

EROSION SURVEY No. 18

*Erosion* and RELATED  
LAND USE CONDITIONS

*in the*  
**Illinois Bayou**  
**Soil Conservation District**  
*Arkansas*

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EROSION

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## CONTENTS

	<i>Page</i>
Introduction.....	1
Using the land in the Illinois Bayou District.....	2
<i>Classes of land according to use capability.....</i>	<i>2</i>
<i>Relation of soil groups, slopes, and erosion to use capability.....</i>	<i>3</i>
<i>Choosing practices to fit the land.....</i>	<i>5</i>
<i>Results and significance of the land inventory.....</i>	<i>16</i>
Description of the area.....	19
Agriculture.....	22
The conservation survey.....	24
<i>Methods and definitions.....</i>	<i>24</i>
<i>Soils.....</i>	<i>25</i>
<i>Erosion.....</i>	<i>38</i>
<i>Slopes.....</i>	<i>41</i>
<i>Land use.....</i>	<i>42</i>
<i>Relation of erosion to other factors.....</i>	<i>42</i>
Summary.....	46

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## Introduction

SOIL EROSION in the area included within the Illinois Bayou Soil Conservation District of Pope County, Ark., has given rise to abandoned fields, to gullied slopes, to areas of unproductive gravel and sand deposited over rich bottom lands, to heavy silting of stream channels, to yearly drought damage, and to dangerously low crop yields. Moderate erosion has affected 56,508 acres or 31.4 percent of the area. Severe and very severe erosion have affected 12,453 acres, or an additional 7 percent.

Soil erosion became active on the uplands along the Arkansas River Valley when the original forest cover was cut. This began in the early part of the nineteenth century and continued until at the present time only small plots of virgin forest remain within the limits of the conservation district.

As land was brought under cultivation, the intertilled crops, corn and cotton, were grown on the greater part of the area farmed and the rows of these crops were laid out without regard to the direction or steepness of slope of the land. Winter cover crops were not used. As a result, soil erosion has carried away much of the topsoil on the upland areas that have been placed under cultivation. Some cultivated fields have been terraced, but many of the terraces have been built with excessive fall. Adequate outlets have not been provided, and gullying both at the outlets and along the flow lines has resulted. The tendency toward excessive soil erosion has been increased by the naturally low content of organic matter in the topsoils of the upland part of the area.

In order to show that serious soil erosion can be checked and to demonstrate the best methods to accomplish this, a camp work area that utilized the service of the Civilian Conservation Corps was established by the Soil Conservation Service at Russellville in June 1935. Through cooperative agreements with many individual farmers, plans for the complete protection of their farms from further soil erosion were adopted and the proper measures to

accomplish this object were gradually undertaken.

Following the passage of Act No. 197, Fifty-first General Assembly of the State of Arkansas, on March 3, 1937, the necessary steps were taken to organize a soil and water conservation district on the Illinois Bayou. As far as possible, boundaries such as roads and rivers were used. The district as established included an area of 179,450 acres. Its location in the north-central

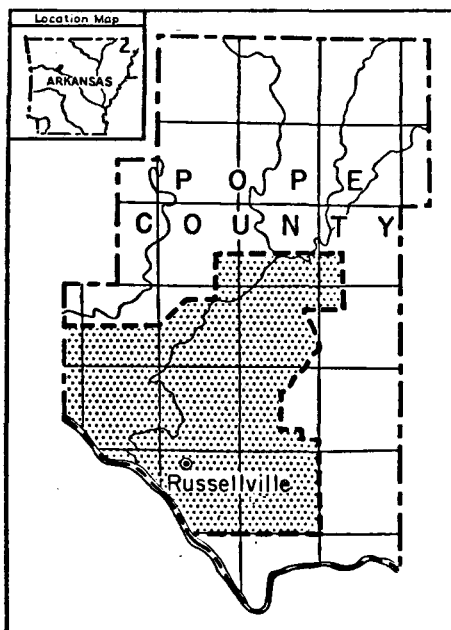


Figure 1.—Sketch map showing location of Illinois Bayou Soil Conservation District.

part of Arkansas is shown on the map (fig. 1.).

A memorandum of understanding between the officers of the district and the United States Department of Agriculture was signed on February 2, 1938, and the necessary steps leading to cooperation in establishing proper measures for soil and water conservation were taken. The district enters into cooperative agreements with farmers to establish soil conservation practices and arranges for the service of technicians in making and carrying out such agreements.

Between March 1938 and February 1939 a conservation survey of the district was made to determine the distribution of the different types of soil, the extent to which soil erosion has already progressed, and the relationships that exist between the slope of the land, the character of the land cover, and erosion conditions. Based on the results of this survey, it is possible to establish the capability of different classes of land for use in farming and to discuss the significance of the physical land factors in planning a program of wise land use and of soil conservation. This report presents the facts as ascertained by the survey and discusses their relationships to the land use problems of the district.

The climatic conditions existing in the district and the history and the present status of agriculture are presented, also, to indicate the circumstances other than the physical factors under which existing conditions have arisen.

The accompanying conservation-survey maps, published on the scale of 4 inches to the mile, show the use-capability classes and the physical character of the land in detail. They show the use capability of the land in colors, the base map in black, drainage in blue, conservation-survey boundaries and symbols in brown, and land use in gray. Each full sheet covers an area of about 10.5 square miles. Owing to the irregular boundary of the district, 32 sheets are required for the map of the entire area.

## Using the Land in the Illinois Bayou District

### *Classes of Land According to Use Capability*

IN MAKING the soil conservation survey, the soil type, slope, kind and degree of erosion, and the present land use were mapped in great detail. Each of these factors has its influence on the erosion processes, and on the methods that should be adopted for erosion control. For working out the more general relationships of erosion-control practices

and good land use on farms, the factors mapped can be grouped into a simple classification that expresses the capability of land for use and gives full recognition to each of the physical factors wherever it is significant.

More than one-fourth of the district is under cultivation at the present time. Additional areas have been cultivated in the past and are now idle or in pasture. More than one-third of the area is in woodland. Some of the land is not well suited to cultivation under the ordinary practices. Among the causes are shallow depth of soil material over the underlying rock; stony topsoil; poor drainage due to stiff, impervious subsoils; frequency of overflow; steepness of slope; and erosion conditions that have made crop yields unprofitable or tillage operations difficult.

The classification according to use capability distinguishes land suitable for cropping from that suitable only for less intensive uses and shows the intensity of protective measures that should be adopted if the land is to be cropped. This classification, considered in connection with the soil-group characteristics, indicates the kinds of practices that need to be adopted to provide adequate soil and water conservation.

Five classes of land according to use capability have been recognized in the Illinois Bayou district. Three of these are suitable for continuous crop production, with appropriate kinds of land management and conservation practices. Another is suitable for very limited cultivation but may be used for permanent pasture or the production of hay. The fifth class is not suitable for any form of cultivation and its best use is limited to permanent pasture, to woodland, and to wildlife.

Class I land is suitable for cultivation without the use of any special practices. It meets all the following requirements: It is nearly level and consequently is not ordinarily subject to erosion under any method of cultivation; it is sufficiently productive to make cropping of some kind feasible; it is physically suitable for cultivation, not needing unusual drainage measures or the removal of excessive amounts of stone. It may have a cover of grass, trees, or

brush at present or be in crops, since its assignment in the classification is based on physical characteristics and not on present use. Although land of class I does not need the adoption of any special farming practices from the standpoint of soil and water conservation, other soil- and crop-management practices are desirable or even necessary to maintain satisfactory yields of crops. Among these are proper crop rotations, the use of lime or fertilizers to replace plant nutrients removed by crops or leached away, the addition of organic matter through plowing under green-manure crops, and practices to control plant diseases and insect pests. These are good farm practices, usually desirable on all cultivated land.

Class II land includes land that is suitable for cropping but requires the application of one or more protective practices in order to be cultivated safely and permanently. In the Illinois Bayou district, these practices, which may be used singly or in combination, include contour tillage, strip cropping, water diversion, and terracing.

Land falling in class III requires intensive measures or combinations of measures in order to be cultivated safely and permanently with a prospect of moderate to high yields of the adapted farm crops. In addition to contour tillage, strip cropping, the use of winter cover crops, and water diversion, complete terrace systems should be installed that include provision for the safe disposal of all surplus water. Class III indicates the limits beyond which intertilled crops may not be grown safely, because of soil characteristics, steep slope, or an advanced stage of soil erosion.

Class IV includes land that may not be cultivated safely except at infrequent periods and with special precautions. It is land that should be provided with a permanent grass cover and used for either pasture or hay or should be maintained in trees or shrubs. Any more intensive use is undesirable.

Class V includes all land that because of rocky surface, steep slope, advanced condition of erosion, or other features is not suitable for any form of cultivation. Most of this land should be utilized for

woodland and wildlife purposes; some of it may be used for pasture.

This classification of land according to use capability furnishes a guide to the kind of cropping practices that may be followed safely and to the intensity and variety of the protective measures that must be used in each class. Selection of the crops to be grown, of the cropping systems to be followed, and of the protective measures to be employed will vary in each class with the nature of the soil and the needs of the individual farmer.

### *Relation of Soil Groups, Slopes, and Erosion to Use Capability*

The soils mapped in the Illinois Bayou district have been combined into 15 groups. Three groups, the three most extensive, occur only in the uplands and cover 137,431 acres or 79 percent of the total area. Two of these consist of deep soils that have been developed on sandstone and shale and the third, and most extensive group, of shallow soils similarly developed. All of them are naturally rather deficient in organic matter. The deeper soils lie on the more gentle slopes, and the shallow soils on the intermediate and steeper slopes. Over 40 percent of the area of the deeper soils is under cultivation; 12.7 percent of the shallow soils is cropland, over 50 percent is woodland.

Terrace, or second bottom, soils that lie at elevations well above any present overflow make up five groups. Two are well-drained and cover an area of about 6,000 acres, and the other three are imperfectly to poorly drained and of small extent. The well-drained soils occur on gentle to moderate slopes, the others chiefly on nearly level land. Over 40 percent of the well-drained soils is under cultivation; the greater part of the poorly drained soils is either in pasture or woodland or is idle.

The six groups of flood-plain soils have a total area of 27,743 acres, of which 22,656 lie along the courses of local streams, 4,714 acres along the Arkansas River, and 373 where tributary streams flow into the Arkansas. These soils occur in level or depressed

areas, some of which are subject to overflow and to the deposition of new material. The better drained soils not subject to overflow constitute some of the best cotton and corn soils in the district. Aside from some stream-bank cutting, soil erosion is not a problem.

There are certain areas of land on which definite soils have not been formed and which have little or no agricultural value. These include river-wash, shale outcrop, and rough stony land, which form another group with a total area of 3,456 acres.

The prevailing slopes of the 15 soil groups differ greatly. Most of the flood-plain soils have a slope of less than 2 percent. Slopes are more varied on the terrace soils, ranging from nearly level on

the terrace tops to 8 percent or more along their margins. Slopes on the upland soils range from gentle or moderate on the deeper soils to very steep on the shallower ones.

Slope affects the rate of run-off, which decidedly influences liability to erosion. It also affects natural drainage. It is one of the factors determining the capability of land for continued use. Slope classes are designated on the map by letters A, B, BB, C, D, and E. A slopes are less than 2 percent on this survey; B, 2 to 5; BB, 5 to 8; C, 8 to 12; D, 12 to 25; and E, all slopes of 25 percent or more.

The character and degree of soil erosion at the present time was also mapped in detail, and 24 different

TABLE 1.—Soil types, slope classes, and erosion classes making up each class of land according to use capability

Soil group	Slope <sup>1</sup> and erosion <sup>2</sup> characterizing land-capability class—				
	I (green) <sup>3</sup>	II (yellow) <sup>3</sup>	III (red) <sup>3</sup>	IV (blue) <sup>3</sup>	V (orange) <sup>3</sup>
1. Upland soils on sandstone		A-+, 1, 2, 3. B-+, 1, 2, 3.	A-27, 37. B-27, 37. BB-1, 2, 27, 3, 37.	A-38. B-2⊙, 3⊙, 38, 4, 47, 4⊙. BB-2⊙, 3⊙, 38, 4, 47, 48.	All other classifications.
2. Upland soils on shale: a, Imperfectly drained		A-1, 2, 3. B-1, 2.	A-27, 37, 33. B-27, 3, 37. BB-1, 2, 27, 3, 37.		Do.
b, Poorly drained				All classifications.	
3. Shallow upland soils on sandstone and shale.			A-1, 2, 27, 3, 37. B-1, 2, 27, 3, 37.		Do.
4. Well-drained soils on terraces of local streams.		A-1, 2, 3. B-1, 2, 3.	A-27, 37. B-27, 37. BB-1, 2, 27, 3, 37.	A-2⊙, 3⊙, 4. B-3⊙, 38, 4, 47, 4⊙, 48. BB-3⊙, 38, 4, 47, 4⊙, 48.	Do.
5. Imperfectly or poorly drained soils on terraces of local streams.				All classifications.	
6. Well-drained soils on terraces of the Arkansas River.		A-1, 2, 3. B-1, 2, 3.	A-27, 37. B-27, 37. BB-1, 2, 27, 3, 37.	A-3⊙. B-3⊙, 38. BB-3⊙, 38.	Do.
7. Poorly drained soils on terraces of the Arkansas River.				All classifications.	
8. Imperfectly drained calcareous soils on terraces of the Arkansas River.		A-3. B-1, 2, 3, 4.	B-37. BB-3, 37, 4, 47.		Do.
9, 11, 12, 13, 14. Soils on flood plains, well-drained or imperfectly drained.	All classifications if not subject to frequent overflow.			All classifications if subject to frequent overflow.	Immediate stream banks.
10. Poorly drained soils on flood plains of local streams.			All classifications if artificially drained and not subject to overflow.	All classifications if not subject to overflow and artificially drained.	
15. Land classes that have little agricultural value.					All classifications.

<sup>1</sup> Slope symbols: A, Less than 2 percent; B, 2-5; BB, 5-8; C, 8-12; and D, 12-25 percent.

<sup>2</sup> Erosion symbols are explained in detail on p. 25 and in the legend on the maps accompanying this bulletin: 2, 3, and 4 indicate progressive degrees of sheet erosion; 7, ⊙, and 8 indicate occasional shallow, occasional deep, and frequent shallow gullies, respectively; 1 indicates no apparent erosion.

<sup>3</sup> Color distinguishing class area on maps accompanying this report.

classes of erosion were recognized. These classes were grouped, as shown on page 38, into recent alluvial deposits, slight, moderate, severe, very severe, and normal erosion.

Table 1 shows the effect of soil type, slope, and existing degree of erosion on the use capability of the land.

### Choosing Practices to Fit the Land

The physical survey of the land presents the facts concerning the soils, slopes, and erosion conditions, and present land uses in such form as to permit choosing the cropping practices and conservation measures that will save the soil, and, at the same time, make better use of the land.

The farming and conservation practices recommended for the Illinois Bayou conservation district are summarized for the different land-capability classes in table 2.

All the tracts of soil that may be considered class I land occur in the naturally well-drained or imperfectly

drained flood plains. None of the second bottom or upland soils are in this class. To fall within class I, land must be capable of being farmed to the staple crops of the region without special treatments beyond the usual farm practices. It must not require erosion-prevention measures nor anything but simple drainage operations. It must not require the removal of stones or other obstructions to tillage. It must give a reasonable response to ordinary cropping and fertilization practices. Such land is shown in figure 2, A. There are 17,345 acres of class I land within the Illinois Bayou Conservation District.

On this land, cotton may be grown continuously and the soil maintained in good condition if a moderate amount of a fertilizer high in phosphorus is used and if a winter legume is grown with the cotton 2 years out of 5 to be turned under as a green manure. On no other land in the district can continuous cropping to cotton be considered a good practice.

TABLE 2.—Farming and conservation practices recommended, according to capability of land for use

Land-capability class	Soil group	Practices for cropland			Practices for meadow or pasture	Practices for woodland <sup>1</sup>
		Rotations	Fertilizers or amendments	Supporting practices		
I.....	Flood plain soils well-drained or imperfectly drained, groups 9, 11, 12, 13, 14.	1. Continuous cotton. 2. Cotton, alternating with corn, sorghum, or soybeans.	Phosphatic fertilizers. Organic matter maintained by plowing under cover crops.	1. Winter legume with cotton 2 years in 5. 2. Winter legume with cotton. Summer legume with corn. 3. Summer legume with corn or sorghum. Lespedeza or alfalfa in rotation or in strips.	Sodding with Bermuda grass. Seeding lespedeza. Clearing brush. Controlled grazing.	Plantings of mixed hardwood species on open land; bois d'arc, catalpa, black locust in furrows and cultivated. Management of established stands: Selective cutting to supply fence posts, poles, and lumber for home use and sale. Protection from fire and destructive grazing.
II.....	Deep upland soils, groups 1, 2. Second bottom soils well-drained, groups 4, 6.	1. Cotton, alternating with corn, sorghum, or soybeans. 2. Row crops with strips of close-growing crops of different widths. 3. Special cropping practices on critical areas.	do.....	1. Winter legume with cotton. Summer legume with corn. 2. Summer legume with corn or sorghum. Oats and lespedeza in strips or lespedeza strips. 3. Summer and winter cover crops to be turned under. Lespedeza in rotations. Contour cultivation. Terraces or diversion terraces as needed.	Sodding with Bermuda grass. Seeding with lespedeza. Contour furrows, as needed. Diversion terraces, as needed. Clearing brush. Controlled grazing.	Plantings of short-leaf pine; black locust sparingly in pine stand or mixed with pine, in furrows and cultivated. Spot planting of pine in openings. Management: Selective cutting of mature pine for poles and lumber, of hardwoods for posts and fuel. Replanting of gullies to suitable species. Protection from fire and grazing.

