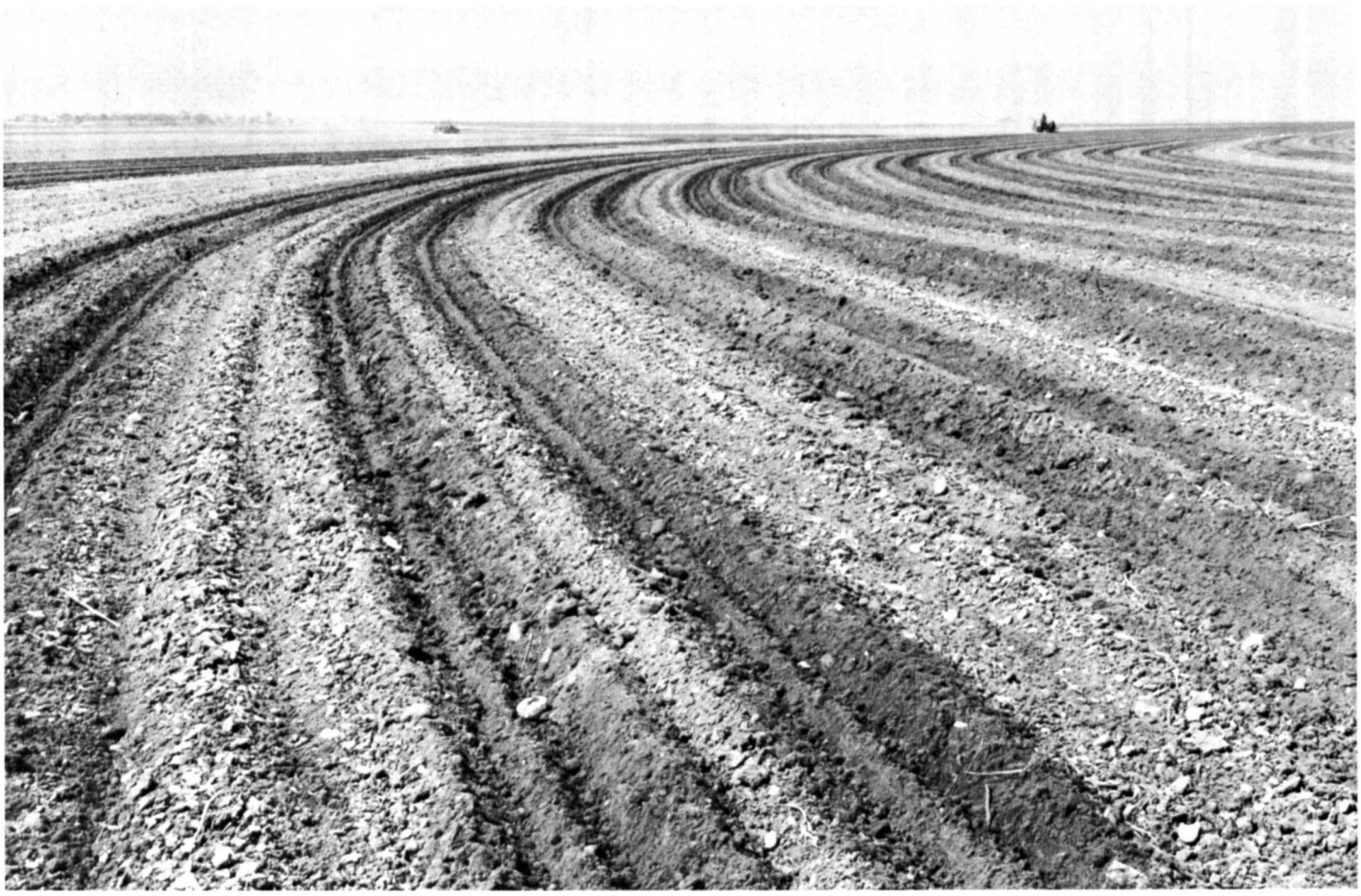
SOIL SURVEY OF

Jones County, Texas



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Texas Agricultural Experiment Station

Issued June 1972

Major fieldwork for this soil survey was done in the period 1960–65. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1966. This survey was made cooperatively by the Soil Conservation Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Middle Clear Fork and California Creek Soil and Water Conservation Districts.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Jones County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and the range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and range sites.

Game managers, sportsmen, and others concerned with wildlife can find information about soils and wildlife in the section "Wildlife."

Ranchers and others interested in range can find, under "Range Management," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain estimates of soil properties, and information about soil features that affect engineering practices.

Soil scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Jones County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They will also be interested in the information about the county given at the beginning of the publication.

Cover: Planting cotton in a dryfarmed area of nearly level Rowena clay loam.

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SOIL SURVEY OF JONES COUNTY, TEXAS

BY COLLETUS A. ROGERS, A. R. GOERDEL, AND H. D. GOOCH, SOIL CONSERVATION SERVICE[1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE TEXAS AGRICULTURAL EXPERIMENT STATION

JONES COUNTY is in west-central Texas (fig. 1). It has a total area of 959 square miles, or 613,760 acres, of which 4,576 acres is water. Anson, the county seat, is slightly west of the center of the county. In 1970, according to the U.S. Census, the total population of the county was 15,705.

About 65 percent of the acreage of the county is in crops. In much of the acreage, the soils are subject to blowing and to water erosion. Cotton, grain sorghum, and winter wheat are the chief crops.

In 1941 the farmers and ranchers in the county organized the Middle Clear Fork Soil and Water Conservation District and the California Creek Soil and Water Conservation District. Through these districts, the U.S. Department of Agriculture, Soil Conservation Service, provides technical assistance to farmers and ranchers to help them in managing, using, and conserving the soils on their farms and ranches.

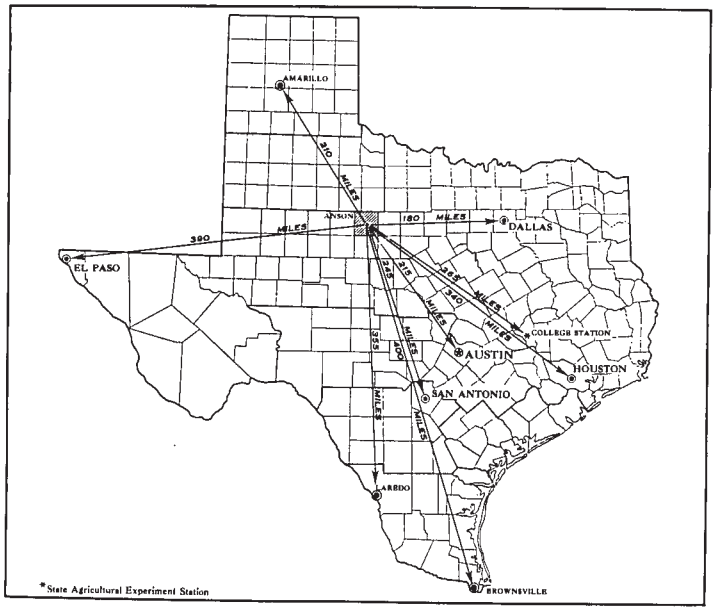

Figure 1.—Location of Jones County in Texas.

[1] Others who contributed to the fieldwork for this survey are RALPH L. SCHWARTZ AND O. A. HAY.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Jones County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Abilene and Miles, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Miles fine sandy loam, 1 to 3 percent slopes, is one of several phases within the Miles series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately.

The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Jones County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. An example is Acme-Cottonwood complex.

An undifferentiated group is made up of two or more soils that could be delineated individually, but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Eufaula and Selden soils, 1 to 3 percent slopes, eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Oil-waste land is a land type in Jones County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Jones County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, or of a larger tract, who want to compare different parts of a county, or who want to know the location of large areas that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, or for choosing the site for a building or other structure, because the soils in any one association generally differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The seven soil associations in Jones County are described briefly in this section and are shown on the colored map at the back of this survey. For more detailed information about the individual soils in each association, refer to the section "Descriptions of the Soils" and to the detailed soil map.

1. Rowena-Olton Association

Deep, well-drained, nearly level to gently sloping clay loams

This association consists of deep, well-drained, nearly level to gently sloping, dark grayish-brown and reddish-brown clay loams.

This association occupies about 51 percent of the county, or about 310,000 acres. Rowena soils make up about 33 percent of the association, Olton soils about 32 percent, and minor soils the remaining 35 percent (fig. 2).

Rowena soils are nearly level, dark grayish-brown, and calcareous. Olton soils are nearly level and gently sloping and have a reddish-brown surface layer underlain by reddish, calcareous sandy clay. Permeability is moderately slow in both soils.

Minor soils in this association are in the Abilene, Miles, Roscoe, Spur, and Tillman series.

The soils of this association are suited to large-scale farming, and all areas are cultivated.

2. Miles-Winters Association

Deep, well-drained, nearly level to gently sloping, reddish-brown fine sandy loams

This association consists of deep, well-drained, nearly level to gently sloping soils.

This association occupies about 15 percent of the county, or 92,000 acres. Miles soils make up about 55 percent of the association, Winters soils about 21 percent, and minor soils about 24 percent (fig. 3).

The Miles and Winters soils both have a surface layer of reddish-brown fine sandy loam. Miles soils are moderately permeable. Winters soils have blocky sandy clay

below the surface layer and are moderately slowly permeable. Both soils have high available water capacity.

Minor soils in this association are in the Abilene, Cobb, and Spur series.

The soils in this association are well suited to farming, and most areas are cultivated. These soils are moderately susceptible to soil blowing, and where gently sloping they are also susceptible to water erosion.

3. Eufaula-Nimrod Association

Deep, moderately well drained and somewhat excessively drained, nearly level to gently sloping and hummocky, brown fine sands

This association consists of nearly level to gently sloping and hummocky, fine sands. It covers about 10 percent of the county, or slightly more than 61,000 acres. Eufaula soils make up 65 percent of this association, Nimrod soils 30 percent, and minor soils the remaining 5 percent.

Eufaula soils are deep, brown fine sands that have continuous bands of sandy clay loam and fine sandy loam at a depth of 44 to 100 inches. Nimrod soils have a surface layer of brown fine sand underlain by mottled sandy clay loam. Both soils have low available water capacity.

Minor soils in this association are in the Nobscot and Miles series.

