better drainage. Additional ditches are not needed so much as better care and use of those already constructed. The main ditches are frequently choked with willows, and often half filled with soil. The soil removed in dredging the ditch is usually left along each side without openings and prevents the water from running off of the adjacent land. Main ditches without many laterals carefully dug and kept open are of little value. Much land of the county will never be brought into its highest state of productiveness until it is tile drained.

Next to drainage the most important general need is better and more thorough cultivation. The large yields produced on these new soils with little effort have given rise to the impression that thorough cultivation is unnecessary. Already soils which have been under cultivation but a few years are losing their freshness and vigor through poor handling, and are being overrun with weeds and grasses. Throughout the county the proper care and improvement of the soil is receiving increasing attention. With the rapidly increasing price of land, scarcity of farm labor, and greater cost of producing crops, the farmers are beginning to realize that profits are to be made through increased yields rather than through an increase in acreage.

The early settlers brought a very low grade of stock into the county, but this is being gradually improved. The belief that climatic conditions here are unfavorable for the raising of high-grade and pure-bred live stock is without foundation. On account of the large area of productive corn soils, and the ease with which forage crops may be grown, it is doubtful if any other section of the State offers better opportunities for the growing and fattening of hogs and cattle. There are also good opportunities in the development of dairying and in raising horses and mules.

White labor is depended on exclusively. Wages range from \$20 to \$30 a month, with house and garden furnished. By the day farm

¹ Missouri Red Book, Part IV.

laborers receive from \$1 to \$1.50. Cotton picking is paid for at a rate varying between 65 cents and \$1 a hundred pounds.

Good cotton land is leased for a cash rental ranging from \$5 to \$7 an acre. Where land is rented for a share of the crop the owner usually receives one-third of the corn and one-fourth of the cotton, and the tenant furnishes teams, seed, and implements.

SOILS.

The soils of Stoddard County belong in two broad groups, the upland or ridge soils and the lowland or bottom soils. The upland soils are of loessial, residual, and sedimentary origin. The lowland soils as a whole are alluvial, with the exception of marginal fringes of colluvial wash from adjoining upland soils.

Crowleys Ridge occupies a little more than one-third of the area of Stoddard County. The boundaries of the ridge mark the limits of the upland or residual and loessial soils. This ridge is made up, in its basal portion, of alternating beds of limestone, sandstone, and shale. These are overlain by beds of unconsolidated sands, clays, and gravel, and these in turn by a surface layer of silty material—loess.

In many places in Stoddard County, especially in the eroded areas around Bloomfield and along the east side of Crowleys Ridge, deep gullies and washes expose beds of waterworn gravel, sand, and clay. This material is well sorted and deposited in horizontal beds, the layers of sand of different colors and different textures often being quite distinct. These deposits are believed to have been made during the Tertiary period and are known as Coastal Plain deposits.¹ The resulting soils are classed as Coastal Plain soils. In addition to the residual soils derived directly from the weathering of the rock beds and the soils from the Coastal Plain deposits, there is on the uplands another soil much more important than the other two, the loessial soil, mapped as the Memphis silt loam.

This loess is believed to be wind-blown material from the adjoining flood plains. It has been laid down regardless of topography, the deepest deposits often occurring on the tops of the hills and ridges. It is not stratified, as it probably would be if deposited by water. It contains no stones, gravel, or coarse material. It is deepest on the Mississippi River side of the areas.

The greater part of Crowleys Ridge is covered with loess. This deposit in Stoddard County and farther south differs somewhat, however, from that in the northern part of the State. It seems to have more gray mottlings in the subsoil, is not so deep, and has been eroded to a greater extent. In addition, it is underlain by Coastal Plain material unlike the loam to the north, which gives rise to the Knox silt loam.

¹ See Geography of Missouri, Emerson, vol. 1, No. 4, p. 6.

The streams which drain Crowleys Ridge and flow principally to the west have broad, shallow valleys, the outer edges of which in places merge with the uplands so gradually that it is difficult to draw sharp boundaries. Only the lower portions of some of these areas, those next to the streams, are subject to overflow, but the soils of the entire valley floors are different from those of the adjacent upland. They are slightly darker in color, contain a higher percentage of organic matter and are more productive. These valley soils are mainly alluvial in origin, although along the outer edges there is some colluvial material. In many places narrow strips of this colluvial soil occur along the edge of the broad valley lowlands immediately below the steeper slopes which mark the edge of the ridge. Near the stream channels narrow strips of natural levee material have been built up in places, being highest next to the channel and sloping away from it.

Much of the soil in these valleys occupies areas in which the drainage has been deficient. In such places it has become white, and in places it is well filled with small iron concretions, commonly called "buck-shot." The soils of these small stream valleys and the outwash or overwash along the foot of the ridge and along the small streams after they have entered the larger valley have been worked from the ridge soils and principally from the loess. Such soil has been mapped as the Olivier silt loam.

The loess at one time probably covered the entire surface of Crowleys Ridge. Along the crest of the ridge, however, it has been eroded, and in many places almost entirely removed, leaving Coastal Plain material and rocks exposed. Owing to their small area, the soils derived from these formations are of comparatively slight importance agriculturally. They have been placed in two series—the Ruston and Clarksville. The larger part of these soils is forested. The Ruston soils are easily identified by the large quantity of waterworn gravel present and by the reddish sandy subsoil. The Clarksville stony loam is characterized by the chert fragments scattered over it in large quantities. In some areas the soil is composed of intermingled loess and Coastal Plain wash.