TABLE 2.—Farming and conservation practices recommended, according to capability of land for use—Continued

Land-capability class	Soil group	Practices for cropland			Practices for meadow or pasture	Practices for woodland <sup>1</sup>
		Rotations	Fertilizers or amendments	Supporting practices		
III.....	Deep upland soils, groups 1, 2.	Cotton and corn, alternating.	Complete phosphatic fertilizer. Organic matter maintained by plowing under cover crops. Manure with phosphate.	Winter legume with cotton. Summer legume with corn. Contour cultivation, strip cropping, terracing, water disposal, gully control. <i>Lespedeza sericea</i> or kudzu 4 to 5 years on eroded areas. Retirement to meadow or pasture.	Sodding with Bermuda grass. Seeding with <i>Lespedeza</i> . Contour furrows as needed. Control of gullies by sodding. Diversion terraces, as needed. Clearing brush. Controlled grazing.	Plantings of short-leaf pine and red cedar. Sod to be removed. Management: No large openings to be made. Protection from grazing and fire. Replanting of gullies.
	Second bottom soils well-drained, groups 4, 6, 8.	1. Cotton, corn, or sorghum. 2. Cotton and corn, grain sorghum in strips. 3. Special cropping practices.	Phosphatic fertilizer with cotton. Organic matter maintained by plowing under cover crops.	.....do.....	.....do.....	Do.
	Shallow upland soils, group 3.	Cotton, corn, or sorghum.	Plowing under of leguminous cover crops to increase organic matter. Use of commercial fertilizer carrying nitrogen and phosphorus.	Summer legume with corn or sorghum. <i>Lespedeza</i> in strips of different widths. <i>Lespedeza</i> in rotation. <i>Lespedeza sericea</i> or kudzu on eroded areas. Gully control. Retirement to meadow or pasture. Terracing not advisable. <i>Lespedeza sericea</i> or kudzu to occupy critical areas for 4 or 5 years. Row crops grown on the contour with intervening strips of Bermuda grass and <i>Lespedeza</i> . Gully control.	Increase acreage in grass land by sodding and seeding.	Do.
IV.....	Deep upland soils, groups 1, 2. Second bottom soils, well-drained, groups 4, 6, 8.	Cotton or corn at long intervals with meadow or pasture intervening for several years.	Complete phosphatic fertilizer used on row crops.	<i>Lespedeza sericea</i> or kudzu to occupy critical areas for 4 or 5 years. Row crops grown on the contour with intervening strips of Bermuda grass and <i>Lespedeza</i> . Gully control.	Grazing to be controlled. Grassland to be fertilized and manured as needed. Supplementary drainage. Contour furrows and ridges. Protection from overflow. Gully control. Cutting of brush.	Same as class III. Black locust only in gullies; catalpa and bois d'arc on moderately well-drained stream terraces.
	Other soils.....	To be used for grass and legumes for hay or pasture.	.....do.....	.....do.....	Control of gullies. Drainage improvement.	
V.....	Upland and second bottom soils, groups 1, 2, 4, 6, 8.	May be used for hay or pasture.	.....do.....	Replanting to woodland.	Control of gullies. Contour ridges or furrows. Liming, as indicated by soil tests.	Maintenance of existing stands by restricted cutting, especially on slopes. Complete protection from fire and grazing. Planting chiefly on gullied areas on stream terraces.
	Group 3. Second bottom and flood plain soils, groups 5, 7, 9, 10, 12, 13, 14.	May be used for hay, pasture, or woodland.	.....do.....	.....do.....	Supplementary drainage. Protection from overflow. Fertilization to maintain grass stand.	
	Land classes of little agricultural value, group 15.	Woodland, only	.....do.....	.....do.....	.....do.....	

<sup>1</sup> All woodland and tree plantings should be protected from fire and grazing.





**Figure 2.**—*A*, Class I land on the well-drained bottom lands of the Arkansas River. This field of cotton is on Portland very fine sandy loam, has A slope, and is not subject to frequent overflow. *B*, Class II land on the deep Hanceville fine sandy loam of the upland, with an A slope and slight erosion. Contour cultivation and cover crops are needed to maintain this land in good condition. *C*, Contour strip cropping on a gentle slope on class II land.

Several different successions of corn and cotton or of corn, cotton, and sorghum may be grown to meet the needs of individual farmers. Phosphatic fertilizer should be used on the cotton crop and a winter legume should be grown with it; a summer legume should be grown with the corn to aid in maintaining the productivity of the land. Lespedeza may be grown for 3 years between a crop of cotton and one of corn, or it may be grown in strips of varying widths with the row crops. Alfalfa may be substituted for the lespedeza on well-drained, calcareous soils or on well-drained soils that have been limed.

Land assigned to class II lies on A or B slopes. It has had but slight or moderate sheet erosion and no gullies have been formed. It is free from any serious obstructions to cultivation, such as large or abundant rock fragments, and it is sufficiently well drained not to require any extensive or unusual drainage operations. It has a total depth of more than 3 feet to underlying rock.

Land of this class occupies the gently sloping parts of the deep sandstone and shale soils of the upland and the well-drained second bottoms. Its total extent amounts to 24,301 acres. A typical area is shown in figure 2, *B*. It may be cultivated to the crops suited to the climate if certain simple precautions are observed to maintain the land against erosion. Cotton should not be grown continuously. Instead, cotton should be alternated with corn, sorghum, and soybeans, grown in acreages to suit the needs of the individual farm. A winter legume should be grown with the cotton and a summer legume with the corn. These should be turned under to maintain or increase the organic-matter content of the topsoil. Phosphatic fertilizers should be applied to the cotton crop. On areas where one-fourth to one-half of the topsoil has been removed, and on B slopes, row crops should be grown with intervening strips of a close-growing crop like lespedeza or winter oats followed by lespedeza. The width and frequency of the strips should be greater on the steeper slopes. The crop rows should be laid out as nearly level as possible—

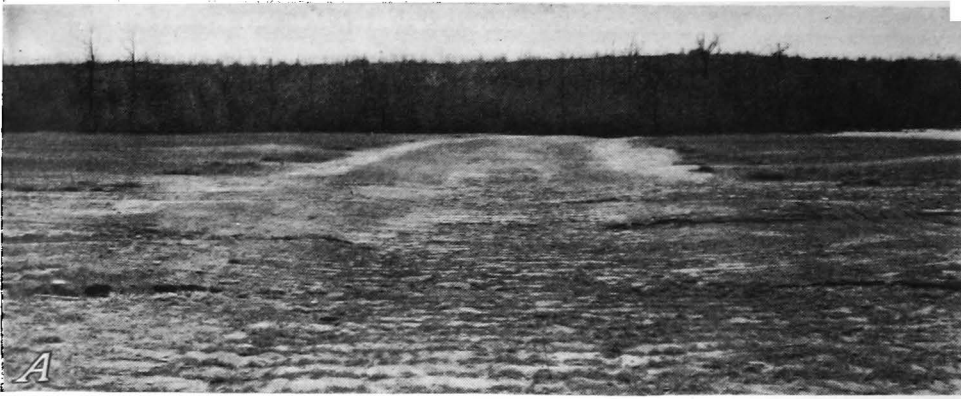
that is, on the contour—and should be cultivated on the contour (fig. 2, *C*). Care should be taken to dispose of excess water by grassed waterways or water should be kept off the land by diversion terraces (fig. 3, *A*). In cases of extreme erosion, special cropping practices may be required, such as the growing of lespedeza for 3 years in rotation with crops of cotton and corn.

Class III lands require the adoption of careful practices of cultivation and the use of supporting measures to permit their continued safe use for cropping. This class includes all areas of deeper upland soils and well-drained terrace soils on A and B slopes on which gullying has started (fig. 3, *B*) and on BB slopes that are not so badly gullied as to render further cultivation dangerous. It includes also a small area of imperfectly drained calcareous soils on the Arkansas River terraces and poorly drained soils on flood plains of local streams that are artificially drained and not subject to overflow.

Cotton should not be grown continuously on class III lands. Cotton and corn may be grown in alternation provided a winter legume is grown with the cotton and a summer legume with the corn to be plowed under to maintain organic matter. Similarly, cotton, corn, and sorghum may be grown in succession, with lespedeza grown either in the rotation or in strips of different widths between the tilled crops. Winter oats, followed by lespedeza, may be grown following the corn crop. Contour cultivation and strip cropping should be practiced on class III land.

On the more severely eroded areas, special cropping practices are needed and sericea or kudzu should be grown for a period of 4 or 5 years. Phosphatic fertilizers or a complete fertilizer rich in phosphorus should be applied to cotton.

In addition to the use of proper cropping practices, it is necessary to install terracing as a supporting measure, with terrace grades and spacing adjusted to the nature of the soil and the steepness of the slopes. Surplus water from the terraces may be disposed of through proper outlet channels and disposal areas. Small depressions across fields should be set in permanent



**Figure 3.—A, A grassed terrace-outlet channel for terraces on class III land; B, this field of class III land, moderately eroded and with gullying started, requires contour strip cropping, terracing, and grassed waterways for water disposal in addition to good cropping practices; C, well-sodded area retired to pasture.**



**Figure 4.—***A*, This land of class IV has been taken out of cultivation and regrassed as pasture land. It lies on a B slope and has been severely eroded. *B*, The stony steeply sloping land in the background has been left in woodland. The land on a C slope below it has been very severely eroded. Gully control and reforestation are needed.

sod to form grassed waterways, checking possible gully formation. Some larger gullies may need to be sodded and seeded or even planted to trees and re-grassed to prevent their encroaching into cultivated land. Other areas may need to be retired to hay or pasture and be cultivated infrequently if at all (fig. 3, C). Small, poorly drained areas may require simple drainage methods to make them cultivable along with adjacent land.

This class III land includes 37,570 acres in the district. For individual farms including any large proportion of this class of land, the advice and assistance of the technicians serving the district should be secured in drawing up a complete plan for the protection of the land and for its best uses. Some of it should undoubtedly be retired from cultivation because of the relatively high cost of maintaining it in crops.

Land class IV includes upland and terrace soils that have been severely or very severely eroded on slopes up to 8 percent or that are poorly drained. It includes also the flood-plain soils that are subject to overflow or that are not sufficiently well drained to permit cropping without artificial drainage. There are 13,335 acres of such land in the district.

Land in this class should be cropped only at long intervals and then with every precaution to prevent further damage. Cotton and corn may be grown infrequently if the row-crop area is properly protected by higher-lying close-growing crops. Sericea or kudzu should be grown for 3 to 5 years successively. By far the greater area of class IV land should be established in grass for mowing or pasture and measures taken to form a thick protective sod. Such an area being grassed over is shown in figure 4, A.

Land class V includes all steeply sloping lands, all bottom lands subject to frequent overflow, all rough stony land and riverwash, and areas that have been very severely eroded. There are 82,042 acres of such land within the district and over 50,000 acres of it are now in woodland. Only 7,609 acres are at present under cultivation, the remainder of the area being idle or in pasture.

Cultivated crops should not be grown on land of this class. The smoother areas, not too steeply sloping, may be established in permanent Bermuda grass sod and used for pasture or hay.

Existing woodlands should be protected from fire, and tree planting may be needed on some of this land to protect it and to assist in protecting adjacent land capable of being cropped. Severely eroded land and steeply sloping stony land, both of class V, are shown in figure 4, B.

#### REPLANNING A FARM

Soil conservation surveys form the physical basis for ascertaining the needs of an individual farm for changes in land use and the farm practices that will prevent further erosion and improve the productivity of the farm. This direct use of the survey in choosing soil-saving practices is shown for a farm of 116 acres in the Illinois Bayou Soil Conservation District.

Figure 5 presents the results of the physical survey and the determination of the land-capability class.

There are 29.0 acres of Class I land, 1.4 of class II, 60.7 of class III, and 23.6 acres of class V. The farmyard and cemetery occupy 1.3 acres.

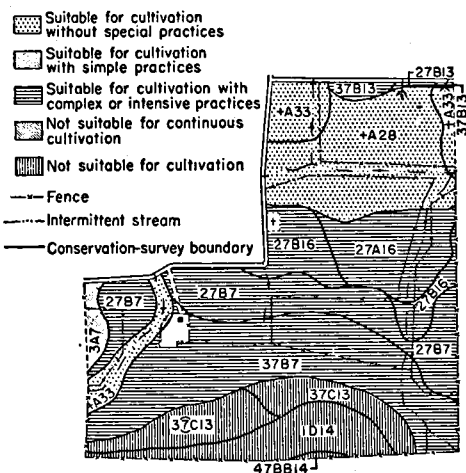
Pope fine sandy loam occupies a small area in the bottom lands on the northern part of the farm. This is one of the most highly prized alluvial soils along the local streams. It is subject to occasional overflow and deposition. It has slopes of less than 2 percent and is available for cropping or grass production without the adoption of special practices. Associated with it are small areas of the alluvial soils, undifferentiated, that are subject to additions of soil material and to overflow but are good grasslands. Both fall into land-capability class I.

There is a low terrace of Holston very fine sandy loam just to the south of the alluvial lands; the greater part lies on A slopes and a small part on B. This land is also valuable cropland, but because the tendency to form gullies must be checked it is assigned to land-capability class III.

Enders fine sandy loam occupies the

A and B slopes of the upland. The greater part of this soil area has been moderately eroded and has infrequent gullies. It is chiefly in class III.

The Pottsville gravelly fine sandy loam is on C slopes. It has lost from 25 to 75 percent of the topsoil and has been gullied deeply in places. It is not suitable for cultivation because of erosion and because the soil itself is not favorable to cropping on these slopes. The extreme southern part of the farm is occupied by the stony and shallow



**Figure 5.**—Physical survey of a farm of 116 acres, showing the classification of the land according to use capabilities. The symbols show erosion-slope-soil type. Erosion legend: +, Deposition; 1, no apparent erosion; 2, less than 25 percent of the topsoil lost; 3, 25 to 75 percent of the topsoil lost; 4, more than 75 percent of the topsoil lost; 7, occasional gullies; ⑦, deep gullies. Slope legend (percent): A, Less than 2; B, 2-5; BB, 5-8; C, 8-12; D, 12-25. Soil legend: 7, Enders fine sandy loam; 13, Pottsville gravelly fine sandy loam; 14, Pottsville-Hector complex; 16, Holston very fine sandy loam; 28, Pope fine sandy loam; 33, alluvial soils, undifferentiated.

Pottsville-Hector complex of soils on BB and D slopes. The area has properly been left in woods by the farmer.

The use of the land at the time the survey was made is shown in figure 6. There were 47.5 acres in crops, including meadow; 3.8 acres were idle; 54 were in pasture; and 9.5 were in woodland, which was also pastured.

In replanning the farm to conserve the soil, the physical factors shown were

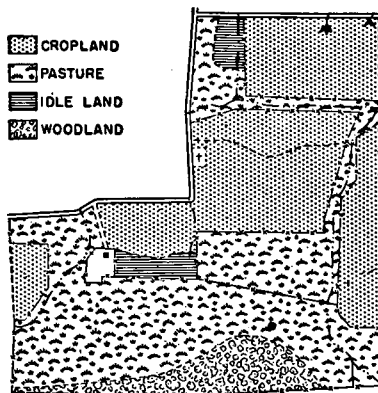
considered together with the economic needs of the farmer for each farm crop. The conservation practices that were agreed on as practicable are shown in figure 7.

Field No. 1, part of which bore a good stand of Bermuda grass and part of which was idle land capable of becoming good meadow, will be established as permanent meadow.

Field No. 2 will remain under cultivation. Contour cultivation will be used and the small area of Pottsville soil at the extreme north border will be cultivated with strips of close-growing crops.

Field No. 3 will remain in permanent meadow.

Field No. 4 will remain under cultivation and be strip-cropped and contour-



**Figure 6.**—Land use on farm shown in figure 5 at the time the survey was made.

tilled. To insure permanency of cultivation in this field, it was necessary to provide for a series of field terraces on the higher lying part and to lead the water from the terraces to grassed waterways in the pasture in field No. 6 or to the terrace outlet to the left of the field. A winter cover crop will be planted every second fall and plowed under in the early spring as a green-manure crop.

Field No. 5 will be continued in cultivation. It will be strip-cropped and contour-tilled, but terracing is not considered necessary since there is no problem of water running from higher lying land across this field as in No. 4.

Field No. 6 will continue to be used as pasture and will be sodded with Bermuda grass on the contour. It

includes land of classes III and V and a small area of class I land. It was not necessary to exclude grazing from the wooded area. Diversion terraces were built in this field near its northern border to carry away water that might otherwise flow across fields Nos. 4 and 8 and damage the croplands.

Field No. 7 will be terraced, strip-cropped, and contour-tilled. Every second year a winter cover crop will be planted in the early fall and turned under as a green-manure crop early the next spring.

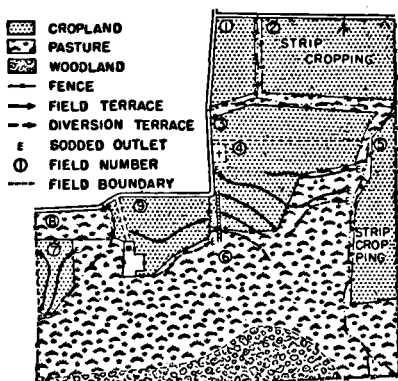


Figure 7.—Land use on the farm shown in figures 5 and 6 as revised in the cooperative agreement. The conservation practices include bringing back into hayland a part of the idle land and the inclusion of the remainder in pasture; terracing, contour cultivation, and strip cropping on the cultivated land; the installation of diversion ditches and sodded waterways to dispose of surplus water; the sodding to Bermuda grass of the large area of pasture not in woodland. (Field Nos. circled.)

Field No. 8 will remain in pasture.

Field No. 9 will be terraced, strip-cropped, and contour-tilled. A small area of idle land will be included in it.

The cooperating farmer agreed to keep livestock out of the cultivated fields when they were wet or when strip crops or cover crops might be damaged by grazing, to refrain from burning crop residues, and to practice a crop rotation in which the same clean-tilled crop is not to be grown on the same land for 2 years in succession. For field No. 5, on which terracing was not required, the cooperator agreed to plant strips of close-growing crops having a minimum width of 14 feet at such

intervals as to provide a width of 25 feet of such crops for each 100 feet down the slope. The aftermath of these strips, peas and Sudan grass, is to be plowed under in the spring. On the pasture land, proper seedbeds are to be prepared for sodding strips of Bermuda grass on 50 acres in alternate strips 30 feet wide. Scattered brush will be cleared from the open area and brush will be kept down. The field will be protected from fire as far as is possible. Overgrazing will be avoided and an effort made to control weeds.

The soil conservation district has agreed to furnish certain technical assistance, some labor and tools, and to assist in building required fences to fit the new farm arrangement.

This farm is fairly representative of the work being done by the Illinois Bayou Soil Conservation District and the cooperating agencies and shows the application of different measures to control soil erosion and to provide for the permanent use of land of different use capabilities in such a way as to meet the needs of the individual farmer.

#### WOODLAND AND WILDLIFE PRACTICES

Woodland was mapped to the extent of 65,735 acres, or 36.7 percent of the entire district. In addition, there are considerable areas of idle land and of pasture and some areas of cropland in classes IV and V whose protection from erosion and proper utilization could best be accomplished by planting to trees and shrubs. While the principal cash returns from land use in the Illinois Bayou district must continue to be obtained from croplands and from pasture, the long-time use of these wooded areas and of others that might well be planted to trees should be considered as another source of income.

The practices recommended for woodland areas are broadly stated in table 2. The class I land, located on the well-drained or imperfectly drained flood-plain soils, includes areas that are best used for woodland both to protect against scouring of the land by overflow currents and to supply needed lumber and fuel. Where planting is desirable, mixtures of bois d'arc, catalpa, black

locust, and other species may be used. All planting sites should be well prepared. Planting should be in furrows and the new plantings should be cultivated until well established. Existing stands should be carefully protected against fire and from damaging grazing by any livestock. Some grazing by hogs may prove beneficial. The management of these stands should be directed toward supplying home needs for posts, poles, and hardwood lumber, both for home use and for sale. Weeding and improvement cuttings are necessary and red gum, oak, and hickory should usually be favored for retention and protection.

On the upland soils of class II, shortleaf pine and black locust should be used chiefly in plantings. Soil preparation, planting in furrows, and the cultivation of the new stand are needed. Existing woodlands and new plantations need to be protected from fire and grazing. The oaks and hickory are the principal trees in existing stands. In cutting for home use or for sale, good trees of post oak, red oak, and white hickory should be left. On well-drained terrace soils, black locust, catalpa, and shortleaf pine may be used for plantings. Land for planting needs thorough preparation, and cultivation after planting. In cutting existing stands, red oak, white oak, and hickory should be favored and retained. On the poorly drained terrace soils of the Arkansas River, bois d'arc, catalpa, and black locust can be planted on lands well prepared. They should be cultivated during the first year of growth. The existing hardwood stands should be managed to maintain a supply of hardwood posts, poles, and rough lumber for home use.