Oak trees are the chief plants on most of the Eufaula soils, but some areas have been cleared and seeded to native grasses and to other grasses. Most of the Nimrod soils occur in fields formerly used for crops, and some of these areas have been seeded to grasses. Soil blowing is a hazard if an adequate cover of vegetation is not kept on the areas.

4. Tillman-Vernon Association

Deep to shallow, well-drained, nearly level to sloping, reddish-brown to red clays and clay loams

In this association are nearly level to sloping, well-drained, reddish-brown to red clays and clay loams.

This association makes up about 9 percent of the county, or 55,000 acres. Tillman soils make up about 60 percent of this association, Vernon soils about 30 percent, and minor soils about 10 percent.

Tillman soils consist of deep, very slowly permeable, reddish-brown clay loams that have high available water capacity. Vernon soils are slowly permeable red clays that are shallow to red clay and shale.

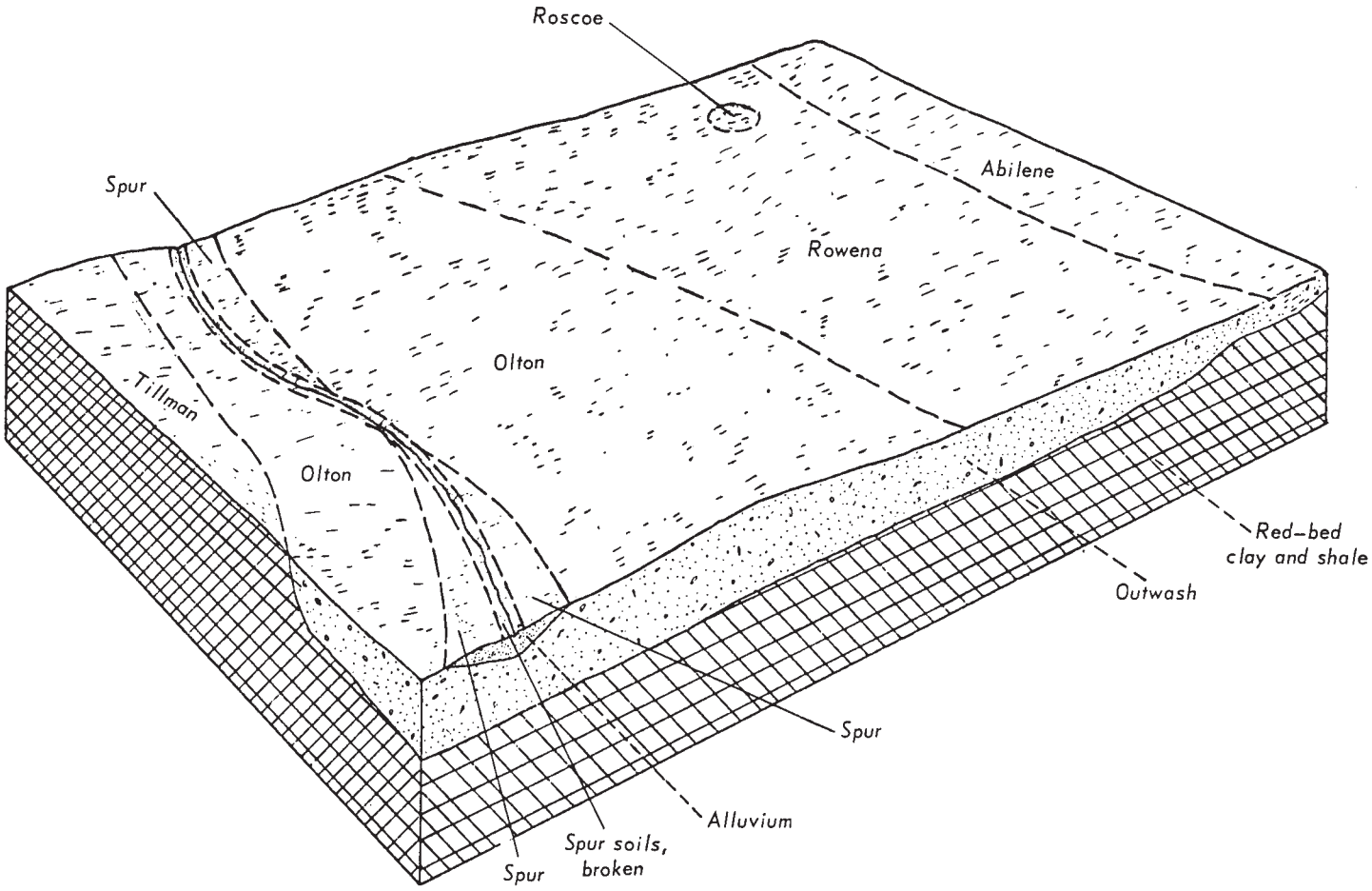

Figure 2.—Soil series and underlying material in association 1.

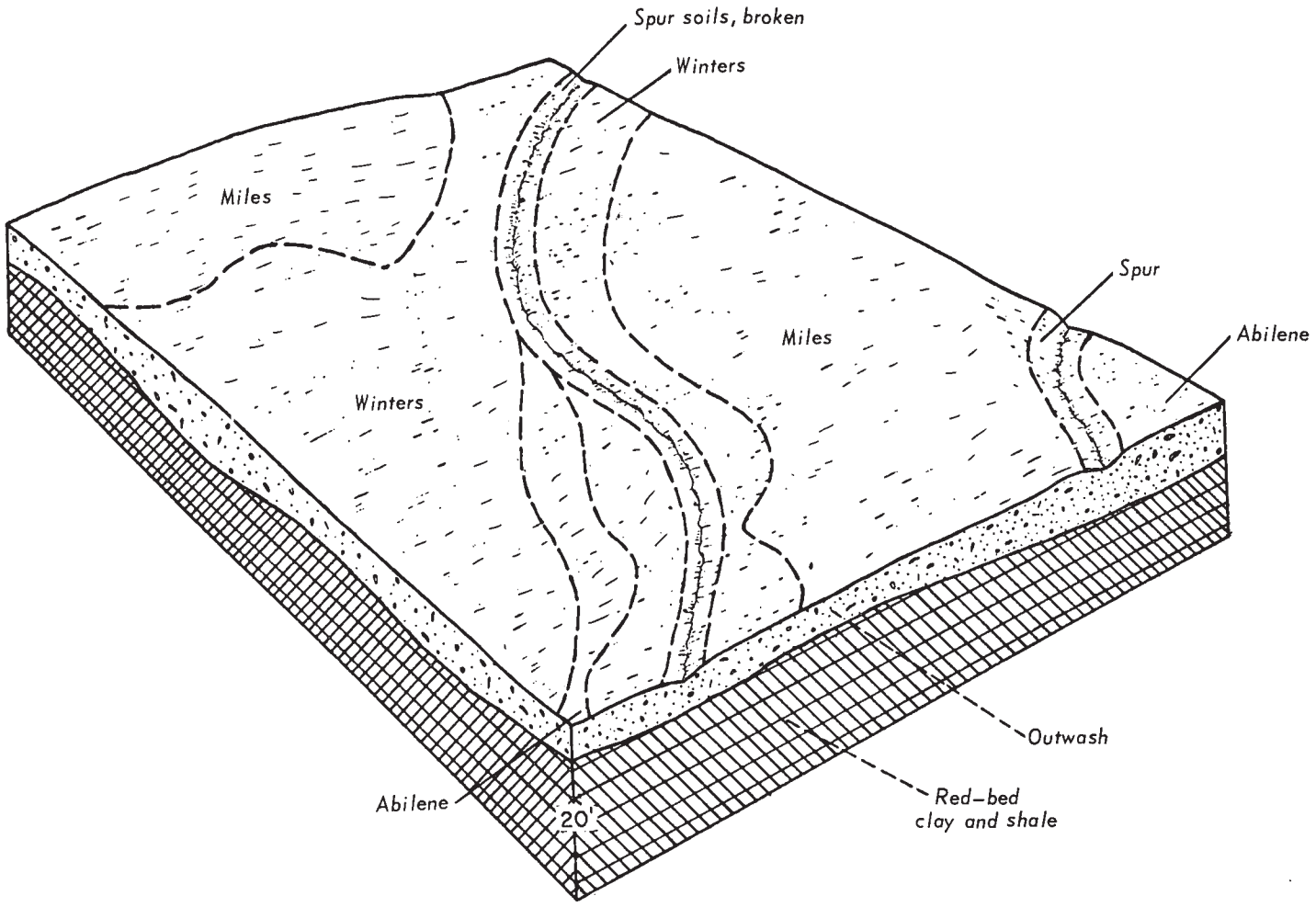

Figure 3.—Soil series and underlying material in association 2.

Minor soils in this association are in the Rowena and Olton series. Also in this association are small areas of Badland.

Most areas of Tillman soils are cultivated. The Vernon soils are used mainly as range. Sloping areas of Vernon soils are highly susceptible to water erosion.

5. Spur Association

Deep, well-drained, nearly level, reddish-brown loams on bottom lands

This association consists of deep, well-drained, nearly level soils on bottom lands. These soils are reddish brown and are loamy. They are on flood plains along the larger streams in the county.

This association makes up about 9 percent of the county, or 55,000 acres. It is about 62 percent Spur loam; about 35 percent Spur soils, broken; and about 3 percent minor soils.

Spur loam has a reddish-brown surface layer and friable clay loam underlying layers. It is occasionally flooded. Spur soils, broken, are flooded about five times each year.

Minor soils in this association are in the Yahola series.

About 60 percent of this soil association is cultivated. The rest is used as pasture.

6. Tarrant-Valera Association

Shallow and moderately deep, well-drained, nearly level to sloping, dark grayish-brown and dark-brown clays and silty clays over limestone

This association consists of shallow and moderately deep, well-drained, nearly level to sloping soils. These soils are dark grayish-brown and dark-brown clays and silty clays over limestone.

This association occupies about 3 percent of the county, or 18,000 acres. It is about 39 percent Tarrant soils, about 29 percent Valera soils, and about 32 percent minor soils.

Tarrant soils are sloping, dark grayish-brown clays that are shallow over limestone. Valera soils are nearly level and gently sloping, dark-brown silty clays that are moderately deep over limestone. Limestone outcrops are common in both soils.

Minor soils in this association are in the Abilene, Tobosa, Owens, and Vernon series.