The soils of the east lowland region are derived from first-bottom alluvial deposits. In places in the northern and eastern parts of this area additional material is being deposited periodically by the overflow waters of the White Water or Little River and the Castor River. A large part of the bottom land, however, is protected from overflow by the levees along the Mississippi River.

The soils of the east lowlands belong in three classes—the clay soils, silty soils, and sandy soils. These occur in bands or strips of varying width, which in the northern part of this belt have a north and south trend and in the central and southern parts a northeast and southwest trend.

In this, as in other parts of the area, there are often sharp lines of separation between such soils as black clay or "gumbo" and fine sandy loam or very fine sandy loam. In other places there is a gradation from one soil type to another, with no well-defined lines of separation, so that rather arbitrary boundaries are drawn in the soil map. In many places, too, there are areas of a soil distinctly different from the surrounding soil, with well-defined boundary lines, but so small that they can not be shown separately on a map of the scale used. Other areas, although of sufficient size to be mapped, differ from the types recognized so slightly that the establishment of new types is not justifiable, and accordingly they are included with those soils which they most closely resemble. Large areas in the eastern part of the county had to be examined by making long foot traverses, i. e., measuring distances by pacing or stepping, so that some approximation was necessarily resorted to in the mapping of these areas. Other large areas on account of swampy conditions were entirely inaccessible.

The clay soils predominate in the northern and eastern parts of the east lowlands. Strips of clay varying in width from a few rods to more than half a mile extend through the southern part of this lowland, one of considerable extent lying immediately east of the sand ridge at Bernie. These strips usually occupy slight depressions, are not so well drained as the adjacent higher soils, and are cultivated to only a small extent. Where drained and cultivated good results are obtained, and the area under cultivation is being extended each year. Three divisions of the clay soils have been made, the black clay, and the black clay loam of the Wabash series and the gray clay of the Waverly series.

The silty soils occur in a large body on both sides of the Castor River north of the Iron Mountain Railroad, in long narrow strips south of the railroad, and in other parts of the east lowland. These strips often follow the drainage courses, and in many places occupy slight elevations along the streams, but in other places they occupy depressions. The silty soils of the east bottom are easily recognized by their gray to white color. They belong in the Waverly series.

The sandy soils of this section of the county are classed as fine sandy loam and very fine sandy loam. The fine sandy loam has more of a brown color than the grayish very fine sandy loam, and has accordingly been correlated as Yazoo, the latter having been correlated as Waverly. A distinction of considerable importance, agriculturally, is based on the character of the subsoil in the case of the Waverly very fine sandy loam. There are strips usually somewhat lower than the adjacent typical portion of the very fine sandy loam in which the subsoil is a heavy clay or silty clay which does not permit of good underdrainage.

In the northwestern corner of the county the bottoms are occasionally subject to partial overflow by backwater from the Castor

River. The Wabash and Waverly clay are the principal types, but there is some Waverly silt loam, and, on the higher positions, some Calhoun clay in these areas. In the Advance bottoms the Waverly very fine sandy loam is the dominant type.

The soils of the west lowlands, comprising the bottoms west of Crowleys Ridge and south of Puxico, occur largely on an alluvial terrace which is above overflow. These terrace soils do not differ greatly from much of the first-bottom soils east of the ridge, except that the subsoil is almost invariably heavier in texture and more impervious, and drainage conditions not so good, thus making a less desirable soil agriculturally. Some Waverly clay is mapped in the west bottoms. This is, or was recently, subject to partial inundation by backwater. Sharp lines between the terrace and first-bottom soils can not be established in this section, except in separating the Vicksburg series, which typically occupies the very low, frequently overflowed bottoms of the St. Francis River.

The material in this section was deposited by flood water, and is strictly alluvial. Much of it has been modified by standing water and imperfect aeration. In the western part of this lowland, especially west and northwest of Dudley, small, elongated mounds and narrow ridges are of frequent occurrence.

The soils of the terrace south of Dexter, upon which Bernie and Bunker Hill are located, are derived from older alluvium than that of the lower lying first bottoms to the east—approximately east of the Cotton Belt Railroad. This alluvium was deposited when the regional stream flood waters reached high levels. The Lintonia and Calhoun soils are mapped on this terrace, the former comprising the brown, better drained lands and the latter the light-colored land.

The following table gives the names and the actual and relative extent of the various soils mapped in the county:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Memphis silt loam.....	104,832	20.1	Lintonia very fine sandy loam	9,344	1.8
Olivier silt loam.....	48,640	9.3	Lintonia fine sandy loam.....	7,808	1.5
Yazoo fine sandy loam.....	43,520	8.3	Ruston gravelly loam.....	6,720	1.3
Wabash clay loam.....	42,240	8.1	Lintonia fine sand.....	4,224	.8
Waverly silt loam.....	41,728	8.0	Waverly clay loam.....	1,984	.4
Wabash clay.....	41,600	8.0	Ruston fine sandy loam.....	1,536	.3
Calhoun silty clay loam.....	36,928	7.1	Clarksville stony loam.....	1,216	.2
Calhoun silt loam.....	33,088	6.4	Ruston gravelly sandy loam..	1,024	.2
Waverly very fine sandy loam	24,192	6.2	Calhoun very fine sandy loam..	960	.2
Heavy subsoil phase.....	8,576		Lintonia gravelly loam.....	704	.1
Waverly clay.....	30,080	5.8			
Calhoun clay.....	19,584	3.8			
Vicksburg silt loam.....	11,072	2.1			
			Total.....	521,600	.....

MEMPHIS SILT LOAM.