The same recommendations apply for class III land as for class II, except on soil group 3, all of which falls in either class III or V. On soil group 3, with 55.6 percent of its area now in woodland, shortleaf pine and red cedar are about the only species that may be planted safely. On all plantings, sod competition must be destroyed. Cultivation of sites is not commonly needed. The existing woodlands are not of high value and serve chiefly as protection to

the soil on which they stand and to lower lying areas. They also supply home needs for posts and fuel. In cutting, which should not open up the stands to any extent, post oak, red oak, cedar, and shortleaf pine should be favored and maintained.

On land of class IV, the recommendations for woodland management and for planting on the uplands are similar to those for class II except that black locust should be used only for gully planting on soil groups 1, 4, and 6, and shortleaf pine should be used elsewhere on groups 4 and 6. No planting is recommended for soil group 2 and little on groups 5 and 7 except occasional plantings of catalpa or bois d'arc where drainage is not too poor. Selective cuttings of hardwoods should be chiefly for home use. No plantings are recommended for the bottom-land soils, and the management for existing stands is the same as for class I land.

Woodland uses are ordinarily the best form of occupation for lands in class V. Woodland not only provides the best protection for soil of this use-capability class, but it affords the best source of income from land not suitable for cropping and of low value even for pasturage.

Of the shallow upland soils of soil group 3, 84.7 percent of its total area, or 73,923 acres, is class V land. Soil group 2 has 1,408 acres of class V land, and soil group 15 with a total area of 3,449 acres falls entirely into this class. The replanting of class V land to trees cannot be recommended except in small tracts and for special protective purposes. Where such replanting is undertaken only the best sites should be chosen, and shortleaf pine is the only species suited to upland planting with the possibility of some black locust for gully control. No replanting can be recommended for areas in soil group 15 beyond such as may be needed for stream bank protection and the checking of the speed of flood waters. Where replanting is undertaken on group 3 areas, the existing grass or scrub cover, which might compete with the seedlings, should be destroyed. Gully banks should be carefully prepared for planting. The main problems on group



3 soils are to restrict the cutting of stands to the needs of the farm for fuel and lumber, to avoid opening any large areas to wind sweep at any one time, and to leave trees of good growth habit to increase in size and to serve as seed trees for natural reforestation. Protection from fire and grazing are required to preserve existing stands and to permit the growth of seedlings.

Class V land in soil group 1 should be handled the same as class IV land in the same group. Woodland management should aim first at the protective use of the forest and at production as a secondary object. The best of fire and grazing protection must be given to assure both soil conservation and reproduction of trees.

On soil groups 4, 6, and 8, only gullied areas should be planted, mostly to locust and shortleaf pine. Protective influences are of primary consideration, but production is incidentally possible.

The bottom-land soils are not recommended for planting, but the immediate stream banks should be maintained in trees and shrubs with little or no cutting so that the tree belt may check destructive overflow.

On all soil groups and on all land-capability classes the value of timber as a crop, its supplementary value for wildlife conservation, and its very effective use for the protection of the soil against erosion should all be given consideration.

The soil conservation practices needed in the proper handling of cultivated lands, pastures, and woodlands afford opportunities for the encouragement of wildlife in the district. Wildlife-management practices are naturally more closely related to existing cover and to possible food supplies than to land-capability classes or soil-group characteristics.

Land-capability class I, confined to alluvial bottom lands, differs from other classes in that no special erosion-control practices are required and provision for wildlife shelter and winter food supply needs to be made along field borders or in small patches in large fields. In all other classes, the practices differ according to the uses made of the land. On cropland, it is desirable to leave shocks or uncut rows

or strips of grain crops along the borders or to plant small patches of peas, beans, sorghum, or other seed-bearing annuals to furnish winter feed. On strip-cropped fields, some strips may be left unharvested both for erosion control and for wildlife uses. Unproductive field borders and turn rows may be planted to annual lespedeza or to sericea. In meadowlands, occasional patches or strips should be left uncut along the sides or in the corners as nesting places. Brush may be controlled by shifting these sites. Nut, mast, and fruit-producing trees in pastures should be left uncut as shade for cattle and food for wildlife. In pastures of more than 40 acres, clumps of trees and bushes should be left to provide cover. Cut brush should be piled on steep slopes and critical areas both for erosion control and for wildlife cover. In the woodlands, management practices should provide for leaving or establishing den trees for the animals and a mixed stand of uneven-aged trees and shrubby undergrowth. Protection from fire and grazing should be provided.

In the process of providing adequate erosion control on farms, special wildlife sites may be established either in fields or pastures or in gullies and on galled areas. Trees, shrubs, and vines need to be planted along the sides and in the bottoms of gullies. A 10-foot strip of shrubs, vines, and herbaceous materials should be left along the gully banks and the banks should be mulched. The gullied areas should be protected from grazing. Galled spots should be mowed, mulched, and sodded to Bermuda grass or seeded to Sudan grass, sorghum, partridge-peas, annual lespedeza, or sericea. Kudzu and other vines may be used. Land should not be plowed closer than 1 rod from stream banks, natural drainageways, or large drainage ditches. Trees and shrubs should be maintained to protect the banks and to provide cover and food for wildlife. On scoured areas along streams, a permanent stand of Bermuda grass and sericea lespedeza should be established in meadows. In pastures or special wildlife areas, trees, shrubs, vines, and briars should be planted. Steep banks and escarpments on the

upland should be maintained in trees, shrubs, and herbaceous vegetation and kudzu and Himalaya-berries should be planted for cover.

In general, fire and grazing should be controlled on the entire farm; hunting and trapping should be restricted so as to leave adequate breeding stock of desirable wildlife species; loose rock piles that have been placed in ditches and have grown up to shrubbery should be left; farm ponds should be fenced and shrubby wildlife refuges developed around the upper edges; a growth of shrubs and herbaceous vegetation should be maintained along fences on the side away from grazing to provide runways for wildlife and to assist in preventing Bermuda grass from spreading into fields.

### Results and Significance of the Land Inventory

The acreage of land in each land-capability class, by soil groups, is shown in table 3 for the entire district and for each land use class. Nearly 10 percent,

or 17,345 acres, is class I land, capable, so far as physical features are concerned, of being cultivated without special practices to prevent soil erosion. It is found exclusively on the alluvial flood plains. An additional area of 24,301 acres, or about 14 percent of the district, is class II land, which may be cultivated if some precautions are taken to prevent soil losses and to maintain the productivity of the land. Thus, 24 percent of the district consists of land that may be held in cultivation to row crops provided such practices as contour cultivation, proper fertilization, and the turning under of green-manure crops to maintain the organic matter in the soil are used.

The information contained in table 3 is summarized in graphic form in figure 8. Much of the land now idle or used for pasture has been under cultivation at some time and the classification according to use capability indicates that some of this land, that in classes I and II, may be utilized again for cropland to meet the needs of the district and of individual farmers within it.

TABLE 3.—Use capability of land by soil groups

#### ENTIRE DISTRICT<sup>1</sup>

Soil group	Area and proportion in land-capability class—										Total Acres
	I (green) <sup>2</sup>		II (yellow) <sup>2</sup>		III (red) <sup>2</sup>		IV (blue) <sup>2</sup>		V (orange) <sup>2</sup>		
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	0	.....	9,927	35.6	13,248	47.5	2,189	7.9	2,503	9.0	27,867
2. Upland soils (shale).....	0	.....	11,686	52.5	8,811	39.5	374	1.7	1,408	6.3	22,279
3. Shallow upland soils.....	0	.....	0	.....	13,362	15.3	0	.....	73,923	84.7	87,285
4. Well-drained terrace soils (local).....	0	.....	2,194	49.0	1,608	35.9	307	6.9	371	8.2	4,480
5. Imperfectly drained terrace soils (local).....	0	.....	0	.....	0	.....	102	100.0	0	.....	102
6. Well-drained terrace soils (Arkansas River).....	0	.....	426	36.7	318	27.4	63	5.4	354	30.5	1,161
7. Poorly drained terrace soils (Arkansas River).....	0	.....	0	.....	0	.....	234	100.0	0	.....	234
8. Calcareous terrace soil.....	0	.....	68	81.8	112	52.3	0	.....	34	15.9	214
9. Well-drained flood-plain soils (local).....	7,409	79.9	0	.....	0	.....	1,869	20.1	0	.....	9,278
10. Poorly drained flood-plain soils (local).....	0	.....	0	.....	111	23.8	355	76.2	0	.....	466
11. Mixed alluvial soils (local).....	5,931	46.7	0	.....	0	.....	6,788	53.3	0	.....	12,719
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	373	100.0	0	.....	0	.....	0	.....	0	.....	373
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	2,657	78.2	0	.....	0	.....	739	21.8	0	.....	3,396
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	975	75.6	0	.....	0	.....	315	24.4	0	.....	1,290
15. Miscellaneous land classes.....	0	.....	0	.....	0	.....	0	.....	3,449	100.0	3,449
Entire district.....	17,345	9.9	24,301	13.9	37,570	21.6	13,335	7.6	82,042	47.0	174,593

<sup>1</sup> Does not include farmyards, urban areas, or miscellaneous areas.  
<sup>2</sup> Color distinguishing class area on maps accompanying this report.

TABLE 3.—Use capability of land by soil groups—Continued

CROPLAND											
Soil group	Area and proportion in land-capability class—										
	I (green) <sup>1</sup>		II (yellow) <sup>2</sup>		III (red) <sup>3</sup>		IV (blue) <sup>4</sup>		V (orange) <sup>5</sup>		Total
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	0	0	5,613	44.0	6,218	49.6	489	3.9	317	2.5	12,537
2. Upland soils (shale).....	0	0	4,457	46.4	4,913	51.2	22	.2	204	2.2	9,596
3. Shallow upland soils.....	0	0	0	0	4,330	38.5	0	0	6,913	61.5	11,243
4. Well-drained terrace soils (local).....	0	0	1,248	68.1	767	35.7	80	3.7	53	2.5	2,148
5. Imperfectly drained terrace soils (local).....	0	0	0	0	0	0	17	100.0	0	0	17
6. Well-drained terrace soils (Arkansas River).....	0	0	292	64.7	126	27.8	1	.2	33	7.3	452
7. Poorly drained terrace soils (Arkansas River).....	0	0	0	0	0	0	61	100.0	0	0	61
8. Calcareous terrace soil.....	0	0	42	59.3	26	36.6	0	0	3	4.2	71
9. Well-drained flood-plain soils (local).....	4,643	100.0	0	0	0	0	0	0	0	0	4,643
10. Poorly drained flood-plain soils (local).....	0	0	0	0	111	100.0	0	0	0	0	111
11. Mixed alluvial soils (local).....	1,966	100.0	0	0	0	0	0	0	0	0	1,966
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	218	100.0	0	0	0	0	0	0	0	0	218
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	2,209	100.0	0	0	0	0	0	0	0	0	2,209
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	733	100.0	0	0	0	0	0	0	0	0	733
15. Miscellaneous land classes.....	0	0	0	0	0	0	0	86	100.0	0	86
All cropland.....	9,769	21.2	11,552	25.1	16,491	35.8	670	1.4	7,909	16.5	46,091
IDLE LAND											
1. Upland soils (sandstone).....	0	0	1,745	29.3	2,835	47.5	894	15.0	486	8.2	5,960
2. Upland soils (shale).....	0	0	1,343	40.3	1,355	40.7	56	1.7	575	17.3	3,329
3. Shallow upland soils.....	0	0	0	0	2,693	23.1	0	0	8,966	76.9	11,659
4. Well-drained terrace soils (local).....	0	0	332	41.0	307	37.9	111	13.7	60	7.4	810
5. Imperfectly drained terrace soils (local).....	0	0	0	0	0	0	8	100.0	0	0	8
6. Well-drained terrace soils (Arkansas River).....	0	0	45	15.4	94	32.1	31	10.5	123	42.0	293
7. Poorly drained terrace soils (Arkansas River).....	0	0	0	0	0	0	39	100.0	0	0	39
8. Calcareous terrace soil.....	0	0	12	12.3	64	66.0	0	0	21	21.7	97
9. Well-drained flood-plain soils (local).....	790	100.0	0	0	0	0	0	0	0	0	790
10. Poorly drained flood-plain soils (local).....	0	0	0	0	0	0	25	100.0	0	0	25
11. Mixed alluvial soils (local).....	1,182	100.0	0	0	0	0	0	0	0	0	1,182
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	93	100.0	0	0	0	0	0	0	0	0	93
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	29	9.6	0	0	0	0	273	90.4	0	0	302
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	0	0	0	0	0	0	170	100.0	0	0	170
15. Miscellaneous land classes.....	0	0	0	0	0	0	0	258	100.0	0	258
All idle land.....	2,094	8.3	3,477	13.9	7,348	29.4	1,607	6.4	10,489	42.0	25,015
PASTURE											
1. Upland soils (sandstone).....	0	0	1,691	27.9	2,948	48.7	786	13.0	630	10.4	6,055
2. Upland soils (shale).....	0	0	3,687	55.8	2,153	32.6	276	4.1	495	7.5	6,610
3. Shallow upland soils.....	0	0	0	0	3,300	21.9	0	0	11,757	78.1	15,057
4. Well-drained terrace soils (local).....	0	0	440	39.7	458	41.4	112	10.1	97	8.8	1,107
5. Imperfectly drained terrace soils (local).....	0	0	0	0	0	0	47	100.0	0	0	47
6. Well-drained terrace soils (Arkansas River).....	0	0	59	24.4	73	30.2	30	12.4	80	33.0	242
7. Poorly drained terrace soils (Arkansas River).....	0	0	0	0	0	0	31	100.0	0	0	31
8. Calcareous terrace soil.....	0	0	9	36.0	14	56.0	0	0	2	8.0	25
9. Well-drained flood-plain soils (local).....	1,943	100.0	0	0	0	0	0	0	0	0	1,943
10. Poorly drained flood-plain soils (local).....	0	0	0	0	0	0	155	100.0	0	0	155
11. Mixed alluvial soils (local).....	2,783	50.0	0	0	0	0	2,783	50.0	0	0	5,566
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	49	100.0	0	0	0	0	0	0	0	0	49
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	419	100.0	0	0	0	0	0	0	0	0	419
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	242	100.0	0	0	0	0	0	0	0	0	242
15. Miscellaneous land classes.....	0	0	0	0	0	0	0	204	100.0	0	204
All pasture.....	5,436	14.4	5,886	15.6	8,946	23.7	4,219	11.2	13,265	35.1	37,752

<sup>1</sup> Color distinguishing class area on maps accompanying this report.

TABLE 3.—Use capability of land by soil groups—Continued

WOODLAND

Soil group	Area and proportion in land-capability class—										Total Acres
	I (green) †		II (yellow) ‡		III (red) ‡		IV (blue) ‡		V (orange) ‡		
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	0		978	29.5	1,247	37.6	20	0.6	1,070	32.3	3,315
2. Upland soils (shale).....	0		2,199	80.1	390	14.2	21	.8	134	4.9	2,744
3. Shallow upland soils.....	0		0		3,039	6.1	0		46,287	93.9	49,326
4. Well-drained terrace soils (local).....	0		174	41.9	76	18.3	4	1.0	161	38.8	415
5. Imperfectly drained terrace soils (local).....	0		0		0		30	100.0	0		30
6. Well-drained terrace soils (Arkansas River).....	0		30	17.2	25	14.4	1	.6	118	67.8	174
7. Poorly drained terrace soils (Arkansas River).....	0		0		0		103	100.0	0		103
8. Calcareous terrace soil.....	0		5	23.8	8	38.1	0		8	38.1	21
9. Well-drained flood-plain soils (local).....	33	1.8	0		0		1,869	98.2	0		1,902
10. Poorly drained flood-plain soils (local).....	0		0		0		175	100.0	0		175
11. Mixed alluvial soils (local).....	0		0		0		4,005	100.0	0		4,005
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	13	100.0	0		0		0		0		13
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	0		0		0		466	100.0	0		466
14. Heavy, imperfectly drained, flood-soils (Arkansas River).....	0		0		0		145	100.0	0		145
15. Miscellaneous land classes.....	0		0		0		0		2,901	100.0	2,901
All woodland.....	46	(*)	3,386	5.2	4,785	7.3	6,839	10.4	50,679	77.1	65,735

† Color distinguishing class area on maps accompanying this report.

‡ Less than 0.1 percent.

Of land now cropped 670 acres fall into class IV. (Table 3.) These lands should not bear row crops except at infrequent intervals. Instead, they should be established in grass and utilized as pasture or else retired to woodland and replanted if necessary. Nearly 17 percent of all the present cropland, 7,609 acres, is in Class V. This land occurs chiefly on the shallow upland soils on which crop yields are not satisfactory even under favorable conditions and on which terracing and other mechanical methods for controlling soil erosion cannot be used. Small areas also occur on the deeper upland soils. Pasturage is the most intensive use to which this land should be placed and the greater part of it should be reforested to supply some farm income eventually.

So far as the entire district is concerned this readjustment might not be difficult, since additional areas of cropland might be secured from class I and II lands now idle or in pasture. On individual farms, the problem might be difficult, especially since such a large proportion of the class V land now cropped is on the thin upland soils. Wherever the individual farm contains areas of

idle land or of pasture land falling in classes I and II, these might be cropped and areas in classes IV and V withdrawn from cultivation.

In making any readjustments involving the retirement of classes IV and V from cultivation and in substituting lands from classes II and III now idle or in pasture, it must be kept in mind that if such land is again brought under cultivation it will require intensive soil conservation practices to render its use of permanent value and to prevent it from becoming so seriously eroded as to be thrown out of cultivation again. Crop rotation, fertilization, the plowing under of cover crops as organic manures, contour farming and contour strip cropping in strips to suit the nature of the soil and the slope would be needed on class II land. On class III land, terracing, water diversion for gully control, and sodded waterways would also be needed.