All areas of Tarrant soils are used as range. About half the acreage of Valera soils is cultivated, and about half is

used as range. Water erosion is a hazard on both the Tarrant and Valera soils.

7. Nobscot-Miles Association

Deep, well-drained, nearly level to undulating, reddish-brown and dark-brown fine sands and loamy fine sands

This association consists of deep, well-drained, nearly level to undulating soils. These soils are reddish-brown and dark-brown fine sands and loamy fine sands.

This association occupies about 3 percent of the county, or 18,000 acres. About 70 percent of this association is Nobscot soils, about 20 percent is Miles soils, and the remaining 10 percent is minor soils.

Nobscot soils have a surface layer of dark-brown fine sand underlain by fine sandy loam. These soils are moderately rapidly permeable. They occur in slightly higher areas than Miles soils. Miles soils have a surface layer of reddish-brown loamy fine sand underlain by sandy clay loam. These soils are moderately permeable.

Minor soils in this association are in the Eufaula and Nimrod series.

Most of the soils of this association are used as range. Soil blowing is a hazard if an adequate cover of vegetation is not kept on the areas.

Descriptions of the Soils

This section describes the soil series and mapping units of Jones County. The procedure is first to describe each soil series, and then the mapping units in that series. Thus, to get full information on any mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs.

Each series contains a short nontechnical description of a representative soil profile and a more detailed description of the same profile for use by scientists, engineers, and others in making highly technical interpretations. This profile is considered representative of all the soils of a series. If the profile for a given mapping unit differs from the representative profile, the differences are stated in the description of the mapping unit, unless the differences are apparent in the name of the mapping unit. Technical terms are used in describing soil series and mapping units only when nontechnical terms cannot convey precise meanings. Many of the more commonly used terms are defined in the Glossary.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Gravelly land, for example, does not belong to a soil series, but nevertheless, it is listed in alphabetical order along with the soil series.

In describing the representative profile, the color of each horizon is given by name and by the Munsell color notation, or by symbols for hue, value, and chroma (*6*).[2] For the profile described, the names of the colors and the color symbols are for dry soils, unless otherwise stated.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the soil or land type on the detailed map at the back of this survey. Shown at the end of each description of each mapping unit are the capability classification and the range site in which the mapping unit has been placed. The page on which each is described is listed in the "Guide to Mapping Units." The location of the soils in the county is shown on the detailed map at the back of this survey, and the acreage and proportionate extent of the mapping units are shown in table 1.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Abilene clay loam, 0 to 1 percent slopes	29, 927	4. 9
Abilene clay loam, 1 to 3 percent slopes	4, 372	. 7
Acme-Cottonwood complex	218	(1)
Badland-Vernon complex	8, 748	1. 4
Cobb fine sandy loam, 0 to 1 percent slopes	2, 608	. 4
Cobb fine sandy loam, 1 to 3 percent slopes	7, 870	1. 3
Cosh fine sandy loam, 1 to 3 percent slopes	2, 171	. 4
Eufaula fine sand	34, 731	5. 7
Eufaula and Selden soils, 1 to 3 percent slopes, eroded	3, 385	. 6
Gomez fine sandy loam	825	. 1
Gravelly land	8, 607	1. 4
Gravel pit	1, 958	. 3
Meno loamy fine sand	2, 605	. 4
Miles fine sandy loam, 0 to 1 percent slopes	16, 329	2. 7
Miles fine sandy loam, 1 to 3 percent slopes	25, 286	4. 1
Miles fine sandy loam, 3 to 5 percent slopes	889	. 1
Miles loamy fine sand, 0 to 3 percent slopes	8, 153	1. 3
Miles complex	7, 515	1. 2
Nimrod-Eufaula fine sands	24, 761	4. 0
Nimrod-Eufaula complex, severely eroded	745	. 1
Nobscot fine sand	11, 194	1. 8
Nobscot soils and Blown-out land	879	. 1
Oil-waste land	147	(1)
Olton clay loam, 0 to 1 percent slopes	62, 277	10. 2
Olton clay loam, 1 to 3 percent slopes	39, 124	6. 4
Owens-Vernon stony complex	1, 945	. 3
Quarry	160	(1)
Randall soils	510	. 1
Roscoe clay	1, 472	. 2
Rowena clay loam, 0 to 1 percent slopes	100, 464	16. 4
Rowena clay loam, 1 to 3 percent slopes	1, 240	. 2
Spur loam	39, 222	6. 5
Spur soils, broken	22, 877	3. 7
Stamford clay, 0 to 2 percent slopes	3, 967	. 7
Tarrant complex	7, 019	1. 1
Tillman clay loam, 0 to 1 percent slopes	27, 774	4. 5
Tillman clay loam, 1 to 3 percent slopes	38, 090	6. 2
Tobosa clay, 0 to 1 percent slopes	329	. 1
Tobosa clay, 1 to 3 percent slopes	627	. 1
Valera silty clay, 1 to 3 percent slopes	5, 308	. 9
Vernon clay, 2 to 8 percent slopes	19, 874	3. 2
Weymouth clay loam, 1 to 3 percent slopes	10, 819	1. 8
Weymouth clay loam, 3 to 5 percent slopes	1, 293	. 2
Winters fine sandy loam, 0 to 1 percent slopes	9, 879	1. 6
Winters fine sandy loam, 1 to 3 percent slopes	9, 162	1. 5
Yahola fine sandy loam	1, 829	. 3
Water (lakes of more than 40 acres)	4, 576	. 8
Total	613, 760	100. 0

[1] Less than 0.05 percent.

Abilene Series

The Abilene series consists of deep, well-drained, nearly level soils that are moderately slowly permeable. These soils are neutral to mildly alkaline and have high available water capacity.

[2] Italic numbers in parentheses refer ot Literature Cited, p. 48.

In a representative profile the surface layer is dark grayish-brown clay loam about 7 inches thick. The next layer is about 29 inches thick. It is dark-brown clay in the upper part and brown clay in the lower part. The underlying material, to a depth of 64 inches, is pink clay loam that contains concretions of calcium carbonate.

Representative profile of Abilene clay loam, 0 to 1 percent slopes (in rangeland 0.9 mile north of Taylor County line, 100 feet south of county road, and 0.5 mile east of Farm Road 707):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong, fine, subangular blocky structure to fine, granular; hard, friable, sticky; mildly alkaline; abrupt, smooth boundary.

B1—7 to 16 inches, dark-brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; strong, fine, subangular blocky structure; hard, firm, sticky and plastic; mildly alkaline; clear, smooth boundary.

B21t—16 to 25 inches, dark-brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate, medium, blocky structure; very hard, very firm, sticky, and plastic; continuous thin clay films; a few threads of calcium carbonate in lower part; mildly alkaline; gradual, smooth boundary.

B22t—25 to 36 inches, brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate, medium, blocky structure; extremely hard, very firm, sticky and plastic; continuous thin clay films; a few fine and very fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

C1ca—36 to 48 inches, pink (7.5YR 7/4) clay loam, reddish yellow (7.5YR 6/6) moist; structureless; hard, friable, sticky; about 30 percent calcium carbonate, by volume; calcareous; moderately alkaline; gradual, wavy boundary.

C2ca—48 to 64 inches +, pink (5YR 7/4) clay loam, reddish yellow (5YR 6/6) moist; structureless; hard, friable, sticky; about 20 percent is calcium carbonate concretions, by volume.

The A horizon ranges from 5 to 10 inches in thickness and from dark grayish brown to brown in color. Reaction is neutral to mildly alkaline.

The B1 horizon ranges from 4 to 12 inches in thickness, from clay loam to clay in texture, and from very dark grayish brown to dark brown in color.

The B2t horizon ranges from 14 to 26 inches in thickness and from dark grayish brown to brown in color. It is noncalcareous in the upper part, but it is calcareous in the lower part.

The Cca horizon is at a depth of 30 to 48 inches. It ranges from pink to brown in color. The visible content of calcium carbonate ranges from about 10 to 60 percent.

Abilene clay loam, 0 to 1 percent slopes (AbA).—This soil has the profile described as representative of the series. Some areas of this nearly level soil are round to irregular in shape and are several hundred acres in size. Others are next to natural drainageways and range from 50 to 200 acres in size.

Included with this soil in mapping are small areas of Roscoe and Olton soils. The Roscoe soil is in small depressions a few inches lower than the surrounding Abilene soil. The Olton soil is on convex ridges above the Abilene soil.

Runoff is slow on this Abilene soil. Most of the acreage is cultivated (fig. 4). Capability unit IIc–1; Deep Hardland range site.

Abilene clay loam, 1 to 3 percent slopes (AbB).—This soil commonly is next to Abilene clay loam, 0 to 1 percent slopes. The areas normally are less than 200 acres, but many areas are 300 to 1,500 feet wide and up to 1 mile long.

Figure 4.—**Aerial view of Abilene clay loam, 0 to 1 percent slopes, under cultivation.**

The surface layer is dark grayish-brown clay loam about 6 inches thick. Below this layer is about 25 inches of clay that is dark grayish brown in the upper part and brown in the lower part. The underlying material is light-brown or pink caliche about 6 to 20 inches thick. It is clay loam that is 15 to 60 percent segregated lime.

Included with this soil in mapping are small areas of Olton clay loam and of Weymouth clay loam.

Water erosion is a hazard on this Abilene soil. Most of the acreage is cultivated. Capability unit IIe–1; Deep Hardland range site.

Acme Series

The Acme series consists of shallow, nearly level, moderately well drained soils that are moderately permeable. These calcareous soils are on uplands.

In a representative profile the surface layer is dark grayish-brown to dark-brown loam about 18 inches thick. The underlying material, to a depth of 30 inches, is mostly white, weakly cemented clay loam derived partly from beds of calcium sulfate and calcium carbonate.

Representative profile of Acme clay loam in Acme-Cottonwood complex (in rangeland 25 feet south of county road, at a point 0.25 mile east of U.S. Highway 83, about 2.4 miles north of junction of State Highway 92 and U.S. Highway 83 in Hamlin):

A11—0 to 12 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong, very fine, subangular blocky and granular structure; slightly hard, friable, slightly sticky; calcareous; mildly alkaline; gradual, smooth boundary.