The Memphis silt loam is a yellowish-gray to pale yellowish brown or light grayish brown silt loam, which at a depth of 5 to 8 or 10 inches gives place to a distinctly yellowish brown heavy silt loam to silty clay loam, which in turn quickly grades into reddish-yellow or buff to dull-red, friable silty clay loam to silty clay. Below a depth of about 20 inches gray mottlings are often noted, continuing to about 30 inches, below which the subsoil usually has the yellowish-brown color of the upper subsoil or is only slightly mottled. This zone of gray mottlings seems to be much more frequent on the slopes and lower ridges than in the higher parts of the upland, where frequently they are not present. Splotches of dark brown and black are also of frequent occurrence. Below a depth of about 30 inches the silt content often increases, and the structure is more friable.

The Memphis silt loam is the principal upland soil type of the county. Its boundaries are practically the same as those of Crowleys Ridge, except where the underlying residual and Coastal Plain soils have been exposed by erosion or the surface soils have been modified by gradual soil movement and deposition along the stream courses. The entire ridge was probably at one time covered by this type. The topography is gently rolling to hilly.

The Memphis silt loam, like the Knox silt loam of areas farther north, is a loess soil, probably made up of wind-blown material. It differs little from the Knox silt loam in color and texture. The deep cuts and perpendicular soil banks characteristic of the Knox are rare in this type in Stoddard County. This is probably due to the thinness of the deposits. It is underlain by deposits of Coastal Plain material, exposures of which are seen in gullies.

Taking the areas as a whole the Memphis silt loam has a depth considerably less than that of the Knox silt loam, many exposures showing the underlying gravelly or residual soil within 3 or 4 feet of the surface. It is also not held in such high favor by the farmers, but this is undoubtedly due, in part at least, to neglect and poor methods of handling.

The forest growth, while including the black walnut and hard maple characteristic of the Knox silt loam, consists more largely of post oak and black oak. While the Memphis silt loam when properly handled is a durable, productive soil, in this county it seems to be somewhat less productive than is the Knox silt loam of other parts of the State.

No other soil of the county responds as readily to good treatment as the Memphis silt loam. It is in need of organic matter and suffers deterioration as the result of erosion. The yield of corn ranges from less than 20 to over 40 bushels per acre, and of wheat from about 9 to

over 20 bushels per acre. With proper handling and improvement the average yields could be materially increased.

OLIVIER SILT LOAM.

The soil of the Olivier silt loam is a pale yellowish brown to yellowish-gray silt loam, having a smooth feel. At a depth of about 6 to 10 inches the surface soil grades into a subsurface stratum of pale-yellow silt loam, mottled with gray or white, or into a white silt loam faintly mottled with yellowish brown or rusty brown. The subsoil beginning at depths ranging from about 12 to 28 inches consists of a silty clay loam mottled with white, gray, or drab and brown, and frequently containing dark-colored oxide of iron concretions. These concretions in some places form fairly distinct layers, and brown and black mottlings, due to the presence of ferruginous material, usually increase with depth. The mottled subsoil continues to a depth of 36 inches or more, but there are some included areas which are underlain at 12 inches or more by heavier material.

This soil, particularly the browner material, seems to be fairly well supplied with organic matter, and has fair drainage. Much of the type, however, is in need of artificial drainage, organic matter, and lime. The type is moderately productive. It is easily cultivated, and is fairly well suited to the general farm crops of the region. It is more productive than the Calhoun silt loam which usually lies next to it.

Along all the small streams which drain Crowleys Ridge there are broad, shallow valleys, the flat bottoms of which are occupied by the Olivier silt loam. These flats are sometimes inundated. The greater part of the land is not now subject to overflow, although rain water frequently remains for some time on the surface, except on the occasional gentle slopes along the outer margins adjoining the uplands. Where the streams extend out into the larger valleys beyond the ridge they are bordered by brownish silt loam deposited by the streams over lighter colored materials. These deposits are deepest near the stream channel and thin out away from it. They also become narrower as the stream extends farther out into the lowlands. In places the streams have changed their courses, leaving surface deposits of this brown soil to mark their former courses. Immediately below the slopes which mark the limits of Crowleys Ridge there are in many places long narrow strips of this soil which have gradually worked down the slope. This material represents a colluvial phase which is not separated from the main type. Examinations of this soil reveal an undesirable subsoil, although the surface appearance would indicate a very desirable type. Where the land is uncleared the transition from a mixed timber growth to one almost exclusively of willow oak or water oak may be taken as a pretty sure indication

of the presence of the rather impervious subsoil. Timber growth of this kind usually occurs where the heavy, light-colored or mottled subsoil is within 12 or 15 inches of the surface.

This soil is composed mainly of wash from the Memphis silt loam. The level surface indicates that the material was deposited principally by stream overflow, but much of it was probably transported by colluvial action. Some of the bottoms evidently at one time extended farther eastward than at present, since the soil borders the high bluff along the eastern side of Crowleys Ridge. The wearing back of the sides of the ridge by erosion has cut off portions of the streams and left the alluvium in a rather peculiar position, directly above other first-bottom alluvium in the Mississippi River bottoms.

There are some isolated patches throughout the alluvial belt west of Crowleys Ridge, which represent old alluvium not closely associated with the small streams flowing from Crowleys Ridge. The material is not greatly different from that of the typical soil, although in places the texture is somewhat sandy.

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

Mechanical analyses of Olivier silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
341901.....	Soil.....	0.0	0.5	0.8	6.9	17.4	65.2	9.1
341902.....	Subsoil.....	.0	.6	.7	4.6	13.7	65.2	15.0

RUSTON GRAVELLY SANDY LOAM.

The Ruston gravelly sandy loam is largely derived from Coastal Plain material and, like this material, it varies widely in color, texture, and arrangement.