The land-capability map enables each farmer to see whether readjustment of land use is desirable on his farm. The technicians who cooperate with the Illinois Bayou Soil Conservation Dis-

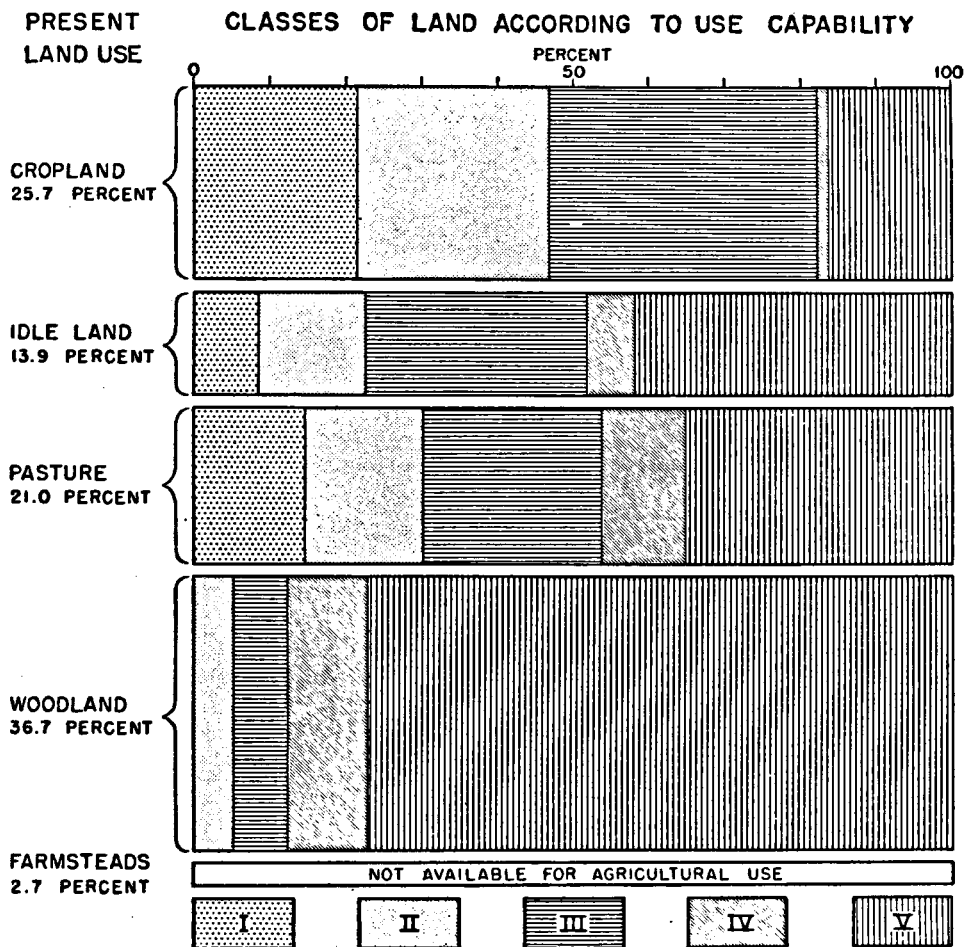


Figure 8.—Present use of land and capability of land in the district.

trict can work out the details of safe land use with him.

### Description of the Area

THE Illinois Bayou Soil Conservation District lies in the central and west-central part of Pope County, Ark. (fig. 1, p. 1). Russellville, the county seat, is in the southwestern part of the district. It is about midway between Little Rock and Fort Smith. The district includes an area of 179,450 acres, or approximately 280 square miles. Its greatest extent from north to south is 20 miles and from east to west, 21 miles.

The district lies almost entirely within the Arkansas River Valley,

bordered on the north by the Boston Mountains.

The Arkansas Valley, which varies in width from 25 to 35 miles, extends from the Oklahoma boundary eastward to the Coastal Plain, near Searcy, Ark. \* \* \* It is a gently undulating plain, most of which stands between 300 and 600 feet above sea level. Many long sharp ridges rise above the plain, however, as well as several broad-topped synclinal hills and mountains, all trending in general north of east. \* \* \* The surface rocks consist of sandstone and shale, are of Carboniferous age and nearly all of them belong to the Pennsylvanian series.<sup>1</sup>

The district contains many flat-topped hills (fig. 9), such as Buck, Lee, Linker, and Carrion Crow Moun-

<sup>1</sup> CRONQIS, CAREY. GEOLOGY OF THE ARKANSAS PALEOZOIC AREA. Ark. Geol. Survey Bul. 3, 457 pp., illus. 1930.

tains, that are 3 to 4 miles wide and 5 to 7 miles long. They rise to elevations of 1,000 feet or more above sea level. These hills are capped by resistant sandstone that forms steeply sloping scarps around their edges. The underlying, interbedded sandstones and shales give rise to steep but regular slopes down to the valleys broken at intervals by small sandstone scarps.

The valleys of the larger streams—McCoy, Baker, Scottsville, Crooked, Gumlog, and Illinois Bayou—are 300 to 500 feet above sea level and are generally less than 1 mile wide. A narrow strip of the Arkansas River bottom lands and terraces forms a border from  $\frac{1}{8}$  to 1 mile wide along the southwestern side of the district.



**Figure 9.**—The district contains many flat-topped hills, like Buck Mountain on the right, capped by resistant sandstone and bordered by steep scarps.

The greater part of the district is drained by the Illinois Bayou, which has its source in Searcy County, about 20 miles to the north of the district. It empties into the Arkansas River 3 miles west of Russellville. The eastern side of the district is drained by tributaries of the West Fork of Point Remove Creek, another tributary of the Arkansas River. Drainage in all parts of the upland is good, numerous intermittent streams affording swift run-off. In some areas of the bottom lands of the Arkansas River and Illinois Bayou, the surface drainage is slow but only in small scattered areas is drainage insufficient for crop production. Parts of these bottom lands are subject to overflow. Most of the smaller streams are dry during the summer months, but the chief tributaries flow throughout the year. Permanent springs are not numerous. The internal drainage of some of the more level areas of upland

soils derived from shales is imperfect to poor, that of shallow upland soils is excessive. Some of the second-bottom soils receive drainage from higher lying areas.

The climate is temperate and even over the entire district. The winters are short and are characterized by brief cold periods of a few days' duration followed by longer periods of mild weather. The soil may be frozen for several days during the winter but seldom to a depth of more than a few inches. Freezing of the soil when followed by heavy rains causes serious soil erosion. The summers are long and rather hot. Rainfall is well distributed throughout the year, with greater precipitation during the spring and summer months than at other times

The spring and fall seasons are long and mild with temperatures that approach the annual average. The highest recorded temperature for the district is 107° F. and the lowest is -15°.

Records covering a period of 16 years show that the average length of growing season is 209 days. The average date of the last killing frost in the spring is April 3 and of the first killing frost in the fall, October 29. The date of the latest killing frost in spring ever recorded was May 1 and of the earliest in the fall, October 10. The length of growing season is sufficient to permit the maturing of cotton and other long-season crops. The growing of selected winter cover crops like winter oats, winter vetch, and rye is possible on all well-drained soils. The region is climatically favorable to Bermuda grass rather than to bluegrass. Common lespedeza is suited to the climate and to most soil conditions.

The average annual precipitation for the district is 46.75 inches. The average annual snowfall is 6.1 inches, which comes in small quantities that melt rapidly. The precipitation is usually sufficient for the production of cotton, but corn is occasionally damaged by drought. The existence of widespread sheet erosion and the deficiency in organic matter of most of the topsoils operate against the absorption and retention of moisture in the upland soils and give rise to serious crop injury during frequent short periods of summer drought. Drought periods of 100 days or more duration have been twice recorded at Dardanelle during a period of 33 years, and droughts of less than 40 days were recorded 74 times. The greatest precipitation in a 24-hour period, from records kept for 23 years, was 4.38 inches.

Many of the soils of the district are underlain at shallow depths by sandstone or shale rock. Some are underlain by heavy clay layers. They be-

come saturated quickly and the run-off is high. They also dry quickly, consequently frequent rains during the growing season are necessary to produce even a moderate yield of cotton or corn. Sheet erosion on soils of this nature becomes very severe if cover crops are not used.

Available data from the Weather Bureau station at Russellville are summarized in table 4.

The area included in the district was originally in forest, chiefly of deciduous trees. Oaks and hickories predominated. The growth was vigorous on the deeper soils but sparse on areas that are underlain at very shallow depths by sandstone or shale. At present, second-growth forests cover most of the steep hillsides. The conservation survey shows that woodland occupies 65,735 acres, or 36.7 percent of the area.

The upland woodlands now consist chiefly of several varieties of oak and of hickory, red cedar, and some shortleaf pine and elm. These species grow in

TABLE 4.—Normal and extreme monthly, seasonal, and annual temperature and precipitation at Russellville, Pope County, Ark.<sup>1</sup>

[Elevation, 526 feet]

Month	Temperature			Precipitation			
	Mean <sup>2</sup>	Absolute maximum <sup>3</sup>	Absolute minimum <sup>3</sup>	Mean <sup>4</sup>	Snow-fall <sup>5</sup>	Total for the driest year (1901) <sup>4</sup>	Total for the wettest year (1900) <sup>4</sup>
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December.....	40.5	86	7	3.01	1.3	4.41	2.21
January.....	39.6	78	-6	3.45	2.5	1.71	6.31
February.....	39.9	82	-15	3.28	2.0	1.69	10.66
Winter.....	40.0	86	-15	9.74	5.8	7.81	19.18
March.....	52.3	90	15	4.88	.3	6.38	8.88
April.....	61.0	92	29	4.00	0	1.85	13.59
May.....	69.6	97	32	5.59	0	1.94	4.36
Spring.....	61.0	97	15	14.47	0.3	10.17	28.83
June.....	77.6	104	37	4.08	0	2.40	4.56
July.....	81.2	106	56	4.27	0	3.01	3.52
August.....	79.9	107	46	3.43	0	2.24	6.47
Summer.....	79.6	107	37	11.78	0	7.65	14.55
September.....	73.4	102	36	4.05	0	.89	8.78
October.....	60.6	92	27	2.76	0	2.18	2.74
November.....	49.8	87	14	3.95	0	2.54	3.70
Fall.....	61.3	102	14	10.76	0	5.61	15.22
Year.....	60.5	107	-15	46.75	6.1	31.24	75.78

<sup>1</sup> From U. S. Weather Bureau reports.

<sup>2</sup> 26-year period.

<sup>3</sup> 22-year period.

<sup>4</sup> Record for 26-year period, 1884-1909; only partially complete for first 4 years during this period.

<sup>5</sup> 16-year period.

the valleys together with ash, sweetgum, willow oak, red and sugar maple, and elm. The creek and river bottoms support a very mixed growth of oak, hickory, pecan, ash, elm, birch, willow, black gum, sweetgum, cottonwood, sycamore, and red and silver maple. The undergrowth on the uplands consists chiefly of huckleberry, blueberry, hawthorn, and dogwood. Idle lands and thin pasture are commonly invaded by persimmon and sassafras, poverty grass, broomsedge, tumblegrass, and bitterweed. Lumbering is a minor industry, but wood is cut on many of the farms for various home uses.

Pope County was originally included in the Indian Territory and was inhabited by the Cherokee Indians. It was formed, principally from Conway County, in 1829, but its present boundaries were not established until 1877. Most of the early settlers came from the Southern States; later settlers were of German extraction. Russellville with a population of 5,628 is the largest town in the district. Dover is second with a population of 510. London has a population of 355 and Pottsville of 293. Hector and Scottsville are smaller.

Population figures for the district are not available but the population of Pope County increased steadily from 19,458 in 1890 to 27,153 in 1920 and then decreased slightly to 26,547 in 1930. In 1935, there were 17,622 persons living on farms in the county. Of this number, 17,004 were white and only 618 were colored.

With the beginning of white settlements, the lumber industry had its start. It increased in importance as transportation facilities improved and reached its peak in 1909. By 1935 production had decreased to slightly more than half that of 1909. Little virgin timber remains, but second-growth timber covers the steep hillsides and rougher areas.

In the early days transportation was by wagon over poor roads. Markets were distant. In 1822 the first steamboat ascended the Arkansas River from Little Rock to the mouth of Illinois Bayou. River transportation was suc-

ceeded by rail in 1873 when a railroad connecting Little Rock and Fort Smith was constructed. This road now constitutes a part of the main line of the Missouri Pacific Railroad. A short railroad runs south from Russellville to the Arkansas River at Dardanelle. A paved highway, United States Highway No. 64, parallels it across the southern part of the district. Hard-surfaced highways run from Russellville north to Dover and south to Dardanelle. Good gravel roads connect Dover and Hector and Russellville. Other gravel roads are being built. Dirt roads for the most part are passable throughout the year.

The chief market center in the district is Russellville, from which good railroad and truck line service make the district accessible to larger markets in every direction.

There are several producing coal mines in the district, only one having railroad connections. There are eight cotton gins, eight lumber mills, one creamery, a rock quarry, a gas pipe line, and an electric power line.

## Agriculture

THE DEVELOPMENT of agriculture parallels that of the other hill sections of Arkansas. In the early days subsistence farming was started while the timber was being cleared off. It was not until railroads were built during the seventies that the shipment of surplus agricultural products on any large scale became possible. At this time this section of Arkansas began to change from subsistence farming to the production of cotton as the chief cash crop.

The acreage in cotton increased to a maximum in the era of high prices during the World War and post-war period. By 1934, this acreage had become reduced half, partly because of the agricultural adjustment program; the area in cotton per farm in Pope County in 1935 was slightly more than one-half that of 1930. The acreage given to corn production has steadily decreased. Wheat has virtually disappeared. The acreage given to oats varies and part of this crop is



threshed but by far the larger part is cut for hay. Potatoes and sweet-potatoes are grown chiefly for home use. Peanuts are grown chiefly for hogging off. There has been a marked increase in the acreage given to soybeans and to cowpeas. In the county the acreage in all legumes saved for hay increased from 700 acres in 1929 to more than 5,000 in 1934. The area in hay crops, other than oats and the legumes, reached a maximum of 15,497 acres in 1934. These changes in cropping practices are an aid in soil conservation and soil building. The increased acreages in hay and in legume crops are especially favorable. Coupled with these increases, the average number of cattle per farm has increased from 3 in 1930 to 5 in 1935. It should be noted that there has also been a marked increase in the area of pasture from 58,000 acres in 1930 to 84,000 acres in 1934. Changes for the county are shown in table 5.

TABLE 5.—Acreage devoted to the principal crops in Pope County, Ark., in specified years<sup>1</sup>

Crop	Year				
	1909	1919	1924	1929	1934
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Corn.....	46,394	44,634	40,503	30,148	29,517
Sorghums.....	726	2,126	2,674	1,126	3,531
Wheat.....	373	1,698	93	4	58
All oats.....	2,837	751	2,958	335	2,103
All hay.....	7,146	14,489	10,299	8,903	15,497
Cotton.....	47,567	57,859	65,287	59,498	33,437
Potatoes.....	570	604	566	584	889
Sweetpotatoes and yams.....	279	1,030	488	241	554
Peanuts.....	30	152	133	308	2,004
Soybeans.....				249	337
Cowpeas.....				714	4,381

<sup>1</sup> U. S. censuses.

In 1935, there were 28,104 apple trees on 965 farms in the county and of these 10,397 were not of bearing age. There were 104,021 peach trees on 1,205 farms of which 13,024 were not of bearing age. The percentage of increase in the planting of apple trees has been much greater than that of peach trees. Fruit growing is chiefly restricted to the sandy soils on the hills, notably on Carrion Crow and Linker Mountains. There are a few farms in the district whose main income is derived from fruit growing but none devoted exclusively to this enterprise.

Cotton and corn are grown on all soil types that are cultivated within the district.

There are no large poultry farms and very few farm flocks above the average size, and there are no farms given exclusively to cattle raising. A few dairy herds are maintained near Russellville.

The classes of land in Pope County according to use are given for stated years in table 6. To this table has been added a column showing the same classes of land use for 11 townships lying chiefly or entirely within the Illinois Bayou Soil Conservation District. A large part of the county lying north of the district is within the Ozark National Forest. Only 268,972 acres out of a total approximate area of 529,920 acres in Pope County were in farms in 1935. This was 50.8 percent of the area of the county.

TABLE 6.—Classes of land according to use in Pope County, Ark., and in 11 townships comprising most of the district area in specified years<sup>1</sup>

Class	Pope County			11 townships <sup>2</sup>
	1924	1929	1934	1929
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Approximate land area.....	529,920	529,920	529,920	177,037
Land in farms.....	275,433	256,500	268,972	*137,034
Cropland, total.....	137,039	129,423	118,693	69,942
Harvested.....	125,054	104,874	88,898	55,798
Crop failure.....	1,024	2,528	6,144	1,140
Idle.....	10,961	22,021	23,651	13,204
Pasture land, total.....	58,047	62,684	84,034	34,556
Plowable.....	15,440	17,094	25,187	9,841
Woodland pasture.....	33,829	35,311	42,557	18,635
Other pasture.....	8,778	10,279	16,290	6,080
Woodland not in pasture.....	59,834	49,590	46,429	24,105
All other land in farms.....	20,513	14,803	19,816	8,431

<sup>1</sup> U. S. censuses.

<sup>2</sup> Bayliss, Center, Clark, Dover, Galla Creek, Illinois, Jackson, Liberty, Moreland, Phoenix, and Valley townships.

\* 1,729 farms having an average of 79.3 acres.

The average size of farm for the county was 78.3 acres and for the district, 79.3 acres. Farms range in size from 3 acres to more than 1,000 acres, but there are few farms at these extremes and the greater part of the farm acreage is in farms ranging from 30 to 174 acres.

In 1935 full-owners operated farms totaling 114,882 acres in the county and tenants operated 112,702 acres, the remainder being run by part-owners or managers.

Very few tractors are used for farming operations and these chiefly on the Arkansas River bottom lands. The use of two-row implements is also confined largely to the bottom lands.

The available statistics as well as observation indicate that the farmers in the district are slowly turning to livestock production to offset the decreased income from cotton growing. This tendency is partly a result of reduced yields of cotton, largely due to increased soil erosion. Soil erosion has also caused the retirement to pasture or forest of thousands of acres of gently sloping to steep land. The land now used for pasture is covered mostly by a sparse growth of native annual grasses and woods. This cover is inadequate to control soil erosion. The greatly increased use of lespedeza in pastures during the past 5 years is proving very beneficial, both through increasing the carrying capacity of the pastures and through building up soil fertility.

Since the organization of the Illinois Bayou Soil Conservation District, technicians of the Soil Conservation Service have assisted in installing complete soil conservation practices on numerous farms. The program adopted by the district provides for retirement to pasture or to woodland of all badly eroded areas; the improvement of pastures; woodland management to improve timber stand and to provide for natural replacement as needed timber is cut; the use of strip crops and contour tillage on gently sloping lands and of properly constructed terraces and terrace outlets in conjunction with strip cropping on the steeper slopes; increased acreages of winter cover crops; plowing under of cover crops to maintain or increase the organic matter in the topsoils. The practice of cropping a field with corn followed by cotton is gradually giving way to the use of some legume, usually cowpeas or soybeans, planted in the corn or, occasionally, as a summer cover crop. Increased acreages of hay are being maintained.

## The Conservation Survey

### *Methods and Definitions*

IN MAKING the conservation survey, aerial photographs on a scale of 1,320 feet to 1 inch were used. The different soil types, the prevailing slopes, and the kind and degree of existing erosion were mapped in their relationships to the present uses of the land. Copies of this field survey, published with this report, are available for use in working out cropping plans for each farm to meet the conditions on that farm and to provide control of soil erosion. The suggested treatment of each tract is in accordance with the use capability of the land as shown by the survey. As conditions improve, modifications of the treatments may be desirable.

The capability of the land, for such forms of use as will prevent further soil losses and gradually improve the soils is shown in colors on the maps accompanying the report. The type of soil, the slope, and the kind and degree of erosion are shown in brown, the present land use in gray. The maps also show roads, houses, railroads, streams, and other important and easily recognized features such as churches, schools, and cemeteries.

Five classes of present land use were mapped. Cropland, as mapped, included all land on which crops were being grown at the time of the survey and all land showing evidence that a crop had been harvested during the preceding year or on which preparation for a crop was in progress. This included all land in tilled crops, all areas cut for hay, and orchards. Idle land consisted of areas that had obviously been under cultivation at one time but were not cultivated nor used for hay or pasture at the time of the survey. Pasture included all land thus used, whether occupied by a good cover of introduced grasses or by a poor stand of native grasses. Areas on which 40 percent or more of the surface was covered by the shade of trees of good forest species were mapped as woodlands. A fifth class, designated as farmsteads and urban areas, includes land occupied by houses and other buildings.