A12—12 to 18 inches, dark-brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong, fine, subangular blocky and granular structure; hard, firm, sticky; calcareous; moderately alkaline; abrupt, wavy boundary.

C—18 to 30 inches +, white (10YR 8/2), weakly cemented clay loam consisting mostly of calcium sulfate and calcium carbonate clay.

The A horizon ranges from 10 to 20 inches in thickness and from brown to dark grayish brown in color. Depth to the C horizon ranges from 10 to 20 inches.

Acme-Cottonwood complex (Ac).—In this complex are well drained and moderately well drained soils that have slopes of 0 to 3 percent. Acme soil makes up 60 to 80 percent of this complex; Cottonwood soil 20 to 40 percent; and white gypsum outcrops, 10 to 100 feet wide, about 10 percent.

The soils of this complex have low available water capacity and are droughty. About half of the acreage is cultivated, and about half is used as range. Capability unit IVs–1; Deep Hardland range site.

Badland-Vernon Complex

Badland-Vernon complex (Bv).—This mapping unit consists of soils that have complex slopes that range to more than 30 percent. It is 60 to 80 percent partly weathered red-bed shale and clay, known as Badland, and about 20 to 40 percent Vernon clay that overlies the red-bed clay and shale. The areas of these soils are dissected by V-shaped gullies (fig. 5). Generally, above the gullied land and next to the upland plains are sharp, distinct escarpments. These escarpments make up about 5 percent of the area. Geological erosion is still active in the area.

The surface layer of the Vernon soil is red clay about 5 inches thick. The next layer is red, extremely firm clay about 7 inches thick. The underlying material is calcareous clayey shale that is weathered in the upper part.

The soils of this complex have little or no value for farming. Plants are sparse on the Vernon clay and are almost nonexistent on the Badland part. Capability unit VIe–1; Shallow Redland range site.

Cobb Series

The Cobb series consists of moderately deep, well-drained, nearly level to gently sloping soils that are moderately permeable. These soils are on uplands.

In a representative profile the surface layer is reddish-brown fine sandy loam about 8 inches thick. The next layer is sandy clay loam, about 26 inches thick, that is reddish brown in the upper part and red in the lower part. Below is weakly cemented red sandstone that contains a few seams and threads of calcium carbonate.

Representative profile of a Cobb fine sandy loam (in Neinda, 2.3 miles east of Farm Road 126 and 100 feet north of county road):

Ap—0 to 8 inches, reddish-brown (5YR 4/3) fine sandy loam, dark reddish brown (5YR 3/3) moist; weak, granular structure; slightly hard, friable; neutral; abrupt, smooth boundary.

B21t—8 to 24 inches, reddish-brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; compound weak, coarse, prismatic structure parting to moderate, fine, subangular blocky; very hard, firm, sticky; a few fine pores and common very fine pores; common worm casts; thin clay films; neutral; gradual, smooth boundary.

Figure 5.—An area of Badland-Vernon complex.

416-630—71——2

B22t—24 to 34 inches, red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; a few dark-gray mottles of manganese oxide in lower part of horizon; compound weak, coarse, prismatic structure parting to moderate, medium, blocky and fine and very fine, subangular blocky; common thin clay films; hard, friable; mildly alkaline; clear, wavy boundary.

R—34 to 38 inches, red, weakly cemented sandstone that parts to fine sand; a few seams and threads of calcium carbonate.

The A horizon ranges from 4 to 10 inches in thickness and from reddish brown to brown in color.

The B2t horizon ranges from 16 to 36 inches in thickness, from dark reddish brown to red in color, and from sandy clay loam to clay loam in texture.

The R layer is weakly to strongly cemented calcareous sandstone that ranges from slightly acid to moderately alkaline.

Cobb fine sandy loam, 0 to 1 percent slopes (CbA).—This soil has the profile described as representative of the series. It is on convex ridges above natural drainageways. The areas are long and narrow and range from 10 to 350 acres.

This soil has moderate available water capacity. Runoff is slow. Soil blowing is the principal hazard. Most of the acreage is cultivated. Capability unit IIe–4; Sandy Loam range site.

Cobb fine sandy loam, 1 to 3 percent slopes (CbB).—This soil normally occurs on side slopes below areas of Cobb fine sandy loam, 0 to 1 percent slopes. The areas are long and narrow and range from 25 to about 1,200 acres. Slopes are dominantly about 2 percent.

The surface layer is reddish-brown fine sandy loam about 6 inches thick. The next layer is reddish-brown sandy clay loam about 24 inches thick. The underlying material is weakly cemented red sandstone that parts to fine sand.

This soil has moderate available water capacity. Runoff is medium. Soil blowing is the principal hazard. Most of the acreage is cultivated. Capability unit IIIe–4; Sandy Loam range site.

Cosh Series

The Cosh series consists of well-drained, gently sloping soils. These soils are shallow over weakly cemented to strongly cemented sandstone.

In a representative profile the surface layer is reddish-brown fine sandy loam about 8 inches thick. The next layer is reddish-brown sandy clay loam about 7 inches thick. Below is reddish-brown sandstone.

Representative profile of Cosh fine sandy loam, 1 to 3 percent slopes (in a cultivated field 100 feet south of county road, 3.8 miles east of Farm Road 1835, and 3.2 miles north of junction of State Highway 92 and Farm Road 1835):

Ap—0 to 8 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, granular structure; hard, friable; mildly alkaline; clear, smooth boundary.

B2t—8 to 15 inches, reddish-brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate, subangular blocky structure; hard, friable; a few thin clay films; mildly alkaline; abrupt, smooth boundary.

R—15 to 18 inches +, reddish-brown (5YR 4/4) sandstone; moderately alkaline.

The A horizon ranges from 4 to 8 inches in thickness and from dark reddish brown to brown in color.

The B2t horizon ranges from 6 to 12 inches in thickness and from dark reddish brown to red in color. Depth to sandstone ranges from 12 to 20 inches.

Cosh fine sandy loam, 1 to 3 percent slopes (CoB).—This is the only Cosh soil mapped in the county. It occurs within larger areas of Cobb fine sandy loam, 1 to 3 percent slopes. The areas are round to oval, 200 to 1,000 feet wide, and up to 1 mile long. They generally are 30 acres in size, but they range from 10 to 200 acres.

This soil is moderately permeable. It has low available water capacity and is droughty. Soil blowing is the principal hazard on this soil. Most of the acreage is cultivated. Capability unit IVe–9; Sandy Loam range site.

Cottonwood Series

The Cottonwood series consists of well-drained, nearly level soils that are moderately permeable and are shallow to underlying material. These calcareous soils are on uplands.

In a representative profile the surface layer is brown clay loam about 6 inches thick. The underlying material, to a depth of 20 inches, is mainly white, weakly cemented clay loam derived partly from beds of calcium sulfate and calcium carbonate.

In Jones County, Cottonwood soils are mapped only in the Acme-Cottonwood complex, described under the Acme series.

Representative profile of Cottonwood clay loam in Acme-Cottonwood complex (in rangeland 2.4 miles north of junction with State Highway 92 in Hamlin, 30 feet south of county road, and 0.25 mile east of U.S. Highway 83):

A1—0 to 6 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate, fine, subangular blocky to granular structure; slightly hard, friable, sticky; calcareous; moderately alkaline; abrupt, wavy boundary.

C—6 to 20 inches +, weakly consolidated white clay loam consisting of calcium sulfate and calcium carbonate.

The A horizon ranges from 4 to 10 inches in thickness and from dark grayish brown to brown in color.

Eufaula Series

The Eufaula series consists of deep, somewhat excessively drained, loose fine sands. These soils are rapidly permeable and have low available water capacity.

In a representative profile the surface layer is brown, neutral fine sand about 6 inches thick. Next is reddish-yellow, neutral fine sand about 38 inches thick. Below, to a depth of about 100 inches, is reddish-yellow, slightly acid fine sand that contains continuous bands of fine sandy loam and sandy clay loam.

Representative profile of Eufaula fine sand (in rangeland, 5.8 miles south-southeast of Funston, 40 feet south of county road, 0.6 mile east of Central Cemetery):

A1—0 to 6 inches, brown (10YR 5/3) fine sand, dark brown (10YR 4/3) moist; single grain (structureless); loose; many roots; neutral; gradual, smooth boundary.

A21—6 to 44 inches, reddish-yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; single grain (structureless); loose; neutral; gradual, wavy boundary.

A22 and B2t—44 to 100 inches +, reddish-yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; single grain (structureless); loose; continuous bands of fine sandy loam and sandy clay loam ¼ to ½ inch thick and 2 to 3 inches apart; slightly acid.

The A1 horizon ranges from 4 to 8 inches in thickness and from brown to light yellowish brown in color. Reaction ranges from slightly acid to neutral.

The A21 horizon ranges from 36 to 50 inches in thickness and from reddish yellow to brownish yellow in color. Reaction ranges from neutral to medium acid.

The continuous bands of fine sandy loam and reddish sandy clay loam in the A22 and B2t horizons range from ¼ to 1 inch in thickness. They are 2 to 4 inches apart.

Eufaula fine sand (Eu).—This hummocky soil has the profile described as representative of the series. Most of this soil is in an area of about 35,000 acres. Slopes are dominantly 3 percent or less, but in places they are up to 5 percent. Included in mapping are a few areas of Nimrod fine sand.

Soil blowing is a hazard on this soil. Most of the acreage is used as pasture, but a few areas have been seeded to native grasses. Capability unit VIe–5; Sandyland Savannah range site.

Eufaula and Selden soils, 1 to 3 percent slopes, eroded (EsB2).—The soils of this unit occur in areas formerly used for crops and for range. These areas range from 15 to 100 acres. They consist of about 40 to 60 percent Eufaula fine sand and 35 to 50 percent Selden fine sand. Nobscot fine sand and scattered areas of blown-out land, included with these soils in mapping, make up 5 to 15 percent of the unit. The Eufaula part occurs as dunes and mounds 50 to 100 feet wide. The Selden part lies between the mounds.

The surface layer of the Eufaula soil is brown fine sand about 5 inches thick. Below is yellowish-brown fine sand about 40 inches thick. The underlying material is reddish-yellow fine sand that contains bands of fine sandy loam and sandy clay loam that are ¼ to 1 inch thick and 2 to 3 inches apart.

The Selden soil has the profile described as representative of the Selden series.