The soil of the Ruston gravelly sandy loam is a gray to yellowish-gray or light-brownish medium to coarse sandy loam. Small water-worn gravel varying in amount from about 10 to over 25 per cent of the soil mass are scattered over the surface and through the soil. The sand is sharp, and in many places there is sufficient coarse sand and gravel to make the soil leachy and unproductive. At 12 to 15 inches the texture of the material becomes heavier, ranging from a heavy sandy loam to sandy clay loam. The color of the subsoil varies considerably, being for the most part reddish yellow to yellowish red. On the steeper slopes the reddish color predominates; on the lower slopes there is considerable yellowish and mottled grayish and yellowish material in the subsoil. The subsoil is influenced by the heavier bottom soils over which it is sometimes deposited.

The Ruston gravelly sandy loam occupies two comparatively small areas on the eastern slope of Crowleys Ridge, northeast of Dexter. The timber growth is mixed.

Along the edge of the valley where sufficiently level to permit of cultivation this soil is used for corn and cotton, but owing to the high percentage of coarse sand and gravel it is not retentive of moisture and not as productive as the lowland soils.

RUSTON GRAVELLY LOAM.

The Ruston gravelly loam ranges in color from yellowish gray to reddish brown and in texture from a sandy loam to silt loam. With increasing depth it becomes slightly heavier in texture, grading at about 12 or 15 inches into a heavy loam or sandy clay loam. The typical soil consists of gray or brownish-gray gravelly loam to gravelly sandy loam, underlain at about 8 to 12 inches by dull-red or reddish-yellow, brittle clay or friable sandy clay, frequently mottled with gray in the lower part of the 3-foot section. Beds of reddish gravel and sand, sandy clay, yellowish-gray to drab, plastic clay, and red, plastic clay with yellowish mottlings are encountered in the substratum. Large quantities of waterworn gravel fragments, consisting chiefly of chert and quartzite, occur on the surface and throughout the soil of much of the type, ranging from very little in some places to probably more than 50 per cent of the material in others, and usually increasing in quantity with depth. The soil in which waterworn gravel and coarse, sharp sand predominate is derived chiefly from Coastal Plain material, but the less gravelly land includes considerable loessial material, representing patches of Memphis silt loam or phases of this type too small to map separately.

The type occupies rolling or ridgy areas and slopes in Crowleys Ridge. Some of it is rather too rough and gravelly for profitable utilization. The principal areas occur along the crest of Crowleys Ridge from Bloomfield south to Old White Oak School.

The most characteristic forest growth on this type is black oak. There is some blackjack oak, especially where the soil is stony and gravelly. Post oak, hickory, and other hardwoods grow in places.

Where there are only small quantities of gravel this soil can be built up by the use of cowpeas, clover, and manure, and fair results with crops obtained. A large part of it is best adapted to permanent pasture. For this purpose bluegrass or Bermuda grass gives best results. Owing to the tendency of Bermuda grass to spread and the difficulty of killing it out, it is not desirable where Kentucky or Canada bluegrass, orchard grass, or other grasses do well.

The following table gives the results of mechanical analyses of fine-earth samples of the soil and subsoil of the Ruston gravelly loam:

Mechanical analyses of Ruston gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
341949.....	Soil.....	2.5	9.3	10.3	14.0	4.8	49.1	9.5
341950.....	Subsoil.....	1.5	7.3	7.6	9.5	1.9	53.1	18.8

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam is a yellowish-gray to gray fine sandy loam, underlain at a depth of 8 to 12 inches by pale-yellowish heavy fine sandy loam. At about 15 to 20 inches a dull-red or reddish-yellow friable fine sandy clay is encountered. Below 24 inches the texture again becomes slightly lighter in some areas, and mottlings of gray are not uncommon.

The type occurs in small areas in the extreme western part of Crowleys Ridge in the vicinity of Asherville and Cobb, and along the Castor River north of Leora. The Ruston fine sandy loam is derived mainly from Coastal Plain deposits, the deeper gullies showing exposures of red and yellowish sandy clay. It also probably includes some residual material from sandstone and in places is modified by a thin surface layer of loess. There are some included patches of Memphis silt loam and Ruston gravelly loam.

The type occupies gently rolling to almost hilly country. It is well drained. A part of it is forested with hardwoods.

This soil when dry is very loose, and it is less productive than the Memphis silt loam. It is used principally for cotton and corn. Cowpeas do well and the soil is well suited to the growing of sweet potatoes and melons.

WAVERLY VERY FINE SANDY LOAM.

The Waverly very fine sandy loam in its typical development consists of a yellowish-gray to grayish-brown or pale yellowish brown very fine sandy loam to loamy very fine sand, underlain at about 6 to 10 inches by a yellowish-brown, compact very fine sandy loam, usually mottled with white or gray. This rests at about 18 to 24 inches upon a fine sandy clay or fine sandy clay loam which is either mottled white and yellow or has a yellowish color with faint mottlings of gray. The surface dries out to light gray, and often becomes quite compact. The subsurface and subsoil layers are also very compact. In some places the soil ranges close to a fine sandy loam in texture. The type as mapped includes patches of Waverly silt loam, which were not separated owing to their intricate association with the typical soil. There are many places where the very fine

sandy loam grades into the Waverly silt loam in such a way that it is difficult to draw sharp boundaries. There are also many places where the texture is so close to a very fine sandy loam or silt loam that rather arbitrary divisions are necessarily made as to the textural classification.

The principal areas of this type occur in the vicinity of Essex, west and south of Essex, and near Advance. The higher lying areas near Frisco and on Nettle Ridge south of Marco are also Waverly very fine sandy loam.