The soil types were mapped according to the standards set by the Division of Soil Survey, Bureau of Plant Industry, and were correlated by that division. Forty-six different soil types or separations were mapped. These are discussed on pages 25-38.

Slope classes have been discussed on page 4. Six classes were mapped. A slopes include areas whose dominant slope is less than 2 feet in 100; that is, 2 percent. B slopes range from 2 to 5 percent; BB slopes, from 5 to 8 percent; C slopes, 8 to 12 percent; D slopes, from 12 to 25; and E slopes are over 25 percent. The fact that slopes greater than BB slopes, may not be used safely for growing clean-tilled crops is brought out in table 1. The precautions required in cultivating the B and BB slopes are also indicated and the proper forms and conditions of use of the steeper slopes are shown.

Running water is the only agent that has brought about serious erosion in the district. There is no appreciable wind erosion.

Water erosion that removes a thin sheet of soil more or less uniformly from the surface of a field is known as sheet erosion; small rills may be formed. When definite channels are formed that are too deep to be plowed or cultivated out, these are classed as gullies. Some stony areas not exposed to accelerated erosion were mapped as normal erosion.

The degree of sheet erosion was mapped by examining the present surface soil and subsoil and estimating the depth to which the original soil profile had been changed by erosion. Comparisons of existing soil depths with those of undisturbed areas on similar slopes were valuable in making this estimate. Erosion was designated by the following symbols:

Sheet erosion:

2. Less than 25 percent of the topsoil removed.
3. 25 to 75 percent of the topsoil removed.
4. 75 percent or more of the topsoil removed.
5. All the topsoil and part or all of the subsoil removed. Parent material may be exposed or eroded.

Gully erosion:

7. Occasional gullies: More than 100 feet apart.

8. Frequent gullies: Occurring less than 100 feet apart but including less than 75 percent of the area delineated.

9. Very frequent or large gullies.

○. Indicates gullies too deep to be crossed by tillage implements, as ⑦, ⑧, or ⑨.

Miscellaneous:

- + . Recent alluvial or colluvial deposits.
- 1. No apparent or very slight erosion.
- ⊖. Undifferentiated erosion (farmyards, urban areas).
- W. Normal erosion (stony areas, not subject to accelerated erosion).

Sheet-erosion symbols, miscellaneous symbols, or combinations of these with gully erosion symbols were used to designate erosion classes. Twenty-four different classes of erosion, including normal erosion, were mapped. These classes, grouped to indicate severity of erosion, are listed in table 8, p. 38.

### Soils

The soils have all been formed in a timbered region having a mild climate and an abundant rainfall. They are prevalently light in color in the surface soil and of a variety of colors, chiefly red, yellow, and brown, in the subsoils. They are acid to very acid with the exception of one small area in the terraces of the Arkansas River.

The upland soils have been formed to various depths from the noncalcareous sandstones and shales of the Carboniferous period. The relief and slope as well as the character of the parent material have influenced the kind and depth of the soil. Deep soils have been formed on the flat hilltops and gentle dip slopes and shallow soils on the steeper slopes.

The Arkansas River and the larger streams draining the upland formed terraces or second bottoms at elevations that are higher than the present level of the streams and no longer subject to overflow. Soils on these terraces range from well drained to imperfectly and poorly drained. Some of them receive run-off from higher-lying land.

A variety of soils has been formed or is being formed in the present flood plains of the Arkansas River and the streams draining the upland. Some areas of alluvial soils, undifferentiated, consist of such mixed material that it

could not be separated into distinct soil types.

Three classes on which definite soils have not been formed were also mapped. These were riverwash, consisting of sand and gravel bars formed by swift

currents; shale outcrop; and rough stony land of sandstone and shale material, found on the uplands, chiefly on steep slopes.

Table 7 shows the acreage and proportionate extent of the 46 separa-

TABLE 7.—Characteristics of soil series and acreage of each

Soil group and series	Soil type	Area		Soil profile		Parent material	Relief
				Surface soil	Subsoil		
1. Upland soils on sandstone:							
Cleburne.....	Fine sandy loam.	Acres 2,579	Percent 1.4	Light gray, mellow, 7 to 10 inches deep. Scattered concretions.	Yellow, rather friable, very fine sandy clay loam. Scattering of concretions.	Massive, bedded, brown, yellow, gray, saccharoidal sandstone at 4 feet or deeper.	A, B, BB slopes on hilltops and gentle dip slopes.
Hanceville.....	Fine sandy loam. Gravelly fine sandy loam.	1,017 8,032	.6 4.5	Light brown, mellow, 7 to 10 inches deep. Scattered concretions.	Brown, rather friable, very fine sandy clay loam.	Rather thin, bedded, brown and reddish-brown, loosely cemented sandstone at 4 feet or deeper.	A, B, BB slopes on hilltops and gentle slopes.
Linker.....	Gravelly fine sandy loam.	16,941	9.4				
Total.....		28,569	15.9	Light gray, mellow, 7 to 10 inches deep. Scattered concretions.	Reddish or yellowish brown, gravelly, slightly friable sandy clay loam.	Massive, bedded, brown, yellow, gray, saccharoidal sandstone at 3 feet or deeper.	A, B, BB slopes on hilltops and gentle dip slopes.
2. Upland soils on shale:							
Conway.....	Very fine sandy loam.	7,808	4.4	Light gray, mellow, 8 to 10 inches deep. Heavy scattering of concretions.	Gray silty clay loam, mottled with yellow and brown. Many concretions.	Laminated, gray, brown, yellow and black shale, at 3½ to 4 feet.	A, B, BB slopes in all wide valleys.
	Very fine sandy loam, mound phase	2,729	1.5				
Enders.....	Fine sandy loam.	13,741	7.7	Brown, mellow, 5 to 7 inches deep. Few scattered concretions.	Reddish brown, slightly plastic, silty clay loam to silty clay. Numerous concretions.	Laminated, gray, brown, yellow, and black shale at 3 to 4 feet.	A, B, BB slopes in valleys.
Poteau.....	Silty clay loam	19	( <sup>1</sup> )	Gray, slightly plastic, 5 to 6 inches deep.	Mottled gray and yellow spotted with red, plastic clay. Heavy scattering of concretions.	Laminated red and gray shale at 3½ to 4 feet.	A slopes.....
Total.....		24,297	13.6				
3. Shallow upland soils on sandstone and shale:							
Muskingum....	Stony fine sandy loam.	21,613	12.0	Light grayish brown, loose, little organic-matter content, 4 to 5 inches deep.	Light brown, gravelly or stony sandy loam.	Massive, bedded, brown, yellow, gray, saccharoidal sandstone at 16 to 18 inches.	All slopes...
	Gravelly fine sandy loam.	12,016	6.7				

<sup>1</sup> Less than 0.1 percent.

tions that were recognized. It also gives the depth and character of the surface soil and subsoil, the surface and internal drainage conditions, the prevailing slopes, the crops commonly grown most extensively, and the degree

to which the soil has been eroded. The 46 different separations have been placed in 15 groups, based on similarity of erodibility, productivity, drainage, and other characteristics that influence proper land use.

*soil type mapped in Illinois Bayou Soil Conservation District*

Natural drainage		Native vegetation	Variations mapped	Distribution in district	Utilization	Dominant class of land capability	Remarks
Surface	Internal						
Good	Good	White oak, red oak, hickory, shortleaf pine.	Depth to parent material 4 to 6 feet. Red mottling in subsoil.	Flat hilltops and gentle dip slopes in central and northern part.	Chiefly in corn and cotton.	II, III	Acid to strongly acid throughout the profile.
do	do	do	Depth to parent material varies from 3 to 6 feet. Subsoil varies from a sandy clay loam to a sandy clay.	Flat hilltops and gentle dip slopes throughout.	do	do	Do.
do	do	do	Depth to parent material varies from 3 to 5 feet. Red mottling in subsoil.	do	do	do	Do.
Slow	Poor	Ash, oak, elm, gum, hickory.	Subsoil varies from silty clay loam to clay. Concretions may form hardpan at 18 inches or more.	Valleys and on the base of slopes around the valleys throughout.	Chiefly in cotton, with large areas in pasture.	do	The mound phase of Conway is best developed east of Russellville. Used for pasture if mounds are numerous. Strongly to very strongly acid throughout the profile.
Good	do	do	Subsoil varies from silty clay loam to silty clay. Depth to shale varies from 3 to 4 feet.	Valleys and on bases of slopes around valleys throughout.	Chiefly in cotton.	do	
Poor	do	do		Broader valleys in south part.	Entirely for pasture.	IV	Strongly acid. In-extensive and therefore of little importance.
Good to excessive.	Good	Oak, hickory, pine, cedar.	Depth to bedded sandstone varies from 12 to 20 inches.	All uplands.	Chiefly in forest, with pasture, idle, and cropland occupying equal areas; used for cotton and to less extent for corn.	V	These soils are very extensive. They are predominantly non-agricultural. Strongly acid.

TABLE 7.—Characteristics of soil series and acreage of each soil

Soil group and series	Soil type	Area		Soil profile		Parent material	Relief
		Acrea	Percent	Surface soil	Subsoil		
Hector.....	Stony fine sandy loam.	4,047	2.3	Dark brown, loose, little organic-matter content, 4 to 5 inches deep.	Reddish brown, stony or gravelly fine sandy loam.	Thin bedded, red and brown, fine grained sandstone at 16 to 20 inches.	B, BB, C, D slopes.
	Gravelly fine sandy loam.	3,623	2.0				
Pottsville.....	Gravelly fine sandy loam.	25,059	14.0	Light grayish brown, very little organic-matter content, 3 to 5 inches deep.	Light reddish-brown compact clay loam to clay containing fragments of shale.	Laminated red, yellow, and gray shale at 6 inches to 2 feet.	B, BB, C, D, E slopes.
Pottsville-Hector soils.	Complex.....	22,408	12.5	Stony fine sandy loam and clay loam.	Stony fine sandy loam to clay.	Bedded sandstone and shale.	C, D, E slopes.
Total.....		88,766	49.5				
4. Well-drained soils on terraces of local streams:							
Waynesboro.....	Fine sandy loam, low terrace phase.	882	.5	Brown, mellow, typically with good organic-matter content, 8 to 10 inches deep.	Reddish-brown, friable, sandy clay loam. 2 to 20 feet or more deep.		Generally on A, B, and BB slopes.
	Gravelly fine sandy loam, low terrace phase.	1,627	.9				
	Gravelly fine sandy loam.	1,093	.6				
Holston.....	Very fine sandy loam.	801	.4	Grayish-brown, mellow, 6 to 10 inches deep. Scattered concretions.	Yellowish-brown fine sandy clay loam. 2 to 20 feet or more deep.		do
	Gravelly very fine sandy loam.	460	.3				
Total.....		4,863	2.7				
5. Imperfectly or poorly drained soils on terraces of local streams: Tyler							
Tyler.....	Silt loam.....	104	.1	Gray-brown, containing many small, hard black concretions, 4 to 6 inches deep.	Gray, stained with brown, plastic silty clay. At about 2 feet begins dark bluish-gray compact clay. Many concretions throughout.		A slopes.
Total.....		104	.1				
6. Well-drained soils on terraces of the Arkansas River: Muskogee.....							
Muskogee.....	Very fine sandy loam.	788	.4	Yellowish brown, mellow, 6 to 10 inches deep.	Brownish yellow, slightly plastic, sandy clay loam. At 3 feet is a light gray plastic clay. Below 6 feet is a brownish-red plastic clay.		A, B, BB slopes.

type mapped in Illinois Bayou Soil Conservation District—Continued

Natural drainage		Native vegetation	Variations mapped	Distribution in district	Utilization	Dominant class of land capability	Remarks
Surface	Internal						
Good to excessive.	Good....	Oak, hickory, pine, cedar.	Depth to bedded sandstone varies from 16 to 20 inches.	All uplands, generally on dip slopes.	Chiefly in forest, smaller areas in pasture, idle, and cultivated; used for cotton and to less extent for corn.	V.....	These soils are extensive. Slightly more productive than the Muskingum soils but low in productivity. Strongly acid.
..do.....	..do.....	..do.....	Depth to shale from 6 inches to 2 feet. The surface soil may rest directly on shale.	All uplands.....	Chiefly in forest. Small areas in cotton or corn.	..do.....	These soils are very extensive. They are very low in fertility. They are strongly acid.
..do.....	..do.....	Oak, hickory, shortleaf pine.	Depth to parent material from 2 to 20 feet.	All steep slopes in uplands.	Forested.....	..do.....	This complex is on slopes where definite profiles have not formed. It is a mixture of sandstone and shale weathered material.
Good.....	..do.....	..do.....	Depth of entire profile varies from 2 to 20 feet or more. Layers of water rounded gravel may be present.	On benches from 20 to 200 feet above local streams.	Cultivation in corn and cotton. Pasture and lespedera, meadows.	II, III....	These soils are highly prized because of their relatively high productivity and ease of tillage. The subsoil can be built into productive soil by addition of organic-matter content. Acid to strongly acid.
..do.....	Imperfect.	..do.....	Depth of entire profile varies from 2 to 20 feet. Layers of gravel may be present.	On benches above overflow of local streams.	Cultivation in cotton and to a lesser extent corn.	II, III....	These soils are not as productive as those of the Waynesboro series and they are generally "later" because of the imperfect internal drainage. Strongly to very strongly acid.
Poor.....	Poor.....	Gum, ash, elm, hackberry, water oak, willow oak.	The concretionary material may form a definite hardpan.	In depressions surrounded generally by Holston or Waynesboro or between these soils and upland soils.	Forest and pasture.	IV.....	Very strongly acid. No use other than for pasture, meadow, or forest unless adequately drained.
Good....	Imperfect.	Gum, ash, elm, hackberry, hickory, oak.	The sandy clay loam may not be present and the surface soil may lie on the clay.	On level to gently sloping benches above Arkansas River or in old channels of that river.	Cultivated in cotton, corn and sorghum. Also used extensively for pasture.	II, III....	Strongly acid. Many areas severely eroded and gullied.

TABLE 7.—Characteristics of soil series and acreage of each soil

Soil group and series	Soil type	Area		Soil profile		Parent material	Relief
		Acres	Percent	Surface soil	Subsoil		
Teller.....	Very fine sandy loam.	170	.1	Brown, mellow, 6 to 8 inches deep.	Red, friable sandy clay loam or clay, to 4 feet or more. Permian Red Bed clay may underlie this.	-----	A, B, BB slopes.
	Gravelly very fine sandy loam.	232	.1				
	Total.....	1,190	.6				
7. Poorly drained soils on terraces of the Arkansas River:							
Wrightsville.....	Silt loam.....	239	.1	Gray, mottled with brown, 5 to 6 inches deep.	Mottled gray and brown silty clay grading downward into a gray, heavy clay.	-----	A slopes.....
Total.....		239	.1				
8. Imperfectly drained calcareous soil on terraces of the Arkansas River:							
Morse.....	Clay.....	223	.1	Dark, reddish-brown, tenacious clay, 4 to 6 inches deep.	Reddish-brown to red plastic clay. Calcareous concretions.	-----	A, B, BB slopes.
Total.....		223	.1				
9. Well-drained or imperfectly drained soils on flood plains of local streams:							
Pope.....	Fine sandy loam.	5,869	3.3	Yellowish-brown, mellow, 6 to 10 inches deep.	Yellowish-brown, fine sandy loam, containing varying amounts of silt and in places streaked with loose sand.	-----	Level first bottoms along Illinois Bayou and other local streams.
	Fine sandy loam, high bottom phase.	1,490	.8	Yellowish brown, mellow, about 8 inches deep.	Brown, fine sandy loam or friable silty clay loam.	-----	Level areas bordering local streams, but above normal overflows.
	Silt loam, high bottom phase.	112	.1				
Philo.....	Fine sandy loam.	456	.2	Gray, mellow, for 4 to 8 inches. Concretions scattered on surface and through layer.	Mottled gray and brown with gray increasing with depth. Scattering of concretions.	-----	Level areas somewhat depressed below. Pope soils.
	Silt loam.....	1,378	.8				
Total.....		9,305	5.2				
10. Poorly drained soils on flood plains of local streams:							
Atkins.....	Fine sandy loam.	197	.1	Gray silt or fine sandy loam for 4 or 5 inches. Heavy scattering of concretions.	Bluish gray heavy silty clay. Concretions may form a hard pan at 2 feet or more.	-----	Depressions in first bottoms and in sloughs along local streams.
	Silt loam.....	270	.2				
Total.....		467	.3				
11. Mixed material deposited by local streams: Alluvial soils undifferentiated.		12,507	7.0	A mixture of sands, silts, and clays having a wide variation in color and texture.	Depositions range in depth from 18 inches to 12 feet or more.	-----	In overflow areas of all small drains. A and B slopes.



*type mapped in Illinois Bayou Soil Conservation District—Continued*

Natural drainage		Native vegetation	Variations mapped	Distribution in district	Utilization	Dominant class of land capability	Remarks
Surface	Internal						
Good....	Good....	Gum, ash, elm, hackberry, hickory, oak, shortleaf pine.	Layers of water rounded flint gravels may be present at any depth or throughout.	On benches above the present Arkansas River bottoms.	Cultivated in cotton, corn. Equal areas are in cropland, idle land, pasture, and forest.	II, III, V	The surface soil and upper subsoil are acid. Red Bed Clay commonly present in the lower part of the profile is strongly alkaline.
Slow....	Poor....	Gum, ash, elm, hickory, carpet grass.	In wooded areas red mottlings occur in the first 20 inches.	Limited to depressions in areas of Muskogee and Teller soils.	Forest, pasture and meadow.	IV.....	Strongly acid throughout the profile.
Good....	Slow....	Ironwood, gum, redbud, dogwood, honeylocust, hickory, elm, oak.	Where erosion has been severe there are calcareous concretions, scattered over the surface.	Occurs on narrow sloping strips of terrace faces above the Arkansas River bottoms.	Cultivated in cotton, peas, and grain sorghum.	II, III...	The surface 4 or 6 inches is slightly acid. The subsoil is strongly alkaline. Gully erosion is very severe in places.
do....	Good....	Gum, oak, hickory, elm, sycamore, willow.	Varying amounts of stratification of loose sand and rounded gravels.	Along all the larger local streams in district.	Corn and cotton.	I.....	This is the most highly prized bottom-land soil along local streams. Acid in reaction.
do....	do....	do....	Varying amounts of stratification of rounded gravels.	Along the larger local streams in broad valleys.	do....	do....	Between periods of overflow these soils are subject to slight sheet erosion. Acid and strongly acid.
Slow....	Slow....	do....	Profile may be brown for first 12 inches and mottled gray and brown below.	Generally between Pope soils and second bottom soils.	do....	do....	These soils are not so productive as the Pope soils. They are "later" and are thus less desirable. Strongly acid.
Poor....	Poor....	Gum, water and willow oak, sycamore, hickory, elm.	Depth to hardpan varies from 2 feet and more.	In wider bottoms along local streams throughout the district.	Forest, pasture, and meadow.	IV.....	Very strongly acid. They are essentially non-arable under natural drainage conditions.
Good....	Slow....	Gum, oak, hickory, sycamore, willow.	Texture, color, consistence, and depth vary greatly.	Along all the smaller streams in the district.	Used in every manner. Better drained areas cultivated in corn or cotton.	I.....	These soils are acid and strongly acid. Use varies according to texture, drainage, and extent.