The soils in this complex have a low content of organic matter. The Eufaula part has low available water capacity, and the Selden part has high available water capacity. Soil blowing is a hazard on these soils. Most of the acreage is used as range. Capability unit VIe–5; Sandyland Savannah range site.

Gomez Series

The Gomez series consists of deep, well-drained, gently sloping soils. These soils are moderately rapidly permeable.

In a representative profile the surface layer is brown fine sandy loam about 12 inches thick. The next layer is very pale brown fine sandy loam about 16 inches thick. The underlying material, to a depth of 64 inches, is white clay loam that has an accumulation of calcium carbonate.

Representative profile of Gomez fine sandy loam (1,700 feet south of county road, at a point 1 mile south and 2.5 miles east of Central Cemetery):

A1—0 to 12 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak, subangular blocky structure; loose, friable, nonsticky; many roots; calcareous; moderately alkaline; gradual, smooth boundary.

B—12 to 28 inches, very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; weak, subangular blocky structure; hard, friable, slightly sticky; calcareous; moderately alkaline; gradual, smooth boundary.

Cca—28 to 64 inches +, white (10YR 8/2) clay loam, light gray (10YR 7/2) moist; granular structure; hard, friable, slightly sticky; about 20 percent, by volume, is soft masses of calcium carbonate; calcareous.

The A horizon ranges from 8 to 18 inches in thickness and from dark brown to light brown in color.

The B horizon ranges from 6 to 22 inches in thickness and from light brown to very pale brown in color.

The Cca horizon ranges from white to pale brown in color. Depth to this horizon ranges from 20 to 40 inches.

Gomez fine sandy loam (Gf).—This is the only Gomez soil mapped in the county. It is gently sloping and occurs in areas that are about 500 feet wide and up to 1 mile long. The areas are dominantly about 30 acres in size, but they range from 10 to 60 acres. Slopes generally are 2 to 3 percent, though in some areas slopes range from 1 to 5 percent.

Available water capacity in Gomez fine sandy loam is moderate. About one-half of the acreage is used as range, and about one-half is cultivated. Capability unit IVe–5; Deep Sand range site.

Gravelly Land

Gravelly land (Gn) consists of gently sloping and strongly sloping areas on convex ridges. The areas are round to irregular in shape and range from 10 to 600 acres. Slopes are about 3 to 12 percent.

About 90 percent of the acreage is gravel beds that are 5 to 15 feet deep. About 10 percent is gravel beds that are 8 inches to 2 feet thick over red beds.

All areas of this land type are used as range. Capability unit VIs–1; Gravelly range site.

Gravel Pit

Gravel pit (Gp) is made up of areas from which gravel and caliche have been removed by mining. These areas are on ridges throughout the county, but the larger areas are in the southeastern part of the county near Lake Fort Phantom Hill. Areas of Gravel pit range from 1 acre to several hundred acres in size and from 4 to 12 feet in depth. They are underlain by red-bed shale and clay. Capability unit VIIIs–1.

Meno Series

The Meno series consists of deep, well-drained, nearly level soils. These soils are moderately permeable.

In a representative profile the surface layer is dark-brown to dark grayish-brown loamy fine sand about 21 inches thick. Below is dark-brown sandy clay loam about 8 inches thick. The next layer is pale-brown clay loam that has brownish-yellow and light-gray mottles and is about 8 inches thick. The underlying material, to a depth of about 74 inches, is white loam in the upper part and pale-brown fine sandy loam in the lower part. The upper part of the underlying material is about 20 percent calcium carbonate.

Representative profile of Meno loamy fine sand (1,200 feet south of county road, at a point 2.2 miles east of the railroad crossing in Hawley):

Ap—0 to 8 inches, dark-brown (10YR 4/3) loamy fine sand, dark brown (10YR 3/3) moist; single grain (structureless); loose, friable, nonsticky; many roots; slightly acid; gradual, smooth boundary.

A1—8 to 21 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; single grain (structureless); loose; friable; slightly acid; gradual, smooth boundary.

B2t—21 to 29 inches, dark-brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; a few roots; patchy thin clay films; slightly acid; gradual, smooth boundary.

B3ca—29 to 37 inches, very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; a few, medium, brownish-yellow and light-gray mottles; weak, subangular blocky to granular structure; hard, friable, sticky and slightly plastic; 10 percent soft masses and fine concretions of calcium carbonate; calcareous; moderately alkaline; diffuse, wavy boundary.

C1ca—37 to 66 inches, white (10YR 8/1) loam, dry and moist; massive (structureless); hard, friable; 20 percent soft masses and concretions of calcium carbonate; calcareous; moderately alkaline; diffuse, wavy boundary.

C2—66 to 74 inches +, pale-brown (10YR 6/3) fine sandy loam; massive (structureless); hard, friable.

The A horizon ranges from 20 to 30 inches in thickness and from brown to very dark grayish brown when dry. The content of organic matter ranges from 0.5 to 1 percent.

The B2t horizon ranges from 6 to 12 inches in thickness, from brown to very dark grayish brown in color, and from sandy clay loam to clay loam in texture.

The B3ca horizon ranges from 4 to 12 inches in thickness and from very pale brown to brown in color. Mottles of light gray and brownish yellow range from a few to common.

The Cca horizon ranges from 10 to 40 inches in thickness and from white to pale brown in color.

Meno loamy fine sand (Me).—This is the only Meno soil mapped in the county. Slopes are 0 to 3 percent. This soil occurs above the surrounding Olton and Miles soils and below areas of the Nimrod soils. The areas are about 200 to 2,000 feet wide and as much as 2 miles long. They range from about 20 to 500 acres in size.

Meno loamy fine sand has moderate available water capacity. Soil blowing is the principal hazard. Most of the acreage is cultivated. Capability unit IIIe–6; Sandyland range site.

Miles Series

The Miles series consists of deep, well-drained, nearly level to sloping soils that are moderately permeable. These soils have high available water capacity.

In a representative profile the surface layer is reddish-brown fine sandy loam about 11 inches thick. Next is reddish-brown sandy clay loam about 27 inches thick. Below is yellowish-red sandy clay loam, about 30 inches thick, underlain by reddish-yellow clay loam to a depth of about 78 inches.

Representative profile of a Miles fine sandy loam (150 feet east of Farm Road 126 and 3.1 miles south of junction with U.S. Highway 83 southeast of Hamlin):

Ap—0 to 11 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, granular structure; slightly hard, friable, nonsticky; neutral; abrupt, smooth boundary.

B1t—11 to 18 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak, coarse, prismatic structure parting to moderate, very fine, subangular blocky; very hard, friable, sticky; a few fine pores; thin, patchy clay films; neutral; gradual, smooth boundary.

B21t—18 to 38 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate, fine, subangular blocky structure; very hard, friable, sticky; a few fine pores; thin, patchy clay films; neutral; gradual, smooth boundary.

B22t—38 to 68 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate, fine, subangular blocky structure; hard, friable, sticky; thin, patchy clay films; neutral; gradual, wavy boundary.

B23t—68 to 78 inches +, reddish-yellow (5YR 6/8) clay loam, yellowish red (5YR 5/8) moist; moderate, fine, subangular blocky structure; hard, friable, sticky; thin, patchy clay films; threads and soft masses of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 7 to 19 inches in thickness, from reddish brown to brown in color, and from fine sandy loam to loamy fine sand in texture.

The B1t horizon ranges from 4 to 10 inches in thickness and from brown to reddish brown in color.

The B2t horizon extends to a depth of more than 60 inches. This horizon ranges from reddish brown and yellowish red to reddish yellow in color. Below a depth of 38 inches the B2t horizon ranges from noncalcareous to calcareous.

Miles fine sandy loam, 0 to 1 percent slopes (MnA).—This soil has the profile described as representative of the series. It is on convex ridges above natural drainageways. The areas are long and narrow. They are dominantly about 140 acres, but they range from 20 to 800 acres.

Runoff is slow. Soil blowing is the principal hazard on this soil. Most of the acreage is cultivated. Capability unit IIe–4; Sandy Loam range site.

Miles fine sandy loam, 1 to 3 percent slopes (MnB).—This soil occurs on long, narrow areas below areas of Miles fine sandy loam, 0 to 1 percent slopes. Areas of this soil average about 200 acres, though some areas range from 20 to 1,400 acres. Slopes are dominantly about 2 percent.

The surface layer is reddish-brown, friable fine sandy loam about 10 inches thick. The material below, to a depth of more than 60 inches, is reddish-brown and yellowish-red, friable sandy clay loam.

Runoff is medium on this soil. Soil blowing and water erosion are the principal hazards. Most of the acreage is cultivated. Capability unit IIe–5; Sandy Loam range site.

Miles fine sandy loam, 3 to 5 percent slopes (MnC).—This soil occurs on areas surrounding areas of Miles fine sandy loam, 1 to 3 percent slopes. The areas of this soil are oval and generally occupy about 25 acres, but they range from 10 to 80 acres. Slopes are dominantly about 4 percent.

The surface layer is reddish-brown, friable fine sandy loam about 8 inches thick. The material below, to a depth of more than 60 inches, is reddish-brown and yellowish-red, friable sandy clay loam.

Runoff is medium on this soil. Soil blowing and water erosion are the principal hazards. Most of the acreage is cultivated. Capability unit IIIe–4; Sandy Loam range site.

Miles loamy fine sand, 0 to 3 percent slopes (MmB).—This soil commonly occurs on areas slightly above areas of Miles fine sandy loams and slightly below areas of Eufaula and Selden soils. The areas of this soil are oval and range from 20 to 80 acres.

The surface layer is reddish-brown, friable, loose loamy fine sand about 12 to 19 inches thick. The material below, to a depth of more than 60 inches, is reddish-brown and yellowish-red, friable sandy clay loam.

Runoff is moderate on this soil. Soil blowing is the principal hazard. In some places sand has accumulated

to a depth of 1 to 6 feet along fences around cultivated fields. Some areas of this soil have been deep plowed to mix the sandy clay loam with the surface layer of loamy fine sand. Almost all the acreage is cultivated. Capability unit IIIe–6; Sandyland range site.