This type occupies swells and flat, slightly elevated situations in the bottoms. The elevation above the associated heavier bottom lands ranges from 1 to 5 or 6 feet.

In ease of cultivation, broad adaptation of crops, and productiveness this soil is quite desirable. The greater part of it is well drained, at least in the higher areas, and is well suited to all crops grown in the county, though there are many areas that would be benefited by artificial drainage. Corn yields 40 to 60 bushels, wheat 15 to over 25 bushels, and cotton two-thirds to 1 bale or more, per acre. Clover, alfalfa, and cowpeas do well when the soil is thoroughly drained. The type is also well suited to potatoes, sweet potatoes, and other truck crops.

Heavy subsoil phase.—The heavy subsoil phase of the Waverly very fine sandy loam consists of a light-gray to pale yellowish brown very fine sandy loam, rather silty and sticky in places, grading at 12 to 18 inches into a mottled gray or white and yellowish-brown, plastic clay which becomes very compact and tough when dry. Iron concretions and slightly cemented hardpan material are of frequent occurrence in the subsoil. The higher, better drained areas have a browner surface soil, and are more productive. The soil is inclined to become compact, and if plowed when wet clods are likely to form.

There are included in this phase areas of silt loam, patches of the typical Waverly very fine sandy loam, and of Waverly fine sandy loam. These areas were too small to show separately on a map of the scale used in the present survey.

The surface is generally nearly level to slightly undulating, and much of the land has poor drainage.

This phase often occurs as long strips through the typical Waverly very fine sandy loam or as a transitional soil between the very fine sandy loam and an adjoining heavier type. Its principal need is thorough drainage. It can be materially improved by open ditches, but tile drainage will be necessary to bring much of it into its highest state of productiveness.

The crop adaptations of this soil are about the same as for the main type, but it is less productive and much of it is better suited for pasture and hay production than for cultivated crops.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Waverly very fine sandy loam:

Mechanical analyses of Waverly very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
341929.....	Soil.....	0.4	3.6	4.0	21.4	36.3	25.4	8.6
341930.....	Subsoil.....	.5	3.2	3.4	19.8	34.5	26.0	12.4

WAVERLY SILT LOAM.

The Waverly silt loam is a light-gray to nearly white silt loam, often faintly mottled with ochreous yellow or rusty brown, underlain at about 18 to 24 inches by a mottled white, rusty-brown and yellow or ochreous-yellow silty clay. This subsoil is rather impervious to water and air. In places the texture becomes slightly heavier with depth, the silt loam grading into a silty clay loam before the subsoil proper is reached. Small iron concretions are present in many places, and these are generally more abundant at lower depths. Below 24 inches in some areas the mottlings become less noticeable and the soil is uniform in color and texture to about 30 to 36 inches, where it grades into a silty clay. The soil is compact when dry. It has a smooth, flourlike feel.

In the east lowlands many areas of this type, too small to be mapped separately, are included in areas of the Waverly very fine sandy loam, heavy subsoil phase. The type includes in this section low spots in which the soil is slightly lighter in color and heavier in texture than usual.

This type is more widely distributed than any other soil in the county. It is encountered in both the east and west lowlands. The largest areas of the typical soil occur north of Hunterville on both sides of the Castor River, and there are smaller areas south of Essex and in the northwestern corner of the county.

The Waverly silt loam is alluvial in origin. The topography is usually level and drainage poor. In some places along the streams there are strips of natural levee lying 2 or 3 feet above the typical soil which are fairly well drained and more productive than the lower areas.

Willow oak and water oak constitute the greater part of the forest growth, which also includes black oak, white oak, sweet gum, black gum, and other trees.

Owing to the small area of this type under cultivation, no accurate estimate of its crop value can be given. The areas in the east lowlands seem to be more valuable for agriculture than those in the

west lowlands. The type, however, is usually considered less desirable than either the sandy or black clay soils.

WAVERLY CLAY LOAM.

The typical Waverly clay loam is a gray, sandy clay loam to sandy clay, which grades downward into a plastic clay of a mottled gray or drab and rusty-brown color. An appreciable amount of sand and fine sand occurs on the surface and throughout the soil and subsoil. In some places it is present in sufficient quantities near the surface to give the soil a decidedly lighter texture. This makes cultivation easy and permits better drainage. There is a great lack of uniformity in this type, no two borings showing the same proportion of sand and clay. In some places the surface material is a loam, while in others it is quite heavy.

The Waverly clay loam is encountered in the northwestern corner of the county. It is not cultivated, and supports a mixed forest growth. Where well drained and properly handled it should prove a good, productive soil.

WAVERLY CLAY.

The Waverly clay is an almost white to mottled grayish, rusty-brown, and yellowish clay or silty clay which grades below into stiffer clay, mottled with white or gray, rusty brown, drab, and yellowish brown or ocherous yellow. The material to a depth of a few inches is somewhat crumbly.

The type occupies first bottoms and is for the most part subject to overflow or inundation by backwater. It occurs in a number of large areas in the western and eastern bottoms.

The forest growth includes water oak, white oak, willow oak, sweet gum, elm, ironwood, maple, and ash. In the lower situations cypress, willow, and tupelo gum are common. There is also a growth of "swamp bush" in many of the low areas.

The Waverly clay is not cultivated. With the establishment of drainage corn and grass should succeed.

In the following table the results of mechanical analyses of samples of the soil and subsoil of the Waverly clay are given:

Mechanical analyses of Waverly clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
341943.....	Soil.....	0.0	0.2	0.1	2.3	7.8	51.9	37.5
341944.....	Subsoil.....	.0	.5	.2	2.2	6.2	51.8	39.5

LINTONIA GRAVELLY LOAM.