TABLE 7.—Characteristics of soil series and acreage of each soil

Soil group and series	Soil type	Area		Soil profile		Parent material	Relief
		Acres	Percent	Surface soil	Subsoil		
Pope.....	Gravelly fine sandy loam.	377	.2	Yellowish brown, very gravelly, 8 to 12 inches deep.	Yellowish-brown, very gravelly sandy loam or heavy gravel layer with little sand.		Closely bordering narrow stream channels. A and B slopes.
Total.....		12,884	7.2				
12. Imperfectly drained soils on bottom land near mouths of streams tributary to the Arkansas River:							
Portland.....	Silty clay loam, overwash phase. Silty clay, overwash phase.	202	.1	Grayish brown, 4 to 8 inches deep.	Mottled, rusty brown and gray silty clay to 2½ to 3 feet. Below is the chocolate-brown clay typical of Portland soils.		A slopes.....
		47	(1)				
Perry.....	Very fine sandy loam.	124	.1	Gray spotted with brown, about 8 inches deep.	Dull gray spotted with brown, plastic clay to 2 feet. Below this is a chocolate brown, streaked with gray.		do.....
Total.....		373	.2				
13. Sandy, well-drained soils on Arkansas River bottoms:							
Portland.....	Very fine sandy loam. Loamy very fine sand.	825	.5	Brown, mellow, 8 to 10 inches deep.	Dark reddish-brown silt loam to 18 in. to 2 feet. Below this is a chocolate brown to salmon fine sandy loam or sandy clay loam.		do.....
		1,614	.9				
Pulaski.....	Very fine sand.	985	.5	Light brown, 8 to 20 inches deep.	Light brown, very fine sand faintly mottled with pink.		do.....
Total.....		3,424	1.9				
14. Heavy imperfectly drained soils on Arkansas River bottoms:							
Portland.....	Silty clay.....	438	.2	Brown, 8 to 10 inches deep.	Dark reddish-brown, plastic clay to 3 to 3½ feet. Below this is a very dark reddish-brown very plastic clay.		do.....
Perry.....	Clay.....	409	.2	Dull grayish brown or drab. 4 to 6 inches deep.	Dull gray plastic clay mottled with brown and containing many soft concretions.		do.....
Brewer.....	Clay.....	443	.3	Dark brown plastic clay, 12 to 18 inches deep.	Dark gray plastic clay to about 4 feet. Below 4 feet is red, plastic, calcareous clay.		do.....
Total.....		1,290	.7				

type mapped in Illinois Bayou Soil Conservation District—Continued

Natural drainage		Native vegetation	Variations mapped	Distribution in district	Utilization	Dominant class of land capability	Remarks
Surface	Internal						
Good	Good	Sycamore, willow, river cane.	Amount of gravel on surface and throughout the profile.	Confined to narrow strips along swift local streams.	Forest and pasture.	IV	This soil is generally too gravelly for cultivation or for use other than forest or pasture.
Slow	Poor	Gum, sycamore, ash, water and willow oak.	Depth to the chocolate brown clay.	Confined to small area where Illinois Bayou makes deposit over Portland soils.	In cotton	I	These soils are acid to strongly acid in upper part of profile and slightly alkaline in lower part.
do	do	Gum, sycamore, water and willow oak.	Depth of sandy loam surface 8 to 12 inches, and to chocolate brown, gray mottled clay.	Confined to depression areas in Arkansas River bottoms.	do	do	The profile is acid. This soil is better adapted to cotton than to corn
Good	Good	Oak, hickory, pecan, sycamore, willow.	Surface soil may have a pinkish cast. Subsoil ranges from dark reddish brown to salmon.	Wider first bottoms of the Arkansas River.	In cotton and corn. Occasionally in alfalfa.	I	Slightly acid to slightly alkaline. They are very productive and are especially adapted to corn and cotton.
do	do	Willow, sycamore, birch.	Profile approaches that of Portland loamy very fine sand in places.	Natural levees paralleling the Arkansas River.	In cotton and corn. Some excellent Bermuda grass pastures.	do	Slightly acid. Owing to its close proximity to the Arkansas River it is rather more subject to swift current action than most bottom soils along the river.
Slow	Slow	Birch, oak, hickory, sycamore, gum.	Lower portion of profile may be pink instead of dark reddish brown.	Confined to Arkansas River bottoms that are subject to depositions from slowly moving backwater.	In cotton, peas, soybeans, alfalfa.	do	Neutral to slightly acid or slightly alkaline. Not adapted to corn. Good alfalfa meadows are established on this soil.
do	Poor	do	The heavy clay with brown mottling carries to surface in wooded areas.	In depression areas in Arkansas River bottoms where backwater makes depositions.	In cotton. Many areas idle and in pasture.	do	Acid. It is not suited to corn. Some alfalfa fields have been established on this soil.
do	Slow	do	In the center of large areas of the type the gray color is lighter, and extends to greater depth.	Confined to area in Arkansas River bottoms where backwater deposits silt and clay.	In cotton and alfalfa.	do	Neutral to slightly acid in the surface soil and alkaline in the subsoil. Well adapted to alfalfa.

TABLE 7.—Characteristics of soil series and acreage of each soil

Soil group and series	Soil type	Area		Soil profile		Parent material	Relief				
				Surface soil	Subsoil						
15. Land classes that have little agricultural value:	Riverwash	1,121	.6	Rocks of boulder and cobble size with little or no sand or silt.			A and B slopes.				
	Shale outcrop	151	.1					Outcropping of shale.	Shale	C, D, E slopes.	
	Rough stony land, sandstone and shale material.	2,184	1.2					Scattered areas of outcropping sandstone and shale, adjacent lower areas covered with large sandstone.		Sandstone and shale.	do.
	Total	3,456	1.9								

Soil group 1 occupies 28,569 acres, or 15.9 percent of the district. It includes the deeper, well-drained upland soils formed on sandstone. The Linker gravelly fine sandy loam is the most extensive type in this group, covering 16,941 acres. The light gray surface soil has a depth of 7 to 10 inches and is underlain by a reddish-brown to yellowish-brown friable sandy clay loam. The Hanceville gravelly fine sandy loam and fine sandy loam occupy 8,032 and 1,017 acres, respectively. The surface soils are light brown, the subsoils are brown very fine sandy loam. The Cleburne fine sandy loam has a light gray surface soil and a yellow very fine sandy clay loam subsoil. These soil types occupy the flat hilltops and gentle dip slopes of the upland (fig. 10, A); they have a total depth of 3 feet or more to the underlying sandstone; their slopes are gentle, ranging from nearly level to about 8 percent; the surface and internal drainage are good and they can be worked several days earlier in the spring than most of the soils of the district. They are cultivated chiefly to corn and cotton. Apple and peach orchards are also located on them. These soils fall chiefly into land-capability classes II and III, since none of them can be used safely for growing tilled crops without the use of either simple or complex erosion-prevention practices. All are deficient

in organic matter, and the use of cover crops to be turned under to increase the supply is desirable.

Soil group 2 covers 24,297 acres, or 13.6 percent of the district. The Enders fine sandy loam, with an area of 13,741 acres is most extensive. It has a mellow brown surface soil, 5 to 7 inches deep, and a reddish-brown silty clay loam subsoil. Drainage is good in the surface soil but poor in the subsoil. The Conway very fine sandy loam has a light-gray surface soil, 8 to 10 inches deep, underlain by a gray silty clay loam mottled with yellow and brown. The mound phase of this soil type has mounds 2 to 4 feet high and 12 to 15 feet in diameter. These interfere with cultivation and the land is used chiefly for pasture. The depth to the underlying shale on which these soils have been formed is from 3 to 4 feet. The surface drainage of the Conway soils is slow and the subsoil drainage is poor. Slopes are gentle, chiefly less than 8 percent. These soils are cultivated to corn and cotton and large areas are in pasture. They are strongly acid in both surface soil and subsoil. They fall predominately into land classes II and III with small, poorly drained areas in class IV. All three soils lie in valley positions between the more elevated soils of group 1 and the soils of the terraces or second bottoms.

*type mapped in Illinois Bayou Soil Conservation District—Continued*

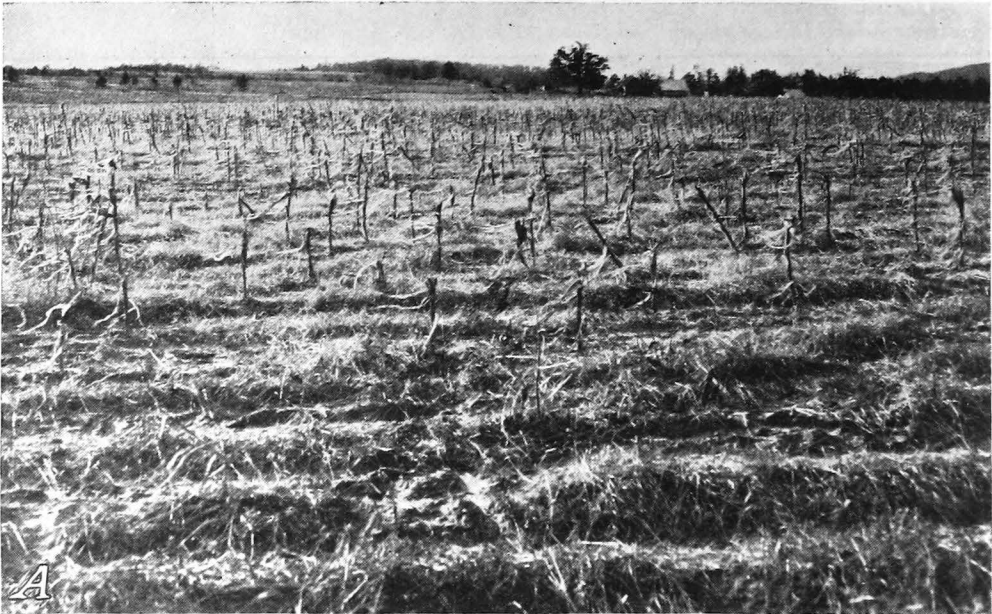
Natural drainage		Native vegetation	Variations mapped	Distribution in district	Utilization	Dominant class of land capability	Remarks
Surface	Internal						
Good	Good	Sparse growth of ash, elm, oak, sycamore, sweet gum, willow.		In the channels of smaller streams where there is swift current.	Forest	V	
do	do	Blackjack and post oak, cedar.		On steep slopes where no soil development has occurred.	do	do	
do	do	Blackjack and post oak, cedar and scattered pine.		On steep slopes on all large hills in the District.	do	do	

Soil group 3 includes all the shallow upland soils formed on shale and sandstone. They cover an area of 88,766 acres, or 49.5 percent of the district. These soils occupy most of the steeper slopes in the uplands. They are generally stony or gravelly in both surface soil and subsoil or consist of accumulations of stony material with little fine earth on steep slopes around the escarpments bordering the mountain areas. The soil types in this group are the Muskingum stony fine sandy loam and gravelly fine sandy loam, which have shallow light grayish-brown surface soils and light-brown subsoils; the Hector stony fine sandy loam and gravelly fine sandy loam, dark brown at the surface and reddish brown in the subsoil; and the Pottsville gravelly fine sandy loam, which has a light grayish-brown surface soil and in the deeper areas a light reddish-brown compact clay loam subsoil. Bedded sandstone underlies the Muskingum and Hector soils at depths ranging from 12 to 20 inches. Shale lies directly below the surface soil, or at a depth of 2 feet or less in the Pottsville soil (fig. 10, B). The Pottsville-Hector complex was mapped on all the steeper slopes where both sandstone and shale material were mingled to form a dominantly stony mass with small amounts of finer earth. Drainage is good to excessive on all the soils of the group. They are chiefly

in forest; small areas are in pasture. The entire group is chiefly in land-capability class V and should be used for woodland and wildlife. Only under extreme necessity and with every precaution to prevent soil erosion should it be cultivated.

Group 4 consists of well-drained soils on the terraces or second bottoms of the local streams and has an area of 4,863 acres, or 2.7 percent of the district. The Waynesboro soils, with brown surface soils of good depth and reddish-brown sandy clay subsoils, lie on benches at elevations of 20 to 200 feet above local streams. They are well drained and highly prized because of relatively high productivity and ease of cultivation. The slopes range from nearly level up to 8 percent. They are cultivated to corn and cotton with pasture and lespedeza meadows on the gravelly soil types. The Holston soils have gray surface soils and yellowish-brown subsoils. Surface drainage is good, but subsoil drainage is imperfect. Slopes are similar to those of the Waynesboro. They are cultivated to cotton and to a less extent to corn. All soils of the group fall into land-capability classes II and III since precautions are necessary to prevent erosion on cultivated lands. They are strongly acid.

Group 5 consists of the Tyler silt loam, which has an area of only 104 acres or 0.1 percent of the district.



**Figure 10.**—*A*, Flat hilltops are occupied by soils with deep profiles like this field on Cleburne fine sandy loam on Buck Mountain; *B*, shale rock underlying the shallow Pottsville soils at a depth ranging from 10 inches to 2 feet.

It is found on poorly drained A slopes on the terraces of local streams, usually in depressions in the Waynesboro and Holston soils. Unless artificially drained it has no other use than meadow, forest, or pasture and falls into land-capability class IV.

The well-drained soils on the terraces of the Arkansas River have an area of 1,190 acres, or 0.6 percent of the district. They constitute soil group 6. The Muskogee very fine sandy loam is the most extensive. It has a yellowish-brown surface soil, 6 to 10 inches deep, and a brownish-yellow, slightly plastic sandy clay loam subsoil. It lies on A, B, and BB slopes. The surface drainage is good; that of the subsoil is imperfect. It is severely eroded in places and is strongly acid. It is cultivated to corn, cotton, and sorghum and used extensively for pasture. It falls in land-capability classes II and III. The Teller very fine sandy loam and gravelly fine sandy loam have brown surface soils and red friable sandy clay loam or clay subsoils. Drainage is good; slopes range from nearly level up to 8 percent. Cotton and corn are grown on the cropland. These soils are divided among classes II, III, and V.

Group 7 consists of the Wrightsville silt loam, having an area of 239 acres or 0.1 percent of the district. It lies on A slopes in depressions in the Muskogee and Teller soils. The surface soil and subsoil are mottled gray and brown, and the subsoil grades down into a heavy gray clay. Since drainage is poor this soil is used for meadow, pasture, and woodland. It requires artificial drainage to render it cultivable and, therefore, falls into class IV.

The Morse clay with a total area of only 223 acres, or 0.1 percent of the district, is a calcareous, imperfectly drained soil of the Arkansas River terraces. It is the only member of soil group 8. The surface soil is a dark reddish-brown tenacious clay; the subsoil is a reddish-brown to red plastic clay. It occurs on narrow, sloping strips of the terraces above the Arkansas River bottom. It is cultivated to cotton, peas, and grain sorghum. Gully erosion is very severe in places. It is in classes II, III, and V.

Soil group 9 contains the well-drained or imperfectly drained soils on the flood plains of the local streams and has an extent of 9,305 acres, or 5.2 percent of the district. Soils of the Pope series make up the greater part of this area. They are yellowish brown in the surface soil and subsoil. They include the fine sandy loam and silt loam, the former a highly prized bottom-land soil. They are cultivated to cotton and corn and fall in land-capability class I. The Philo soils have gray surface soils and mottled gray and brown subsoils. Although they are not so well drained as the Pope soils, they are used for corn and cotton and are in class I.

The poorly drained soils of the Atkins series of the local flood plains make up group 10 with an area of 467 acres, or 0.3 percent of the district. They occupy depressions in the flood plains and in local sloughs. Both the fine sandy loam and silt loam are used chiefly for meadow, pasture, and woodland. They are in land-capability class IV, since they require drainage and protection from overflow to make them available for cropping.

Group 11 covers all of the undifferentiated alluvial material deposited by the local streams, and the Pope gravelly fine sandy loam. The group has an area of 12,884 acres, or 7.2 percent of the district. The material consists of a mixture of gravel, sand, silt, and clay deposited in the overflow areas of all small drainageways. Slopes are gentle and the land is used in a variety of ways. The better drained areas are planted to cotton and corn; others are used for meadow, pasture, and woodland. The Pope gravelly fine sandy loam falls into class IV, the other alluvial soils into class I, if not subject to destructive overflow.

Group 12, consisting of the imperfectly drained soils deposited on the bottom lands near the mouths of the local streams, has a total area of only 373 acres, or 0.2 percent of the district. These soils consist of an overwash of gray or grayish-brown material deposited to varying depths over the typical chocolate-brown or mottled gray and brown subsoils that characterize the Portland and Perry series. They

occupy nearly level areas, are imperfectly to rather poorly drained, and are cultivated to cotton to better advantage than to corn. They are in class I.

Soil group 13, with an area of 3,424 acres, or 1.9 percent of the district, includes the Portland very fine sandy loam and loamy very fine sand and the Pulaski very fine sand. The Portland soils have brown surface layers and reddish-brown subsoils resting on a chocolate to salmon underlayer. They occupy A slopes on the wider first bottoms of the river. They are especially adapted for growing cotton and corn, and some tracts are suitable for alfalfa. They constitute land of class I. The Pulaski very fine sand occurs on the natural levees paralleling the river and is cultivated to cotton and corn and carries some excellent Bermuda grass pastures. It is class I land.

The heavy, imperfectly drained soils on the Arkansas River bottoms form soil group 14, with an area of 1,290 acres, or 0.7 percent of the district. The Portland silty clay lies in bottom lands that are subject to deposition from slowly moving backwater. The surface soil is brown, the subsoil a chocolate brown. The surface is level or depressed and drainage is slow. It is used for growing cotton, corn, cowpeas, and alfalfa and constitutes class I land. The Perry clay is a gray soil formed where backwater makes deposition. It is poorly drained, level, and cultivated to cotton although many areas are idle or in pasture. The Brewer clay is a dark-brown clay similarly situated and cultivated to cotton and some alfalfa. Both are in class I.

Group 15 is made up of the areas covered with soil materials that are not suited to agricultural uses. It has an area of 3,456 acres, or 1.9 percent of the district. Riverwash occupies the channels of the smaller streams where sand and gravel are temporarily deposited by successive floods. These areas bear a sparse growth of mixed bottom-land trees and have no agricultural value. Shale outcrop occupies 151 acres consisting of the exposure of bare shale rock. Rough stony land of both shale and sandstone material

was mapped on 2,184 acres where these rocks outcrop and where rock fragments have accumulated on adjacent lower-lying areas. Blackjack oak, post oak, and cedar, with a scattering of pines, make some growth. Soils of this group have no value except for the trees that may grow on them. They are class V land.

### Erosion

The erosion classes mapped in the Illinois Bayou Soil Conservation District are given in detail on page 25. Sheet erosion occurs alone on some areas, but by the time that sheet erosion has become advanced gullies have usually started. In table 8 the more simple classes of erosion are combined into erosion groups that express the relative degree of damage.