Miles complex (Mp).—The soils in this mapping unit are on convex ridges above surrounding Miles, Tillman, and Abilene soils. The areas of this complex are round to irregular in shape. They are dominantly about 20 acres, but they range from about 5 to 80 acres. Slopes range from 1 to 8 percent. Miles fine sandy loam makes up 50 to 70 percent of this complex, and an unnamed gravelly soil makes up 30 to 50 percent.

The Miles part has a surface layer of reddish-brown fine sandy loam about 10 inches thick. Below is sandy clay loam, about 33 to 60 inches thick, that is reddish brown in the upper part and yellowish red in the lower part. At a depth below 40 inches, the material is 10 to 20 percent quartz and caliche pebbles.

The well-drained gravelly part is moderately permeable. It has a surface layer of reddish-brown loam about 10 inches thick. Below is yellowish-red sandy clay loam about 10 inches thick. The underlying sandy clay loam is 50 to 70 percent caliche and siliceous pebbles. Some of the siliceous pebbles are coated with calcium carbonate.

Water erosion is the principal hazard on the soils in the Miles complex. Most of the acreage is used as range, but a few small areas are cultivated. Capability unit IVe–9; Sandy Loam range site.

Nimrod Series

The Nimrod series consists of deep, nearly level to gently sloping, moderately well drained soils that are moderately slowly permeable. These soils have low available water capacity.

In a representative profile the surface layer is brown, neutral fine sand about 4 inches thick. Below is about 20 inches of very pale brown, neutral fine sand, and then about 17 inches of yellowish-red, mottled sandy clay loam. The next layer is pale-yellow, mottled sandy clay loam about 21 inches thick. It is underlain to a depth of 72 inches by mottled red, pale-yellow, and light-gray sandy clay that is medium acid.

Representative profile of a Nimrod fine sand in Nimrod-Eufaula fine sands (50 feet south of county road and 0.55 mile east of U.S. Highway 277 and 5.4 miles south of junction with U.S. Highway 180 in Anson):

A1—0 to 4 inches, brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; single grain (structureless); loose; neutral; clear, irregular boundary.

A2—4 to 24 inches, very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) moist; single grain (structureless); loose; neutral; abrupt, wavy boundary.

B21t—24 to 41 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; a few, fine, faint, brown, strong-brown, and light-gray mottles; moderate, medium, blocky structure; very hard, very firm; common, distinct clay films on ped faces; common, fine, soft ferromanganese concretions; medium acid; gradual, wavy boundary.

B22t—41 to 62 inches, pale-yellow (5Y 7/3) sandy clay loam, pale olive (5Y 6/3) moist; a few, fine, faint yellowish-red and brown mottles; moderate, medium, blocky structure; very hard, very firm; common, distinct clay films on ped faces; common, fine, soft ferromanganese concretions; medium acid; gradual, wavy boundary.

IIB23t—62 to 72 inches +, mottled red (2.5YR 4/6), pale-yellow (5YR 7/3), and light-gray (2.5YR 7/2) sandy clay; massive (structureless); very hard, very firm; a few ferromanganese concretions; medium acid.

The A horizon ranges from 20 to 36 inches in thickness. Its dry color ranges from very pale brown to brown.

Combined thickness of the B21t and B22t horizons ranges from 24 to 40 inches. In these horizons, red, gray, light olive-brown, and brown mottles range from faint to prominent. Reaction ranges from strongly acid to medium acid.

Nimrod-Eufaula fine sands (Ne).—The soils in this complex occur in irregular areas that range from 20 to several hundred acres. Slopes are 0 to 3 percent. Nimrod fine sand makes up about 60 percent of the unit, and Eufaula fine sand about 40 percent. The Nimrod part lies below the Eufaula part, which occurs as dunes along the edges of the area.

Nimrod fine sand has the profile described as representative of the Nimrod series.

The surface layer of the Eufaula part is brown, neutral fine sand about 6 inches thick. Below is reddish-yellow fine sand about 38 inches thick. At a depth below 44 inches is reddish-yellow, slightly acid fine sand that contains bands of fine sandy loam and sandy clay loam that are ¼ to ½ inch thick and 2 to 3 inches apart.

Soil blowing is the principal hazard on these soils. Most of the acreage consists of fields that formerly were cultivated, but a few areas are seeded to native grasses (fig. 6). Capability unit VIe–5; Sandyland Savannah range site.

Nimrod-Eufaula complex, severely eroded (Nf3).—In this mapping unit are severely eroded soils that have slopes of 0 to 3 percent. The area is about 75 to 80 percent Nimrod soil and about 20 to 25 percent Eufaula soil. The Eufaula part occurs as bands, 100 to 300 feet wide, along the edges of the area. It lies about 2 to 10 feet above the Nimrod part.

The surface layer is fine sand 2 to 10 inches thick in one-half to three-fourths of the area of this complex. In one-fourth to one-half of the area, yellowish-red sandy clay loam is exposed.

Figure 6.—Area of Nimrod-Eufaula fine sands seeded to native grasses.

Soil blowing is the principal hazard on these soils. Most of the acreage consists of fields that formerly were cultivated, but a few areas are seeded to native grasses. Capability unit VIe–5; Sandyland Savannah range site.

Nobscot Series

The Nobscot series consists of deep, well-drained, nearly level to undulating soils that are moderately rapidly permeable. These soils are slightly acid and have low available water capacity.

In a representative profile the surface layer is brown, slightly acid fine sand about 5 inches thick. Next is very pale-brown, loose fine sand about 31 inches thick, and then reddish-brown, friable fine sandy loam about 16 inches thick. The underlying material, to a depth of 70 inches, is reddish-yellow, loose, slightly acid loamy fine sand.

Representative profile of Nobscot fine sand (50 feet north of ranch road and 3 miles northeast of ranch headquarters, 1 mile north of Farm Road 1812 and 0.2 mile east of Fisher County line):

A1—0 to 5 inches, brown (10YR 5/3) fine sand, dark brown (10YR 4/3) moist; single grain (structureless); loose; slightly acid; gradual, smooth boundary.

A2—5 to 36 inches, very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) moist; single grain (structureless); loose; slightly acid; gradual, wavy boundary.

B2t—36 to 52 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, fine, subangular blocky structure; hard, friable; slightly acid; gradual, smooth boundary.

C—52 to 70 inches +, reddish-yellow (5YR 7/6) loamy fine sand, reddish yellow (5YR 6/6) moist; single grain (structureless); loose; slightly acid.

The A1 horizon ranges from 4 to 6 inches in thickness. Reaction ranges from slightly acid to neutral.

The A2 horizon ranges from 15 to 32 inches in thickness and from light brown to very pale brown in color. Reaction ranges from slightly acid to neutral.

The B2t horizon ranges from 8 to 18 inches in thickness and from yellowish red to reddish brown in color. Reaction ranges from slightly acid to neutral.

The C horizon ranges from fine sand to loamy fine sand in texture. It ranges from neutral to slightly acid in reaction.

Nobscot fine sand (No).—This soil has the profile described as representative of the series. It occurs in an area of about 11,000 acres. Slopes are dominantly 1 to 3 percent, but they range from 0 to 5 percent.

Included with this soil in mapping are small areas of Nimrod fine sand and of Nobscot soils and Blown-out land.

Soil blowing is a hazard on Nobscot fine sand. Most of the acreage is used as range. Capability unit VIe–5; Deep Sand range site.

Nobscot soils and Blown-out land (Ns).—Areas of this mapping unit occur within larger areas of Nobscot fine sand. The areas range from 20 to 300 acres. Slopes are dominantly 1 to 3 percent, but they range from 0 to 5 percent.

Nobscot fine sand makes up 40 to 50 percent of this unit. It has a surface layer of brown fine sand about 5 inches thick. Below is very pale brown fine sand about 31 inches thick, and then reddish-brown fine sandy loam about 16 inches thick. The underlying material is reddish-yellow loamy fine sand.

A soil that has a surface layer of reddish-yellow, neutral to slightly acid fine sand, 20 to 40 inches thick, makes up 10 to 20 percent of this unit. Below, to a depth of 50 inches, is reddish-brown, slightly acid clay loam that has coarse, prismatic structure that parts to coarse, medium, blocky. Patchy clay films are on the faces of the peds.

A soil that has a surface layer of brown fine sand, about 20 inches thick, makes up 15 to 20 percent of this unit. Below the surface layer, to a depth of 50 inches, is reddish-brown sandy clay loam.

A soil that occurs in areas that are 5 to 15 feet above surrounding soils makes up about 10 to 20 percent of this unit. It has a reddish-yellow, slightly acid surface layer of fine sand that is 60 to 80 inches thick over red sandy clay loam.

Blown-out land makes up 10 to 20 percent of this unit. Most of the surface layer of this land type has been blown away, and reddish-brown sandy clay loam about 30 inches thick is exposed. The underlying material is reddish-yellow fine sand and loamy fine sand.

Soil blowing is the principal hazard on these soils. Most of the acreage is used as range. Capability unit VIe–5; Deep Sand range site.

Oil-Waste Land

Oil-waste land (Os) consists of areas that range from 5 to 55 acres. Slopes are generally 1 to 3 percent. Liquid oily waste and salt water have contaminated these areas to a depth of 2 feet or more. Gravity flow and lateral seepage from slush pits and wells have added to the contamination.

Plants on areas of Oil-waste land are sparse, and revegetating the areas is difficult. Capability unit VIIIs–1; not used as range.

Olton Series

The Olton series consists of deep, well-drained, nearly level to gently sloping soils that are moderately slowly permeable. These soils have high available water capacity.

In a representative profile the surface layer is reddish-brown, noncalcareous clay loam about 12 inches thick. The next layer is reddish-brown, firm sandy clay, about 16 inches thick, that is calcareous in the lower 9 inches. It is underlain by red, calcareous sandy clay, about 10 inches thick, and light-red, friable clay loam that is about 14 inches thick and is 20 to 30 percent calcium carbonate. Below, to a depth of 64 inches, is red, friable, calcareous sandy clay loam.

Representative profile of an Olton clay loam (90 feet south and 0.1 mile west of intersection of county roads, 2 miles north and 1 mile east of Funston):

Ap—0 to 8 inches, reddish-brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate, very fine, subangular blocky structure to granular; hard, friable, sticky; mildly alkaline; gradual, smooth boundary.

A12—8 to 12 inches, reddish-brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; medium, subangular blocky structure to granular; hard, friable, sticky; common worm casts and a few fine pores; mildly alkaline; abrupt, smooth boundary.