The Lintonia gravelly loam consists of a brown light loam which grades below into lighter brown or yellowish heavy loam to sandy clay loam. In most places there is a large quantity of gravel on the surface and throughout the soil section. The texture of the soil ranges close to a sandy loam, particularly along the boundary of the Ruston gravelly sandy loam.

The type occurs as a long, narrow strip along the lower slope of Crowleys Ridge between Dexter and Idalia. The surface is nearly flat with a slight slope from the ridge side toward the bottoms.

The material apparently consists both of colluvial wash from the slope and of old alluvial material. The soil mapped in Stoddard County is not a typical development of the Lintonia gravelly loam, since there is present considerable material washed from the Coastal Plain deposits lying beneath the Memphis silt loam of Crowleys ridge. The flat topography is probably the result of stream action, and there is probably present considerable material which is the result of stream deposition, although the surface material no doubt consists mainly of colluvial wash.

The type has good drainage. It is largely under cultivation to the general farm crops of the region, to which it is well suited, although it is not a very productive soil.

LINTONIA FINE SAND.

The Lintonia fine sand is a light-brown, loose fine sand. At a depth of about 12 inches it is slightly lighter in color, but the texture remains about the same throughout the soil section. The lower portion is usually yellowish brown.

The surface is level, except in places, where it is faintly ridged or undulating.

Only one area of this type occurs within Stoddard County, this being on the higher outer edge of the terrace south of Dexter, running through Bunker Hill and Bernie to the southern county line. On the east side of the terrace next to the edge of the lowlands the profile is typical. Here the sand has a depth of 3 feet or more. Toward the west the surface covering of sand becomes thinner, and the type grades into the Lintonia fine sandy loam or very fine sandy loam. The western boundary of the type is indefinite and rather arbitrarily placed.

Although it does not produce as good yields of corn, cotton, or wheat as the fine sandy loam and very fine sandy loam types, the Lintonia fine sand is well adapted to watermelons, cantaloupes, sweet potatoes, peanuts, and other crops which require a warm, light soil.

LINTONIA FINE SANDY LOAM.

The Lintonia fine sandy loam consists of a pale yellowish brown fine sandy loam, underlain at about 15 inches by yellowish-brown fine sandy clay loam to silty clay of a rather brittle structure when dry. There are some included patches of loam, silty clay loam, and also patches of a comparatively poorly drained grayish phase approaching a silt loam. A few colluvial slopes were also mapped with the type, as the area between Dexter and the Cotton Belt Railroad to the south. These gentle slopes represent wash from the Coastal Plain strata underlying the loess of Crowleys Ridge, and the soil consists of a mixture of loess and Coastal Plain material. The development south of Dexter consists of grayish to yellowish-brown fine sandy loam to sandy loam, underlain by yellowish loamy sand to sandy clay.

The type occupies the well-defined broad terrace bordering Crowleys Ridge to the south of Dexter. The surface is nearly level, with the exception of faint undulations, which are hardly noticeable in perspective.

The material is apparently old alluvium, deposited many years ago when the regional overflow attained much higher levels than at present. The terrace occupied by this and the associated types is approximately 10 to 15 feet above the lowlands east of the "Sand Road" from Dexter to Bernie.

The Lintonia fine sandy loam is a good agricultural soil. Cotton, corn, and forage crops do well. Small grains give fair to good results.

LINTONIA VERY FINE SANDY LOAM.

The Lintonia very fine sandy loam consists of a brown to light-brown very fine sandy loam, underlain at 12 to 18 inches by a yellowish-brown, friable silty clay loam to very fine sandy clay, which is mottled with gray in places. At 10 to 28 inches a yellowish-brown, rather tough, silty clay is encountered. The type includes some patches of Lintonia fine sandy loam, Calhoun silt loam, and Calhoun very fine sandy loam too small to be shown separately on the soil map.

The type occurs on the well-defined terrace south of Dexter, and in a large area in the vicinity of Advance, in the northern part of the county. An important area begins about 2 miles north of Bunker Hill, extends southward to the vicinity of Bernie, and thence southwestward nearly to the Dunklin County line. The surface is nearly level.

The material consists of old stream alluvium which was deposited when the waters of the Mississippi River reached high levels. This type is well drained, and is being successfully used in the production of the general farm crops of the region.

WABASH CLAY LOAM.

The Wabash clay loam consists of very dark brown to almost black sandy clay loam or sandy clay underlain at 4 to 6 inches by a dark-brown to almost black plastic clay, faintly mottled with yellowish brown. The lower subsoil is mottled drab and yellowish brown and is quite plastic, although there is some sand present throughout the 3-foot section.

The Wabash clay loam differs from the Wabash clay in having distributed over the surface and mixed with the soil and subsoil varying amounts of sharp quartz sand. The quantity in the surface soil is usually sufficient to give it a loamy texture and make it easy to cultivate. The presence of the sand also facilitates drainage.

Proportionally more of this type is under cultivation than of the Wabash clay, and it is considered by many the most productive type of the east lowlands. It occurs in large bodies in the eastern part of the county and in strips in other sections, frequently adjoining areas of clay. In some places narrow areas comprise a sandy clay on one side and clay on the other.

WABASH CLAY.

The Wabash clay is a black or very dark brown clay at the surface. In places the material is black to a depth of 2 feet or more, but generally the lower part is mottled brown, rusty brown, and drab or bluish gray. When dry it cracks and has a tendency to assume a granular character at the surface. The material is usually quite plastic at a depth of a few inches. When wet it is sticky at the surface.