TABLE 8.—*Areage and percentage of each erosion group and class*

Erosion group and class	Area	
	Acres	Percent
Recent alluvial and colluvial deposits: + .....	28,864	16.1
Slight erosion:		
1 .....	34,599	19.3
2 .....	43,193	24.1
6 .....	1,484	.8
Total .....	79,276	44.2
Moderate erosion:		
27 .....	6,782	3.8
3 .....	25,682	14.2
37 .....	24,044	13.4
Total .....	56,508	31.4
Severe erosion:		
27 .....	782	.4
28 .....	91	.1
37 .....	2,845	1.6
Total .....	3,718	2.1
Very severe erosion:		
27 .....	69	(1)
38 .....	803	.4
37 .....	613	.4
4 .....	2,385	1.3
47 .....	3,249	1.9
47 .....	651	.4
48 .....	325	.2
47 .....	426	.2
5 .....	1	(1)
57 .....	1	(1)
57 .....	5	(1)
9 .....	34	(1)
9 .....	173	.1
Total .....	8,735	4.9
Normal erosion: W .....	2,349	1.3
Total .....	179,450	100.0

1 Less than 0.1 percent.



The recent alluvial and colluvial deposits, mapped on 28,864 acres, consist of materials from upland sources that have been carried down by running water and deposited with more or less sorting of materials into coarse, medium, and fine particles. They are found chiefly on the flood plains of the local streams but also in the flood plains of the Arkansas River. They are subject to the addition of new material with every flood or overflow. Protection from overflow and simple drainage practices on poorly or imperfectly drained areas are needed.

Slight erosion includes all areas from which less than 25 percent of the topsoil has been removed and on which gully-ing has not started. It was mapped on 79,276 acres, or 44.2 percent of the area. This might seem to indicate that the district was in good position with respect to soil losses but a reference to table 14, page 45, shows that this condition was mapped on 9,654 acres of cropland and 52,787 acres of woodland. It is, therefore, a condition most closely associated with the partial or complete protection of the soil by

vegetation and does not represent a favorable condition on large areas of cropland. Only 21 percent of the cropland is but slightly eroded. Slight erosion is found to the extent of 55,918 acres on shallow upland soils, which are dominantly covered by woods and which are stony or gravelly, rather loose and porous, and are capable of absorbing rainfall readily. These soils fall chiefly into land-capability class V. At least 50,000 acres of the 79,276 acres having slight erosion are not suited to cropping under the most favorable conditions.

Moderate erosion includes areas that have lost 25 to 75 percent of the topsoil and are not gullied and all gullied areas that have lost less than 75 percent of the topsoil and have no more than three shallow gullies to the acre. It covers 56,508 acres, or 31.4 percent of the district. Moderate erosion is only a relative term in describing conditions in the district. The topsoils were originally shallow and have become depleted in organic matter by too continuous cultivation to row crops. Consequently, the loss of as little as 25



*Figure 11.*—Severe gully erosion on a C slope on Enders fine sandy loam placing this field in land-capability class V.

percent of the topsoil is a matter requiring attention, and greater losses are serious. Moreover, over half of both the cropland and the idle land has been moderately eroded, and 40 percent of the pasture, as is shown in table 14, page 45. Moderate erosion that includes gullying is a condition that requires improved cropping practices—contour cultivation, strip cropping, the use of winter cover crops, the plowing under of green-manure crops to restore organic matter to the topsoil—and, on most areas, sodded waterways and terracing. This is shown in table 1, page 4, where nearly all such land falls into class III.

Severe erosion includes areas that have lost less than 75 percent of the topsoil and have occasional deep gullies (fig. 11) and areas with slight erosion and shallow frequent gullies. It was mapped on 3,718 acres, or 2.1 percent of the district. Over 3,000 acres are on idle land and in pastures that have been retired from cultivation, and this erosion condition accounts largely for the fact that these areas are not now in cultivation. It has occurred on slopes ranging from 2 to 12 percent and chiefly on the upland soils, although appreciable areas of the well-drained terrace soils have been severely eroded.

Very severe erosion, which is the loss of a large part of the topsoil or all the topsoil and some of the subsoil, or deep or frequent gullying, was mapped on 8,735 acres, or 4.9 percent of the district. It is found most extensively on the shallow upland soils where injudicious attempts at cultivation have resulted in the destruction of the land for all practical purposes. About the same proportionate extent of the other upland soils and some areas of the well-drained soils of the Arkansas River terraces are very severely eroded. It has been a controlling influence in shifting cropland into idle land or pasture, as is shown by the fact that 3,856 acres of idle land and 2,635 acres of pasture are very severely eroded. Cropland showed 1,816 acres on which erosion was very severe. This land cannot economically be retained in cultivation. Some tracts may be used for pasture by sodding with Bermuda

grass, but it would undoubtedly be best to plant the greater part of this erosion group to trees. This is desirable not only from the standpoint of securing the best protection for the land itself and the best prospect of some return from it but also to protect other land in better condition from the encroachment of gullies and from the damage due to rapid run-off of storm water from the eroded areas.

The existing kind and degree of erosion is an expression of the combined influence of the soil, the slope, and the present and past use or misuse of the land. It is the resultant of these factors in different combinations under the climatic conditions of the district. It exerts a dominant influence on the capability of the land for continued agricultural uses suited to the climate, the soils, and the cropping habits of the district. It is the destructive process against which provision must be made by the adoption of improved crop rotations and improved methods of cultivation, and by the use of mechanical aids to dispose of otherwise dangerous run-off.

### *Slopes*

Slope exerts a strong influence on the behavior of water falling on the surface of the land. On a gentle slope the water flows away slowly and does not exert great cutting power on the topsoil. Because the water remains longer it has a greater opportunity to sink into the soil. On different soils, some open and porous, others more compact, the behavior of water is different.

The A slopes, less than 2 percent, constitute 42,155 acres, or 23.5 percent of the area of the district. They are extensive on the upland shale soils. There are some areas of A slopes on terrace soils, but the greatest area is on the flood-plain soils (table 9).

The B slopes, 2 to 5 percent, have an area of 49,569 acres, or 27.7 percent of the district. Of these slopes, 45,585 acres are on the upland soils and the remainder are on the well-drained terrace soils.

So far as slope alone is concerned, the A and B slopes could be cultivated without serious danger from erosion and with

TABLE 9.—Distribution of the slope classes in each soil group

Soil group	A slopes (less than 2 percent)		B slopes (2-5 percent)		BB slopes (5-8 percent)		C slopes (8-12 per- cent)		D slopes (12-25 per- cent)		E slopes (25 percent and over)		Total  Acres
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	965	3.4	16,953	59.3	8,841	30.9	1,521	5.3	287	1.1	2	( <sup>1</sup> )	28,569
2. Upland soils (shale).....	10,581	43.6	12,240	60.4	1,249	5.1	1,182	.7	45	.2	0	0	24,297
3. Shallow upland soils.....	590	.8	16,392	18.4	22,732	25.6	14,784	16.6	16,953	19.1	17,315	19.5	88,766
4. Well-drained terrace soils (local).....	1,383	28.4	2,486	51.1	651	13.4	222	4.6	115	2.4	6	.1	4,863
5. Imperfectly drained terrace soils (local).....	104	100.0	0	-----	0	-----	0	-----	0	-----	0	-----	104
6. Well-drained terrace soils (Arkansas River).....	300	25.2	439	36.9	255	21.4	71	5.9	93	7.8	32	2.8	1,190
7. Poorly drained terrace soils (Arkansas River).....	228	95.4	11	4.6	0	-----	0	-----	0	-----	0	-----	239
8. Calcareous terrace soil.....	18	5.1	132	59.2	52	23.3	11	4.9	10	4.5	0	-----	223
9. Well-drained, flood-plain soils (local).....	9,240	99.3	64	.7	1	( <sup>1</sup> )	0	-----	0	-----	0	-----	9,305
10. Poorly drained, flood-plain soils (local).....	467	100.0	0	-----	0	-----	0	-----	0	-----	0	-----	467
11. Mixed alluvial soils (local).....	12,110	94.0	774	6.0	0	-----	0	-----	0	-----	0	-----	12,884
12. Imperfectly drained, allu- vial, flood-plain soils (Ar- kansas River, partly local).....	373	100.0	0	-----	0	-----	0	-----	0	-----	0	-----	373
13. Sandy, well-drained, flood- plain soils (Arkansas River).....	3,424	100.0	0	-----	0	-----	0	-----	0	-----	0	-----	3,424
14. Heavy, imperfectly drained, flood-plain soils (Arkan- sas River).....	1,290	100.0	0	-----	0	-----	0	-----	0	-----	0	-----	1,290
15. Miscellaneous land classes.....	1,032	31.3	78	2.3	122	3.5	94	2.7	339	9.8	1,741	50.4	3,456
Entire district.....	42,155	23.5	49,569	27.7	33,903	18.9	16,885	9.4	17,842	9.9	19,096	10.6	179,450

<sup>1</sup> Less than 0.1 percent.

simple practices. A reference to table 1, page 4, shows that these slopes, unless eroded, fall into land-capability class II and that if moderately eroded into class III.

BB slopes, 5 to 8 percent, have a total area of 33,903 acres, or 18.9 percent of the district. Nearly two-thirds of this total is on the shallow upland soils, not well suited to cultivation even on more moderate slopes, and most of the remainder on the deeper upland soils where experience has shown that a BB slope requires special practices to control erosion. The terrace soils of the Arkansas River also have some areas of these slopes. The BB slopes constitute the steepest group on which cultivation should be attempted over any large area or for a long period of time. It is shown in table 1, page 4 that even slight or moderate erosion conditions place these slopes in land class III. Advanced erosion throws them into classes IV and V where pasture and woodland are the best uses.

C slopes range from 8 to 12 percent and were mapped on 16,885 acres, or 9.4 percent of the district. Seven-eighths of this area, or 14,784 acres, is on the

shallow upland soils, soil group 3. Nine percent of soil group 1 falls into this class. Most of the remainder is found on the terrace soils and the miscellaneous group. Table 10 shows that only 1,513 acres, or 9.0 percent, of this slope class are cultivated whereas 8,737 acres, or 51.7 percent, are in woodland. This is a recognition of the fact that the slope is too great for the conduct of cultivation although the prevalence of this slope class on soil group 3 also shows that the stony and porous nature of the soil exerts a strong influence on the land use of the slope and the soil group. Some of the land in this slope class falls into land-capability class IV, but its best use is for tree growth, placing by far the greater part in class V.

D slopes range from 12 to 25 percent and were mapped to the extent of 17,842 acres, or 9.9 percent of the district. They occur principally on soil group 3. Only 2 percent of the area of the D slopes is cropped and 84.6 percent is in woodland. Cropping should not be attempted on these slopes, and woodland is the best form of land use.

E slopes are in excess of 25 percent. They cover 19,096 acres, or 10.6 percent

TABLE 10.—Distribution of the land use classes in each slope class

Land use class	A slopes (less than 2 percent)		B slopes (2-5 percent)		BB slopes (5-8 percent)		C slopes (8-12 per- cent)		D slopes (12-25 per- cent)		E slopes (25 percent and over)		Entire dis- trict	
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.
Cropland.....	15,824	37.6	20,112	40.6	8,288	24.4	1,513	9.0	354	2.0	0		46,091	25.7
Idle land.....	4,265	10.1	9,723	19.6	7,660	22.6	2,559	15.2	790	4.4	18	0.1	25,015	13.9
Pasture.....	11,478	27.2	11,622	23.4	9,005	26.6	3,886	23.0	1,530	8.6	231	1.2	37,752	21.0
Woodland.....	9,237	21.9	5,594	11.3	8,239	24.3	8,737	51.7	15,087	84.6	18,841	98.7	65,735	36.7
Farmyards, urban, and miscellaneous areas.....	1,351	3.2	2,518	5.1	711	2.1	190	1.1	81	.4	6	( <sup>1</sup> )	4,857	2.7
Total.....	42,155	100.0	49,569	100.0	33,903	100.0	16,885	100.0	17,842	100.0	19,096	100.0	179,450	100.0

<sup>1</sup> Less than 0.1 percent.

of the district and are almost entirely on soil groups 3 and 15. None of this slope class is cultivated and 98.7 percent is in woodland, its best use.

It will be seen from table 10, that there has already been a partial adjustment of land uses to slope conditions, since 44,224 acres of cropland are located on A, B, and BB slopes; 1,513 acres on C slopes; 354 acres on D slopes; and none on E slopes. The area in woodland increases sharply with increased slope. It should also be noted that on BB slopes the use is almost equally divided between cropland, idle land, pasture, and woodland. The adoption of proper soil conservation measures on each land use class would bring these slopes well under control.

### Land Use

The relationships of present land use and soil groups is fairly distinct in the Illinois Bayou Soil Conservation District. Cotton and corn are the dominant crops and they are grown in various proportions on nearly all soils that are not too rough, too steeply sloping, or too poorly drained to permit cultivation. Cropland was mapped on 46,091 acres, or 25.7 percent of the district. It covered the highest proportionate extent of the well-drained and imperfectly drained soils of the stream terraces and stream bottoms but the greatest acreage is on the much more extensive upland soils (table 11). On the upland, depth of soil, freedom from stone, and drainage conditions affected cropping; on the terrace and flood-plain soils, drainage was the dominant influence. Idle land, amounting to 25,015 acres, was rather evenly distributed in

proportionate extent through the soil groups, since erosion accounts for throwing most of this land out of cultivation. Pasture, with a total area of 37,752 acres, was widely distributed in the different groups, although there was a concentration on the imperfectly drained terrace soils and the mixed alluvial soils where frequent overflow and the deposition of new material interfere with the production of cultivated crops. Woodland, with an area of 65,735 acres, or 36.7 percent of the district, is found chiefly on the shallow upland soils, the mixed alluvial soils, the upland sandstone soils, and the miscellaneous land classes. This distribution is associated either with the nature of the soils or with the dominant slope.

The agricultural conditions of the district lead toward the production of as large an acreage as possible of cotton, the cash crop, and corn, the chief home-grown feed crop. Consequently, there has not been any close adjustment of crop to soil. The notable exception is the growing of orchards on the deep, well-drained upland soils where both air and water drainage are favorable to fruit production.

### Relation of Erosion to Other Factors

Commonly, slope exerts a very strong influence on the rate at which soils are eroded. Increases in slope greatly accelerate the rate at which water flows across the land and this increases the size of the soil particles that may be moved and the mass of the soil material that may be carried away. A decrease in slope to such a degree that the velocity of the flowing water is checked brings about the deposition of at least

TABLE 11.—Distribution of the land use classes in each soil group

Soil group	Cropland		Idle land		Pasture		Woodland		Farmyards, urban, and miscellaneous areas		Total Acres
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	12,537	43.9	5,960	20.9	6,055	21.2	3,315	11.6	702	2.4	28,569
2. Upland soils (shale).....	9,596	39.4	3,329	13.7	6,619	27.2	2,744	11.3	2,018	8.4	24,297
3. Shallow upland soils.....	11,243	12.7	11,659	13.0	15,057	17.0	49,326	55.6	1,481	1.7	88,766
4. Well-drained terrace soils (local).....	2,148	44.2	810	16.7	1,107	22.8	415	8.4	383	7.9	4,863
5. Imperfectly drained terrace soils (local).....	17	16.4	8	7.7	47	45.2	30	28.8	2	1.9	104
6. Well-drained terrace soils (Arkansas River).....	452	37.9	293	24.8	242	20.3	174	14.6	29	2.4	1,190
7. Poorly drained terrace soils (Arkansas River).....	61	25.4	39	16.4	31	13.0	103	43.1	5	2.1	239
8. Calcareous terrace soil.....	71	31.8	97	43.5	25	11.3	21	9.4	9	4.0	223
9. Well-drained flood-plain soils (local).....	4,643	49.8	790	8.5	1,943	20.9	1,902	20.5	27	.3	9,305
10. Poorly drained flood-plain soils (local).....	111	23.8	25	5.4	155	33.1	175	37.5	1	.2	467
11. Mixed alluvial soils (local).....	1,966	15.3	1,182	9.2	5,566	43.1	4,005	31.1	165	1.3	12,884
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	218	58.5	93	24.0	49	13.1	13	3.5	0	-----	373
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	2,209	64.6	302	8.8	419	12.2	466	13.6	28	.8	3,424
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	733	56.8	170	13.2	242	18.8	145	11.2	0	-----	1,290
15. Miscellaneous land classes.....	86	2.5	258	7.5	204	6.8	2,901	84.0	7	.2	3,456
Entire district.....	46,091	25.7	25,015	13.9	37,752	21.0	65,735	36.7	4,857	2.7	179,450

the coarser part of the load. This is evident where streams overflow their banks and build up sandy natural levees near the channels and where streams are checked in their rate of flow by trees and shrubs or in joining less rapidly flowing streams. Consequently, the areas where alluvial deposits have been made recently and are still being made are on the flood plains, chiefly on A slopes, though some deposition has also occurred on B slopes.

The relationship of erosion to slope is shown in table 12. Slight erosion is found quite extensively on A, B, and BB slopes, as would be expected, but it was mapped more widely on C, D, and E slopes and in greater proportion compared with their total area. This

reversal of normal conditions can only be explained by the fact that these slopes are dominantly on soil groups 3 and 15 and that both of these are chiefly in woodland. The effect of steep slope has been partly counteracted by the protection afforded to the soil by tree cover.

Moderate erosion was mapped most extensively on B and BB slopes and in small areas on the D and E slopes, again due chiefly to the fact that the former are extensively cultivated whereas the latter are in woodland.

Severe erosion was mapped chiefly on the B and BB slopes and on cultivated fields, idle land, and pasture.

Very severe erosion was found on the B, BB, and C slopes in the greatest areas and proportionate extents. It was found

TABLE 12.—Distribution of the erosion groups in each slope class

Erosion group	A slopes (less than 2 percent)		B slopes (2-5 percent)		BB slopes (5-8 percent)		C slopes (8-12 percent)		D slopes (12-25 percent)		E slopes (25 percent and over)		Entire district	
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.
Recent alluvial and col- luvial deposits.....	27,919	66.2	945	1.8	0	-----	0	-----	0	-----	0	-----	28,864	16.1
Slight erosion.....	9,650	22.9	15,525	31.3	11,990	35.3	9,992	59.2	15,068	84.5	17,051	89.3	79,276	44.2
Moderate erosion.....	4,408	10.5	28,589	57.7	16,903	49.9	4,813	28.5	1,596	8.9	199	1.0	56,508	31.4
Severe erosion.....	10	( <sup>1</sup> )	992	2.0	1,505	4.4	872	5.2	280	1.6	59	.3	3,718	2.1
Very severe erosion.....	168	.4	3,490	7.1	3,385	10.0	1,117	6.6	560	3.1	15	.1	8,735	4.9
Normal erosion.....	0	-----	28	.1	120	.4	91	.5	338	1.9	1,772	9.3	2,349	1.3
Total.....	42,155	100.0	49,569	100.0	33,903	100.0	16,885	100.0	17,842	100.0	19,096	100.0	179,450	100.0

<sup>1</sup> Less than 0.1 percent.

on cultivated land, idle land, and pasture land and is very evidently to be associated with faulty forms of cropping and the eventual abandonment of the land rather than with slope characteristics.

That erosion in the Illinois Bayou Soil Conservation District is more closely related to other conditions than to slope is shown in table 13, which gives the distribution of the erosion groups in each slope class on the cropland of the district. By a natural adjustment of cropping to slope conditions, no E slopes are in crops and only 4 percent of the cropland is on C and D slopes. There has been moderate or more severe erosion on 1,444 acres or 77 percent of the cropland on the C and D slopes, and 226 acres or 12 percent have been severely or very severely eroded. The A slopes show deposition rather than any great degree of erosion as would be expected since they occur chiefly on flood plains. The B slopes, on which 43.6 percent of the cropland is located, show 76 percent of moderate or more severe erosion, and the BB slopes, with 18 percent of the cropland have 82 percent of moderate or more severe erosion. Difference in soil characteristics also influence erosion as is shown in table 15, page 45, consequently the cropping of 11,243 acres of the porous soils of group 3 (table 11) influences the relationship of slope to erosion on cultivated land. Table 13 shows that the clean cultivation of even B and BB slopes gives rise to conditions that require the adoption of protective measures to prevent serious soil losses. This is especially true if the original topsoil is shallow, as it is in this district.