B21t—12 to 19 inches, reddish-brown (5YR 4/4) sandy clay, dark reddish brown (5YR 3/4) moist; moderate, medium, blocky structure; hard, firm, sticky and plastic; common continuous clay films; neutral; gradual, wavy boundary.

B22t—19 to 28 inches, reddish-brown (2.5YR 5/4) sandy clay, reddish brown (2.5YR 4/4) moist; moderate, medium, blocky structure; hard, firm, sticky and plastic; common continuous clay films; a few fine soft masses and

threads of calcium carbonate; calcareous; moderately alkaline; gradual, wavy boundary.

B23t—28 to 38 inches, red (2.5YR 5/6) sandy clay, red (2.5YR 4/6) moist; moderate, medium, blocky structure; hard, very firm, very sticky and plastic; common continuous clay films; medium soft masses of calcium carbonate; calcareous; moderately alkaline; gradual, wavy boundary.

B24tca—38 to 52 inches, light-red (2.5YR 6/8) clay loam, red (2.5YR 5/8) moist; weak, medium, subangular blocky structure; hard, friable, sticky; common continuous clay films; 20 to 30 percent of horizon is calcium carbonate, by volume; gradual, wavy boundary.

B25t—52 to 64 inches +, red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; weak, medium, subangular blocky structure; hard, friable, sticky and plastic; patchy clay films; 5 percent of horizon is calcium carbonate, by volume; calcareous; moderately alkaline.

The A horizon ranges from 6 to 14 inches in thickness and from reddish brown to brown in color.

The B21t horizon ranges from 6 to 10 inches in thickness and from clay loam to sandy clay in texture.

The B22t horizon ranges from 8 to 12 inches in thickness, from reddish brown to red in color, and from sandy clay loam to sandy clay in texture.

The B23t horizon ranges from 6 to 30 inches in thickness, from red to yellowish red in color, and from sandy clay to clay loam in texture.

The B24tca horizon ranges from reddish brown to light red to pink in color. Depth to this horizon ranges from 30 to 48 inches. Carbonate accumulation generally ranges from 20 to 40 percent.

Depth to the B25t horizon ranges from 48 to 70 inches.

Olton clay loam, 0 to 1 percent slopes (OtA).—This soil has the profile described as representative of the series. It is in areas that are round to irregular in shape. The areas range from 20 to several hundred acres.

Maintaining tilth is the chief concern of management on this soil. Most of the acreage is cultivated. Capability unit IIc–1; Deep Hardland range site.

Olton clay loam, 1 to 3 percent slopes (OtB).—This soil is in long, narrow areas along drainageways. The areas are dominantly about 150 acres, but they range from 25 to 300 acres. Slopes range from 1 to 3 percent.

The surface layer is reddish-brown, friable clay loam about 8 inches thick. It is underlain by reddish-brown sandy clay 16 inches thick. Next is red, calcareous sandy clay about 10 inches thick, and then light-red, calcareous clay loam, about 14 inches thick, that is 20 to 40 percent calcium carbonate. Below is red, friable sandy clay loan.

Water erosion is the principal hazard on this soil. Most of the acreage is cultivated, but a few areas are used as range. Capability unit IIe–1; Deep Hardland range site.

Owens Series

The Owens series consists of sloping to steep, grayish-brown, clayey soils that are shallow over underlying material. Permeability in these calcareous soils is very slow.

In a representative profile the surface layer is grayish-brown, very firm, calcareous clay about 8 inches thick. The next layer is light yellowish-brown, very firm, calcareous clay about 6 inches thick. The underlying material, to a depth of 22 inches, is weakly consolidated beds of light-gray shaly clay.

Representative profile of an Owens clay in Owens-Vernon stony complex (in range 1,400 feet north of U.S. Highway 180, 14.2 miles east of junction with U.S. Highway 277 in Anson):

A1—0 to 8 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong, fine, subangular blocky structure; very hard, very firm, very sticky, and very plastic; calcareous; moderately alkaline; gradual, smooth boundary.

B—8 to 14 inches, light yellowish-brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; moderate, fine to very fine, subangular blocky structure; very hard, very firm, very sticky, and very plastic; calcareous; moderately alkaline; gradual, smooth boundary.

C—14 to 22 inches, light-gray (2.5Y 7/2) shaly clay; a few, medium, light-yellow mottles; massive (structureless); very hard, very firm; calcareous; moderately alkaline.

The A horizon ranges from 4 to 10 inches in thickness and from grayish brown to olive in color.

The B horizon ranges from 6 to 10 inches in thickness and from light olive gray to light reddish brown in color.

The C horizon is shaly clay or weakly consolidated shale.

Owens-Vernon stony complex (Ov).—The soils of this complex occur in long areas along escarpments that are 100 to 500 feet wide. Stones of limestone cover 15 to 50 percent of the surface, and limestone ledges occur along upper edges of the escarpments. Slopes are dominantly 12 to 20 percent, but they range from 6 to 40 percent. About 50 percent of this complex is Owens clay, and about 50 percent is Vernon clay. Owens clay generally occupies the upper slopes, and Vernon clay the lower slopes.

Owens clay has the profile described as representative of the Owens series.

Vernon clay has a surface layer of red, extremely firm, calcareous clay about 6 inches thick. The next layer is red, extremely firm, calcareous clay about 8 inches thick. Below is weathered and unweathered clay and shale.

Runoff is rapid on the soils of this complex. Water erosion is the principal hazard. All of the acreage is used as range (fig. 7). Capability unit VIe–1; Shallow Redland range site.

Quarry

Quarry (Qu) is made up of areas from which limestone has been mined. In many places these areas are 30 feet deep and have several strata of limestone 2 to 3 feet thick. Capability unit VIIIs–1.

Randall Series

The Randall series consists of deep, somewhat poorly drained soils that are very slowly permeable.

In a representative profile the surface layer is dark-gray clay about 14 inches thick. Next is gray, extremely firm clay about 20 inches thick. Below this layer is olive-gray, extremely firm, calcareous clay about 14 inches thick. The underlying material, to a depth of 60 inches, is yellow, firm clay loam that is about 10 percent calcium carbonate.

Representative profile of Randall clay in an area of Randall soils (2.9 miles south of Funston and 100 feet west of county road):

A1—0 to 14 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; a few fine roots between peds; tilted, medium, platy wedges; neutral; gradual, wavy boundary.

AC1—14 to 34 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; a few, fine, faint, brown to reddish-brown mottles; weak, medium, blocky structure; extremely

Figure 7.—An area of Owens-Vernon stony complex.

hard, extremely firm, very sticky, and very plastic; prominent slickensides; a few very fine ferromanganese concretions; mildly alkaline; gradual, wavy boundary.

AC2—34 to 48 inches, olive-gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak, coarse, blocky structure; extremely hard, extremely firm, very sticky, and very plastic; prominent slickensides; a few, very fine, ferromanganese concretions; a few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

Cca—48 to 60 inches +, yellow (2.5Y 7/8) clay loam, olive yellow (2.5Y 6/8) moist; a few, fine, faint, reddish-yellow and light-gray mottles; massive (structureless); hard, firm, sticky and plastic; 10 percent of horizon is soft masses of calcium carbonate.

The A horizon ranges from 12 to 25 inches in thickness and from gray to dark gray in color.

The AC horizon ranges from 20 to 35 inches in thickness and from gray to dark grayish brown to olive gray in color. It contains a few to common ferromanganese concretions.

The content of calcium carbonate in the Cca horizon ranges from 5 to 30 percent.

Randall soils (Rd).—These are the only Randall soils mapped in the county. They occur in depressional areas that are 2 to 5 feet lower than surrounding areas of other soils. The areas of Randall soils are round and are from 5 to 80 acres. Slopes are less than 1 percent.

Included with these soils in mapping are small areas of Abilene, Rowena, and Miles soils. These soils are on the edges of areas of Randall soils.

Water stands on the surface of these soils for several months after heavy rains. Crops can be grown on the areas only in years when rainfall is below normal. Capability unit IVw–1; not used as range.

Roscoe Series

The Roscoe series consists of deep, moderately well drained, level to nearly level clayey soils that are very slowly permeable.

The surface layer is dark-gray calcareous clay about 32 inches thick. The next layer is grayish-brown, very firm, calcareous clay about 24 inches thick. The underlying material, to a depth of 62 inches, is light-gray, mottled, firm clay that is about 20 percent calcium carbonate.

Representative profile of Roscoe clay (100 feet west of county road at a point 0.8 mile south of State Highway

92 and at a point 3 miles east of its junction with Farm Road 1661):

Ap—0 to 8 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate, fine and very fine, subangular blocky and fine granular structure; hard, friable, sticky, and plastic; calcareous; moderately alkaline; gradual, smooth boundary.

A1—8 to 32 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate, medium, blocky structure; very hard, very firm, sticky, and plastic; a few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

AC—32 to 56 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; prominent slickensides; a few fine and very fine calcium carbonate concretions; a few fine quartzite pebbles; calcareous; moderately alkaline; gradual, wavy boundary.

Cca—56 to 62 inches +, light-gray (10YR 7/1) clay, light gray (10YR 6/1) moist; a few, fine to medium, dark-gray mottles and a few, fine, faint, olive mottles; hard, firm, sticky and plastic; soft calcium carbonate content about 20 percent, by volume; calcareous; moderately alkaline.

The A horizon ranges from 14 to 36 inches in thickness and from dark gray to very dark gray in color.

The AC horizon ranges from 10 to 40 inches in thickness and from light gray to dark grayish brown in color.

Depth to the Cca horizon ranges from 42 to 70 inches. This horizon ranges from white to light gray in color.

Roscoe clay (Ro).—This is the only Roscoe soil mapped in the county. It occurs slightly below the surrounding Rowena soils. The areas are round to irregular in shape. Normally they are about 40 acres in size, but the range in size is from 10 to 300 acres. Slopes are less than 1 percent.

Most of this soil is cultivated. It has high available water capacity, but it cracks when it dries. In about 1 year in 5, crops fail because of wetness. Capability unit IIIw–1; Deep Hardland range site.

Rowena Series

The Rowena series consists of deep, well-drained, nearly level to gently sloping soils that are moderately slowly permeable. These calcareous soils have high available water capacity.