The largest bodies of this soil lie in the low, undrained lands in the eastern part of the county. Many parts of these areas are inaccessible. An area north of Puxico in the Mingo Swamp, although not quite typical, is included with this soil. In the east lowlands south of Essex long strips or belts of this soil occur. These occupy areas which are slightly lower than the adjoining lands, vary in width from only a few rods to half a mile or more, and usually include drainage courses. Many drainage ditches follow these low belts.

On the narrow strips of Wabash clay cypress and tupelo gum constitute the predominating forest growth, but on the broader areas there is a mixed growth of these and white oak, red oak, willow oak, sweet gum, and black gum.

Although little has yet been done to clear the larger areas, many of the narrow strips are being cultivated. Where they are well drained excellent results with corn are obtained. No other crop is grown. On account of the rank growth of weed and late maturity it is doubtful if cotton will prove as desirable a crop as on the lighter, warmer soils.

CALHOUN VERY FINE SANDY LOAM.

The Calhoun very fine sandy loam consists of a grayish to brownish-gray very fine sandy loam, underlain at varying depths by gray or drab very fine sandy loam, usually mottled with rusty brown and yellowish colors, which generally passes within the 3-foot section into a rather plastic and impervious silty clay. In places the surface soil ranges to a silt loam, and frequently the silty clay stratum is quite near the surface.

The type occurs in comparatively small areas on the terrace southwest of Bernie. The surface is flat to slightly depressed, and the drainage is poorly established.

This soil is best suited to those plants which thrive on poorly drained soils, such as grasses, lespedeza, and sorghum. With improved drainage corn and small grains can be successfully grown.

CALHOUN SILT LOAM.

The Calhoun silt loam as mapped in Stoddard County occurs in three general localities, the type in each locality differing in some respects from that in the others. The most extensive development of the soil is in the broad lowland west of Crowleys Ridge and south of Puxico. In this region the type consists of a pale yellowish brown to light-gray silt loam, underlain by almost white silt loam faintly mottled with rusty brown or yellowish brown. A mottled gray or white, drab, and yellowish-brown plastic silty clay loam or silty clay is encountered within the 3-foot section. Black oxide of iron concretions and concretionary material are common in the subsoil. In this locality there is some variation in the type. In places there is more brown in the surface soil and less mottling in the subsoil than usual. Again, large quantities of fine sand are sometimes present in the material. In general the type in this part of the county is physically very much like the Waverly silt loam.

Another occurrence of the Calhoun silt loam is in small, somewhat isolated areas in the minor valleys on the western side of Crowleys Ridge, only a short distance above the point at which the valleys open out into the broad western lowland. Representative areas occur in Duck Creek Valley and in the main valley or west lowland west of Asherville. In this general location the type consists of a light-gray silty clay loam, mottled with brown, underlain at about 4 to 8 inches by a white silty clay loam which is also mottled with shades of brown. The subsoil is encountered at 15 to 20 inches and consists of a brownish-drab, plastic silty clay, faintly mottled in places with ochreous yellow. The surface soil contains large quantities of iron concretions. The subsurface material becomes noticeably powdery on drying out. In the lower part of the subsoil there is in many places considerable white, friable silty clay loam. In this

development of the type the surface is usually level and the material represents old alluvium not now subject to overflow but usually poorly drained. The soil is slightly heavier here than that encountered in the lowland. It is mainly in need of thorough drainage, the incorporation of organic matter, and probably lime.

The third general occurrence of the type is in the lowland east of Crowleys Ridge, between the foot of the ridge and the Cotton Belt Railroad. In this locality it occurs in a number of more or less isolated areas on old stream terraces, such as that south of Dexter. The soil is a pale yellowish gray to mottled gray and yellowish-brown, smooth-textured silt loam, underlain at about 5 to 8 inches by a white silt loam, mottled with rusty brown, yellowish brown, and drab. This white subsurface material is very powdery when dry and changes abruptly at 15 to 24 inches into a heavy, tenacious silty clay, mottled with gray or white and drab, yellowish brown, and rusty brown. This subsoil sometimes contains dark oxide of iron material, and in places the upper few inches is cemented by iron salts into a rather resistant hardpan. The lower part of the subsoil is sometimes comparatively light in texture. In this general location the type is composed of old alluvium, deposited when the regional flood waters reached higher levels than at present. The surface is from a few inches to 2 or 3 feet higher than that of adjoining soils. In its natural state the type supports a forest growth consisting almost exclusively of post oak. Drainage is only fair.

Large areas of the Calhoun silt loam are under cultivation, and where the soil is of good depth fair results are obtained. It can be improved by artificial drainage, the application of lime, and the incorporation of organic matter. Phosphatic fertilizers have proved beneficial on land similar to this in other sections. The type seems best adapted to wheat, sorghum, timothy, and other grasses.

CALHOUN SILTY CLAY LOAM.

The soil of the Calhoun silty clay loam consists of gray to nearly white silty clay loam, frequently mottled with rusty brown and occasionally with yellowish colors. This is underlain at about 14 to 18 inches by a gray or drab, tough silty clay, frequently mottled with brown, and usually containing iron concretions. This clayey subsoil is so impervious as to retard drainage and aeration of the soil.

The type has an extensive development in the bottoms west of Crowleys Ridge, and is also encountered in the northern part of the county, east of Advance. The surface is characteristically level, and rainwater frequently stands on it for long periods.

Most of the type is forested, the principal trees being willow oak and water oak. There are some places where water-loving grasses and shrubs are common, and trees are scarce.

The type occurs on the broad terrace mainly between the first bottoms of the St. Francis River and the foot of Crowleys Ridge. The material was deposited when the streams reached higher levels than they do now.