All the topsoil should be retained for crop uses.

The relationship between the degree of soil erosion and the present use of the land is shown in table 14. Deposition has occurred in each different land use class, since the well-drained bottom lands not subject to too frequent or too prolonged overflow are cropped and other areas that are overflowed are either pastured, remain in woods, or are idle. Slight erosion was mapped far more extensively in woodland than elsewhere since the tree cover aids greatly in erosion prevention on all soils and slopes. Pasture is less effective than woodland for the control of erosion, since under existing conditions some land used for grazing purposes is not well sodded and the growth of wild grasses is not sufficiently dense to give good protection. About 17 percent of the idle land and 21 percent of the cropland is only slightly eroded. Moderate erosion, which is strongly evident on cropland, idle land, and pasture, is a condition that marks the beginning of the abandonment of land for cultivation. Hence, the fact that 24,351 acres of cropland, or 52.9 percent of its total area, was mapped as moderately eroded shows the need for the use of protective measures before erosion has reached a more advanced stage. Severe and very severe erosion are concentrated largely on the idle and pasture land, although 4.6 percent of the land now cropped has reached one of these stages.

The distribution of erosion groups in each soil group is shown in table 15. Recent alluvial and colluvial deposits are confined to the flood-plain soils and riverwash. Slight erosion is most ex-

TABLE 13.—Distribution of the erosion groups in each slope class for cropland

Erosion group	A slopes (less than 2 percent)		B slopes (2-5 percent)		BB slopes (5-8 percent)		C slopes (8-12 percent)		D slopes (12-25 percent)		Entire district	
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.
Recent alluvial and colluvial deposits.....	9,831	62.2	132	0.7	0	-----	0	-----	0	-----	9,963	21.6
Slight erosion.....	3,120	19.7	4,675	23.2	1,436	17.3	323	21.3	100	28.2	9,654	20.9
Moderate erosion.....	2,838	17.9	14,191	70.6	6,104	73.6	1,031	68.2	187	52.9	24,351	52.9
Severe erosion.....	0	-----	106	.5	154	1.9	37	2.4	9	2.5	306	.7
Very severe erosion.....	35	.2	1,007	5.0	594	7.2	122	8.1	58	16.4	1,816	3.9
Normal erosion.....	0	-----	1	( <sup>1</sup> )	0	-----	0	-----	0	-----	1	( <sup>1</sup> )
Total.....	15,824	100.0	20,112	100.0	8,288	100.0	1,513	100.0	354	100.0	46,091	100.0

<sup>1</sup> Less than 0.1 percent

TABLE 14.—Distribution of the erosion groups in each land use class

Erosion group	Cropland		Idle land		Pasture		Woodland		Farmyards, urban, and miscellaneous areas		Entire district	
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.
Recent alluvial and colluvial deposits.....	9,963	21.6	2,732	10.9	8,506	22.5	7,441	11.3	222	4.6	28,864	16.1
Slight erosion.....	9,654	20.9	4,302	17.2	9,740	25.8	52,787	80.3	2,793	57.5	79,276	44.2
Moderate erosion.....	24,351	52.9	12,721	50.9	15,098	40.0	2,674	4.1	1,664	34.2	56,508	31.4
Severe erosion.....	306	.7	1,318	5.3	1,704	4.5	343	.5	47	1.0	3,718	2.1
Very severe erosion.....	1,816	3.9	3,856	15.4	2,635	7.0	303	.5	125	2.6	8,735	4.9
Normal erosion.....	1	( <sup>1</sup> )	86	.3	69	.2	2,187	3.3	6	.1	2,349	1.3
<b>Total.....</b>	<b>46,091</b>	<b>100.0</b>	<b>25,015</b>	<b>100.0</b>	<b>37,752</b>	<b>100.0</b>	<b>65,735</b>	<b>100.0</b>	<b>4,857</b>	<b>100.0</b>	<b>179,450</b>	<b>100.0</b>

<sup>1</sup> Less than 0.1 percent.

tensive on soil group 3, porous upland soils, prevalently timbered and chiefly exposed to erosion on their more moderate slopes. On this group, soil permeability, slope, and cover operate together to reduce the liability to erosion. The poorly or imperfectly drained terrace soils are but slightly eroded both because of prevailing low slopes and because they are used for other purposes than cultivation. Approximately one-half of the area of the shale

soils of group 2 has been slightly eroded, and it has been shown that the slopes are moderate on these soils. A considerable part of the mound phase of the Conway very fine sandy loam is in pasture. Only 31 percent of the sandstone soils has experienced but slight erosion.

The position of the upland soils with regard to moderate erosion is reversed: 59 percent of group 1, about 43 of group 2, and only 29.1 of group 3 falling in

TABLE 15.—Distribution of the erosion groups in each soil group

Soil group	Recent alluvial and colluvial deposits		Slight erosion		Moderate erosion		Severe erosion		Very severe erosion		Normal erosion		Total Acres
	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	Acres	Pct.	
1. Upland soils (sandstone).....	0		8,860	31.0	16,870	59.1	1,314	4.6	1,524	5.3	1	( <sup>1</sup> )	28,569
2. Upland soils (shale).....	0		12,066	49.7	10,385	42.7	411	1.7	1,435	5.9	0		24,297
3. Shallow upland soils.....	0		55,918	63.0	25,820	29.1	1,775	2.0	5,253	5.9	0		88,766
4. Well-drained terrace soils (local).....	0		1,621	33.3	2,834	58.3	101	2.1	307	6.3	0		4,863
5. Imperfectly drained terrace soils (local).....	0		94	90.4	10	9.6	0		0		0		104
6. Well-drained terrace soils (Arkansas River).....	0		457	38.4	420	35.2	110	9.2	171	14.4	32	2.7	1,190
7. Poorly drained terrace soils (Arkansas River).....	0		235	98.3	0	0	0	0	4	1.7	0		239
8. Calcareous terrace soil.....	0		10	4.5	168	75.4	7	3.1	38	17.0	0		223
9. Well-drained flood-plain soils (local).....	9,305	100.0	0		0		0		0		0		9,305
10. Poorly drained flood-plain soils (local).....	467	100.0	0		0		0		0		0		467
11. Mixed alluvial soils (local).....	12,884	100.0	0		0		0		0		0		12,884
12. Imperfectly drained, alluvial, flood-plain soils (Arkansas River, partly local).....	373	100.0	0		0		0		0		0		373
13. Sandy, well-drained, flood-plain soils (Arkansas River).....	3,424	100.0	0		0		0		0		0		3,424
14. Heavy, imperfectly drained, flood-plain soils (Arkansas River).....	1,290	100.0	0		0		0		0		0		1,290
15. Miscellaneous land classes.....	1,121	32.4	15	.5	1	( <sup>1</sup> )	0		3	.1	2,316	67.0	3,456
<b>Entire district.....</b>	<b>28,864</b>	<b>16.1</b>	<b>79,276</b>	<b>44.2</b>	<b>56,508</b>	<b>31.4</b>	<b>3,718</b>	<b>2.1</b>	<b>8,735</b>	<b>4.9</b>	<b>2,349</b>	<b>1.3</b>	<b>179,450</b>

<sup>1</sup> Less than 0.1 percent.

this erosion group. Most of the terrace soils also show a high proportionate area with moderate erosion.

The greatest areas of severe and very severe erosion are on the upland soil groups and are rather evenly distributed among them. In proportion to their extent, the terrace soils of the Arkansas River, soil groups 6 and 8, have been most severely eroded, especially because gullies have cut back into these soils and because water from higher lying soils runs across them.

Table 15 indicates that, while soil type definitely affects the run-off of water and consequently the liability to erosion, other factors, especially the kind of plant cover, the cropping uses made of the land, the prevailing slope conditions, and the position in relation to the controlling drainage levels all modify this relationship.

## Summary

THE Illinois Bayou Soil Conservation District includes 179,450 acres in the southern part of Pope County, Ark.

A survey of this district has been made showing the present land uses, the soils, slopes, and existing erosion conditions. The results of this survey and an interpretation of the findings are presented in this report.

By giving consideration to all the physical factors that influence the uses of land, it was possible to distinguish five classes of land. Class I, comprising all areas that can be farmed safely and permanently without any special practices beyond good farming methods, included about 10 percent, or 17,345 acres. Class II, which may be cultivated safely by observing simple practices, such as contour cultivation and the use of cover crops, had an extent of 24,301 acres, or about 14 percent of the district. Class III, which may be farmed with safety only if intensive practices and extra precautions are taken, had an area of 37,570 acres, or 21.6 percent of the total. Class IV, which should be in tilled crops only at long intervals but may be used for hay and pasture,

amounted to 13,335 acres, or 7.6 percent of the district. Forty-seven percent, or 82,042 acres, were class V land, not available for cropping and best used for woodland and to a small extent for pasture. The survey indicated that 8,279 acres of land now cropped should be retired to other uses since they fall into land-capability classes IV and V. It would be possible to bring into cultivation an equivalent area of land in classes I and II not now in crops in order to maintain the present area of cropland.

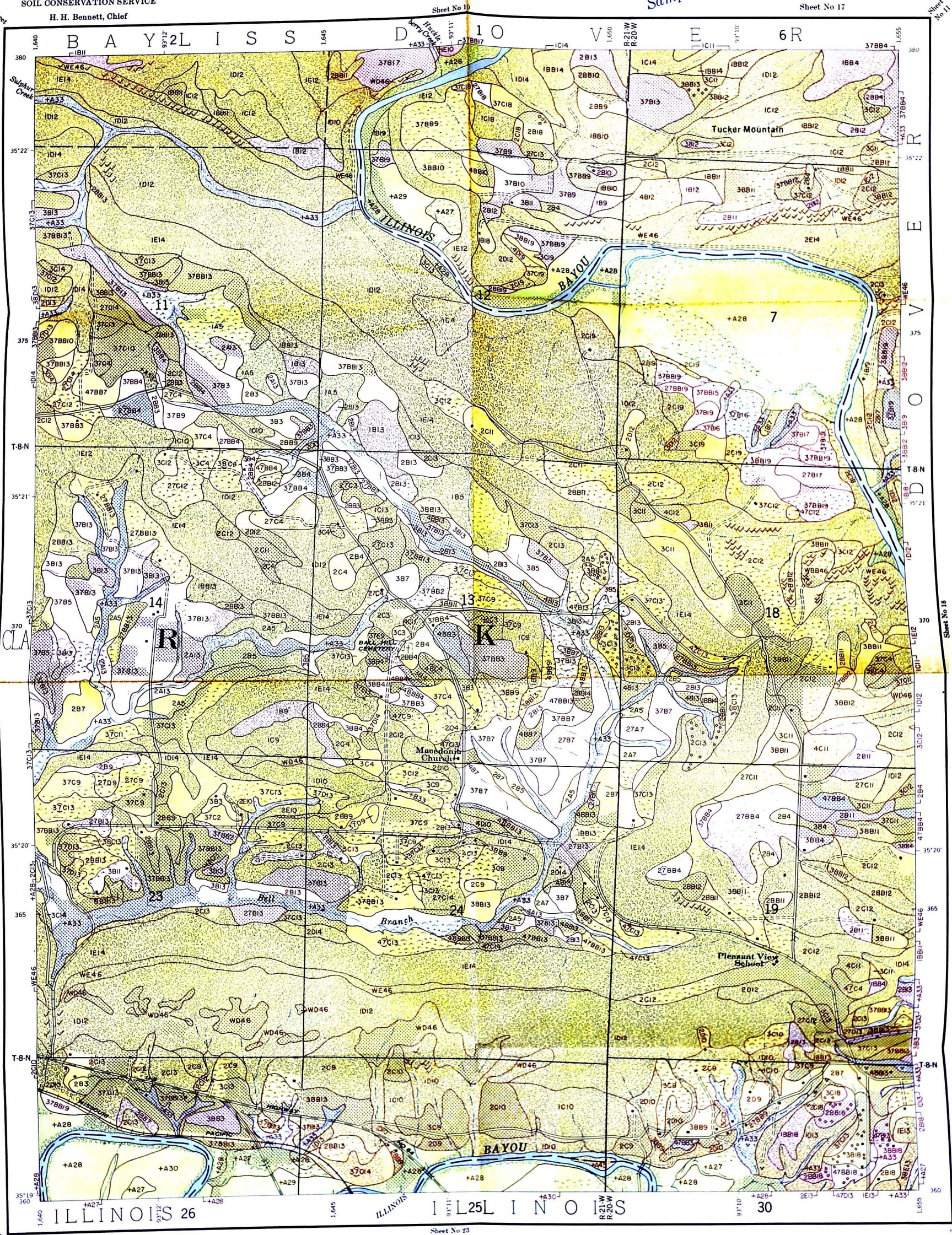
The protective practices that are needed include crop alternations and rotations; the use of fertilizers and amendments; the growing of winter and summer cover crops; strip cropping on the contour; contour cultivation; the use of terraces and protected terrace outlets, diversion ditches, and grassed waterways; gully control; the improving of pastures; woodland management, tree planting; and practices that tend to conserve wildlife.

The soil conservation survey shows the physical conditions on each farm and the capability of the land for use. From it plans can be made for such readjustments of land use as are needed to insure protection from further erosion and to make the land permanently capable of some form of production.

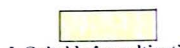
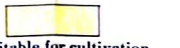



There has already been considerable loss of soil in a section that originally had a relatively shallow topsoil. The physical survey shows that 56,508 acres, or 31.4 percent of the district, have been moderately eroded. Seven percent, or 12,453 acres, has been severely or very severely eroded. Slight erosion has occurred on 79,276 acres, or 44.2 percent, and deposition of material on 28,864 acres, or 16.1 percent. The principal problem is so to use the land that erosion does not further reduce the soil resources of the district.

The information supplied in this report and shown on the maps is presented to assist in bringing about desirable readjustments in land use and serve as a guide in applying the proper practices and methods for soil conservation.



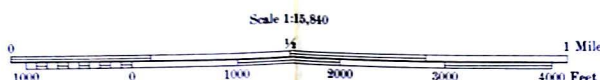


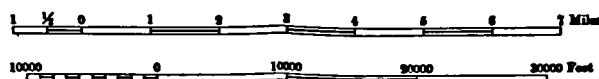
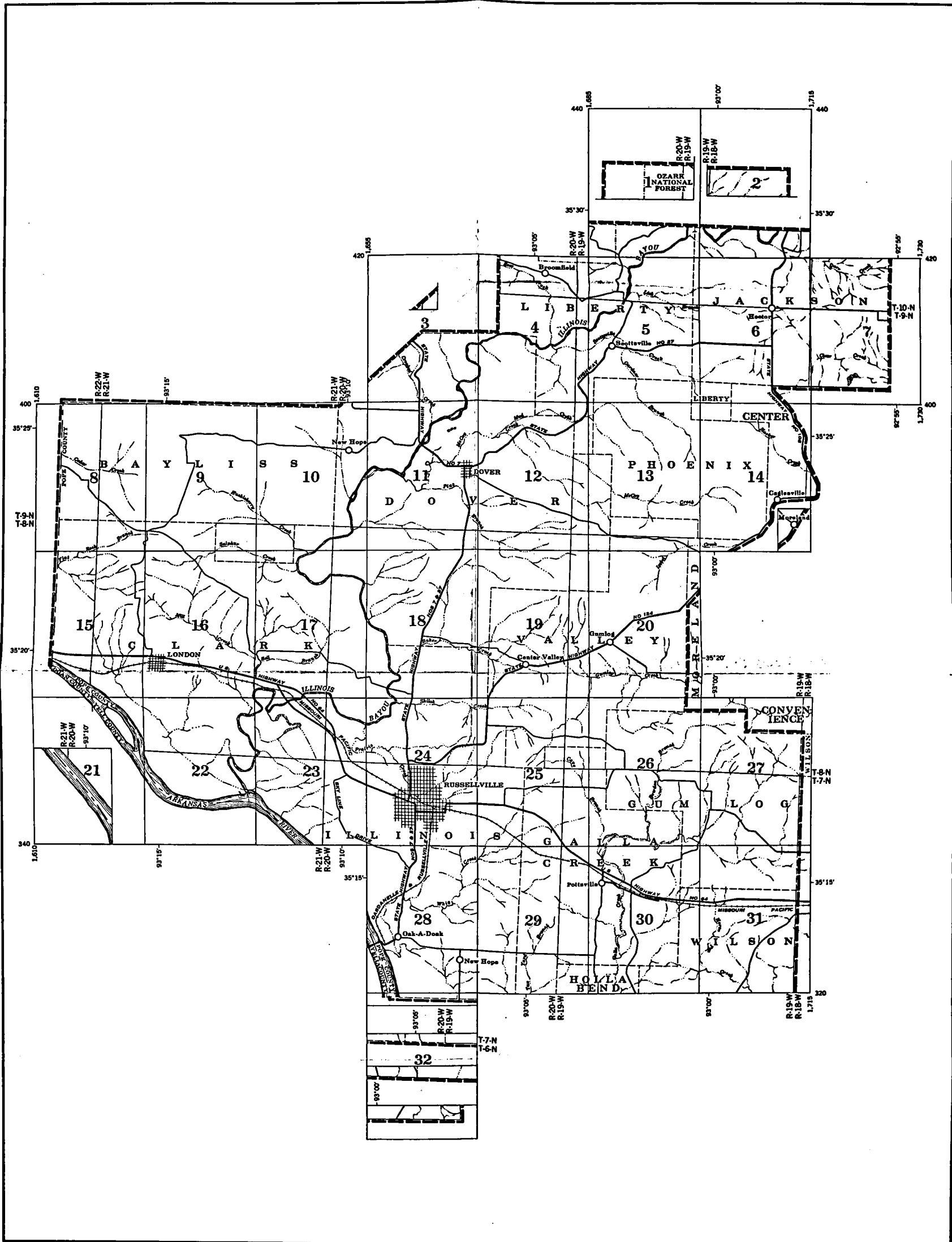
**CLASSES OF LAND ACCORDING TO USE CAPABILITY**

-   
**I - Suitable for cultivation without special practices**
-   
**II - Suitable for cultivation with simple practices**
-   
**III - Suitable for cultivation with complex or intensive practices**
-   
**IV - Not suitable for continuous cultivation**
-   
**V - Not suitable for cultivation**

Base map compiled from aerial photographs by Soil Conservation Service.  
Horizontal control by S.C.S., U.S.G.S., U.S.C. & G.S., and F.S.  
Lambert projection, 5000 foot grid based upon  
Arkansas system (North Zone) of plane coordinates with  
last three digits of grid numbers omitted.  
Polyconic projection, North American 1927 datum,  
indicated by marginal ticks.

42°05' S.W. corner of map  
True North  
Magnetic North  
Approximate Mean Declination, 1939  
Annual Magnetic Change 2' East





- Hard-surfaced roads
- Soft-surfaced roads
- City township lines
- U S township lines
- Project boundary
- County lines
- Railroads