In its present condition the soil is best suited to those crops which succeed on poorly drained soils, such as lespedeza and certain grasses. With better drainage, wheat could probably be made a successful crop. Corn also should give fair to good returns during years of moderate rainfall. Liberal applications of lime would probably give good results.

CALHOUN CLAY.

The Calhoun clay consists of a brownish-gray, faintly mottled with drab, to mottled gray, yellowish-brown, and rusty-brown silty clay. This is underlain at about 6 inches by a mottled gray or white, yellowish-brown, rusty-brown, and drab clay or silty clay.

This type occurs mainly in the west bottoms, but there are also some small areas in the Advance bottoms.

In areas of the Calhoun clay near the St. Francis River an appreciable amount of fine and very fine white sand is present on the surface and throughout the soil. Some of these areas are under cultivation, and fair crops are produced.

The greater part of the type is forested, mainly with water oak, willow oak, elm, maple, sweet gum, hickory, ash, and black oak. This soil is probably best adapted to grass and lespedeza.

VICKSBURG SILT LOAM.

The Vicksburg silt loam is a brown, smooth silt loam. At a depth of about 16 inches the material is slightly heavier in texture, and has a light yellowish brown color. In places it grades into a silty clay loam.

This is a first-bottom soil, strips of which have been built up along the St. Francis, Castor, and Little Rivers. It is still in the process of formation, being added to at each overflow. The soil is deepest near the streams, gradually becoming shallower away from their courses.

This type is alluvial, and composed of wash from several soils, including those of loessial origin.

Where of good depth and well drained this is one of the most productive soils of the county. Good yields of corn, cowpeas, and clover are produced. The type is also well suited to alfalfa and potatoes. Its disadvantages are that it occurs in narrow strips, that portions of it are subject to overflow, and that the areas a short distance back from the streams are often poorly drained.

YAZOO FINE SANDY LOAM

The typical Yazoo fine sandy loam is a brown to grayish-brown or yellowish-gray loamy fine sand to fine sandy loam, underlain at about 6 to 12 inches by a lighter brown or yellowish-brown, compact fine sandy loam, which grades at 15 to 24 inches either into a mottled yellowish and grayish, friable fine sandy clay or into a yellowish-brown fine sandy loam, faintly mottled with shades of yellow.

Bodies of Waverly very fine sandy loam, as well as of Waverly silt loam, too small to be mapped separately, are included with the Yazoo fine sandy loam.

This type occupies the higher positions in the Mississippi River bottoms east of Crowleys Ridge, ranging from a few inches to about 4 or 5 feet above the heavier soils. The surface is characteristically gently undulating. The more nearly level the surface the lighter is the color of the soil material, and the more intensely mottled is the subsoil. In other words, the better drained areas are darker in color.

The material forming this type has been deposited from overflow water, and exists as first bottom lands along the larger streams. This is a good agricultural soil, well suited to corn, cotton, and forage crops. There is no reason why alfalfa could not be successfully grown on the typical brown soil, such as that near Hunterville. The poorer drained, flatter areas can be improved by tiling or ditching and probably by liming.

In some places in the southern part of the county sand mounds, locally known as "sand blows" are common to the type, being sufficiently numerous in places to affect the agricultural value of the land.

CLARKSVILLE STONY LOAM.

As mapped in Stoddard County, the Clarksville stony loam is somewhat variable in composition. The typical soil is a grayish silt loam which quickly passes into a pale-yellow silt loam or silty clay loam and this into yellowish to reddish material carrying large quantities of chert fragments. There is present over the surface and through the soil enough angular fragments of chert to give the material a prevalingly stony character.

The type occupies hills and the upper slopes of the sides of stream valleys. The areas are rather small. They occur in the vicinity of Puxico and Idlewild. Those strips along the valley wall of the Mingo Slough include considerable rock outcrop.

The material appears to be mainly residual from the underlying limestone, but there is no question that the soil in places carries considerable material from the deposit of loess which originally mantled the general region.

The greater part of this type is forested, mainly with oak. It is, on account of its topography and rocky character, generally best suited to forestry. Some areas might be used for fruit growing.

SUMMARY.

Stoddard County, with an area of 815 square miles, or 521,600 acres, is an important county in the lowland region of southeastern Missouri. This region differs from the remainder of the State in climate, stage of development, and character of agriculture. The growing season is longer, the winters are milder, and the precipitation is greater than in other sections. The remainder of the State has been settled and farmed for 50 to over 100 years, but the larger part of the lowland region has been under cultivation for less than 10 years. The population in much of the remainder of the State is decreasing. In the lowland region it is rapidly increasing.

Stoddard County has two distinct topographic divisions, Crowleys Ridge and the lowlands.

Crowleys Ridge comprises about one-third of the county, and has been settled for a longer time than the lowlands. The older type of farming, common to the Southern States, is generally practiced in this region.

The soils of the county may be divided broadly into two groups corresponding with the two important physiographic divisions, the uplands and the lowlands.

The upland soils, derived from loess, from limestone, or from Coastal Plain deposits have been grouped with the Memphis, Clarksville, and Ruston series.

The lowland soils are alluvial types and fall in eight different series. The most important of these in point of extent are the Olivier, Yazoo, Wabash, Waverly, and Calhoun.

The lowland soils are more valuable than the upland. Uncleared lowland areas, where drained, may be purchased for prices ranging from \$30 to \$50 an acre. After clearing, such land is worth from \$50 to \$100.

Corn, cotton, and wheat are the principal agricultural products of Stoddard County.

Approximately one-half of the lowlands is drained and under cultivation. Reclamation of the remainder is progressing.

The region is one well suited to general farming and stock raising.



[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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