In a representative profile the surface layer is dark grayish-brown clay loam about 10 inches thick. Below this is dark grayish-brown clay about 18 inches thick, and then brown clay about 8 inches thick. Next is reddish-yellow clay, about 28 inches thick, that contains soft masses of calcium carbonate. The underlying material, to a depth of 70 inches, is red clay.

Representative profile of a Rowena clay loam (100 feet east of county road and south 4.8 miles to U.S. Highway 83 and southeast 1.4 miles to junction with U.S. Highway 277):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak, granular structure; hard, friable, very sticky; calcareous; moderately alkaline; abrupt, smooth boundary.

B21—10 to 28 inches, dark grayish-brown (10YR 4/2) clay, very dark grayish brown (10 YR 3/2) moist; moderate, medium blocky structure; very hard, very firm, very sticky; shiny pressure faces on peds; common, very fine pores; a few soft calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

B22—28 to 36 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate, fine and medium, blocky structure; very hard, very firm, very sticky; shiny pressure faces on peds; a few soft calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

C1ca—36 to 64 inches, reddish-yellow (5YR 7/6) clay, reddish yellow (5YR 6/6) moist; common, fine, strong-brown (7.5YR 5/6) mottles; massive (structureless); very hard, very firm, very sticky; horizon is about 20 percent, by volume, soft masses of calcium carbonate; common gypsum crystals; calcareous; moderately alkaline; gradual, smooth boundary.

C2—64 to 70 inches +, red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; massive (structureless); very hard, very firm, very sticky; horizon is about 2 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 6 to 12 inches in thickness, from dark brown to dark grayish brown in color, and from clay to clay loam in texture.

The B2 horizon ranges from 17 to 30 inches in thickness. Cracks as large as 1 inch wide extend to a depth of 20 inches when the soil is dry.

The C1ca horizon ranges from 14 to 30 inches in thickness and from pink to reddish brown in color. Depth to this horizon ranges from 30 to 40 inches. The content of calcium carbonate ranges from 15 to 40 percent, by volume.

Depth to the C2 horizon ranges from 50 to 70 inches.

Rowena clay loam, 0 to 1 percent slopes (RwA).—This soil has the profile described as representative of the series. It occurs in areas that range from 50 to 40,000 acres. Slopes are from 0 to 1 percent. Included in mapping are small areas of Roscoe clay in small depressions.

Runoff is slow on this Rowena soil. Most of the acreage is cultivated. Capability unit IIc–1; Deep Hardland range site.

Rowena clay loam, 1 to 3 percent slopes (RwB).—This soil occurs in areas along natural drainageways. The areas are 20 to 200 acres in size. They generally are below areas of Rowena clay loam, 0 to 1 percent slopes.

The surface layer is dark grayish-brown clay loam about 6 to 10 inches thick. Below this is clay, about 22 inches thick, that is dark grayish brown in the upper part and brown in the lower part. The next layer is caliche, 14 to 30 inches thick, that is 15 to 40 percent calcium carbonate, by volume.

Maintaining tilth and controlling water erosion are the chief concerns of management on this soil. Most of the acreage is cultivated. Capability unit IIe–1; Deep Hardland range site.

Selden Series

The Selden series consists of deep, moderately well drained soils that are moderately slowly permeable. These soils range from medium acid to neutral and have high available water capacity.

In a representative profile the surface layer is brown fine sand about 4 inches thick. Just below is reddish-yellow fine sand about 6 inches thick. Next is reddish-yellow, mottled sandy clay loam about 16 inches thick, and then mottled brownish-yellow sandy clay loam. The underlying material, to a depth of 70 inches, is light-gray clay that has prominent, coarse, red mottles.

In Jones County, Selden soils are mapped only with Eufaula soils, described under the Eufaula series.

Representative profile of a Selden fine sand (in an abandoned field 300 feet west of road and 4.8 miles south of U.S. Highway 180 and 6.4 miles east of junction with U.S. Highway 277 in Anson):

A1—0 to 4 inches. brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; single grain (structureless); loose; neutral; abrupt, smooth boundary.

A2—4 to 10 inches, reddish-yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6) moist; single grain (structureless); loose; slightly acid; abrupt, wavy boundary.

B21t—10 to 26 inches, reddish-yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; common, fine to medium, brown and reddish-brown mottles; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; common thin clay films; slightly acid; gradual, wavy boundary.

B22t—26 to 64 inches, brownish-yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; fine, distinct, light-gray (10YR 7/1) mottles; moderate, medium, blocky structure; extremely hard, extremely firm; a few, fine, weakly cemented, brown ferromanganese concretions; medium acid; gradual, wavy boundary.

B23t—64 to 70 inches +, light-gray (10YR 7/1) clay, gray (10YR 6/1) moist; prominent, coarse, red (2.5YR 5/6) mottles; weak, blocky structure to moderate, coarse, blocky; extremely hard, extremely firm; a few, fine, weakly cemented ferromanganese concretions in the upper part of horizon; medium acid.

The A1 horizon ranges from 2 to 6 inches in thickness and from brown to yellowish brown in color. The A2 horizon ranges from 6 to 12 inches in thickness and from reddish yellow to very pale brown in color. Reaction of the A2 horizon ranges from slightly acid to strongly acid.

The B2t horizon extends to a depth of more than 60 inches. It is strong brown, yellowish brown, reddish yellow, or light gray. This horizon has a few to many red, yellowish-brown, brown, and gray mottles. Reaction of the B2t horizon ranges from slightly acid to medium acid.

Spur Series

The Spur series consists of deep, friable, well-drained, nearly level soils that are moderately permeable. These friable soils are calcareous, and they occur on flood plains.

In a representative profile the surface layer is reddish-brown loam about 18 inches thick. The next layer, to a depth of 60 inches, is reddish-brown, stratified clay loam.

Representative profile of Spur loam (50 feet west of farm road, then south 0.15 mile to county road, west 0.4 mile to Farm Road 707, and north 0.9 mile to bridge over the Clear Fork of the Brazos River):

A1—0 to 18 inches, reddish-brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; moderate, fine, subangular blocky structure; hard, friable, sticky; many pores; calcareous; moderately alkaline; clear, smooth boundary.

B—18 to 60 inches +, reddish-brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate, fine to very fine, subangular blocky structure; hard, friable, sticky; stratified layers of fine sandy loam ½ to 2 inches thick; a few threads and films of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 11 to 20 inches in thickness, from brown to dark reddish brown in color, and from clay loam to fine sandy loam in texture.

The B horizon ranges from reddish brown to brown and yellowish red in color and from clay loam to loam in texture.

Spur loam (Sp).—This soil has the profile described as representative of the series. The areas parallel the larger streams of the county and range from about 30 to 900 acres. They are 300 to 2,000 feet wide and are as much as several miles long. Slopes are less than 1 percent and are dominantly about 0.5 percent.

Runoff is slow on this soil. Available water capacity is high. Soil blowing and compaction from tillage are the principal hazards. Flooding is infrequent, and the water remains on the surface for less than 36 hours.

Most of the acreage of Spur loam is cultivated. Capability unit I–1; Loamy Bottomland range site.

Spur soils, broken (Sr).—These soils are along the larger streams of the county. They are on benches 4 to 20 feet above the stream channel, on streambanks, and in channels of meandering streams. The areas are 200 to 500 feet wide and as much as several miles long. Slopes are dominantly 0.5 to 1.5 percent, but they range to 5 percent.

The surface layer is reddish-brown, calcareous loam about 11 to 20 inches thick. The underlying material is reddish-brown, calcareous clay loam that has strata of fine sandy loam.

These soils are flooded after each major rain. Most of the acreage is used as range. Capability unit Vw–1; Loamy Bottomland range site.

Stamford Series

The Stamford series consists of deep, well-drained, nearly level to gently sloping soils that are calcareous. These soils are very slowly permeable.

The surface layer is reddish-brown clay about 14 inches thick. The next layer is reddish-brown clay about 20 inches thick. The underlying material, to a depth of 58 inches, is essentially unaltered clayey shale red beds.

Representative profile of Stamford clay, 0 to 2 percent slopes (in rangeland, 150 feet north of county road, and 0.15 mile west-northwest of the east end of the dam on Lake Anson, and about 8 miles north of Anson courthouse):

A1—0 to 14 inches, reddish-brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm, very sticky, and plastic; many roots; calcareous; moderately alkaline; gradual, wavy boundary.

AC—14 to 34 inches, reddish-brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; prominent slickensides; parallelepipeds are evident; a few fibrous roots to a depth of 30 inches; a few, fine, soft masses of calcium carbonate; a few very fine ferromanganese concretions; calcareous; moderately alkaline; gradual, wavy boundary.

C1—34 to 42 inches, red (2.5YR 4/6) clayey shale; massive (structureless); extremely hard, very firm; some thin strata of light-gray clay; calcareous; moderately alkaline; gradual, wavy boundary.

C2—42 to 58 inches +, red (2.5YR 4/6) clayey shale; massive (structureless); extremely hard, very firm; a few round, light-gray splotches; essentially unaltered redbed material.

The A horizon ranges from 8 to 20 inches in thickness and from reddish brown to dark red in color.

The AC horizon ranges from 20 to 30 inches in thickness and from reddish brown to red in color.

A weakly developed Cca horizon is at a depth of 30 to 40 inches in a few places. Depth to the C horizon ranges from 30 to 50 inches.

Stamford clay, 0 to 2 percent slopes (StA).—This is the only Stamford clay mapped in the county. It occurs

above or beside natural drainageways. The areas are round to irregular in shape and range from 30 to 300 acres.

This soil has high available water capacity. The heavy clay texture impedes movement of water, roots, and air and makes the soil difficult to till.

Most of the acreage of this soil is used as range. Large areas that formerly were cultivated are now used as range, but a few areas are cultivated. Capability unit IIIs–1; Clay Flat range site.

Tarrant Series

The Tarrant series consists of well-drained, gently sloping to sloping, clayey soils. These soils are shallow to fractured limestone. They are moderately slowly permeable.

In a representative profile the surface layer is dark grayish-brown clay, about 9 inches thick, that is about 55 percent limestone fragments. The next layer, to a depth of 14 inches, is 5 to 10 percent dark-brown clay and 90 to 95 percent limestone fragments. Below this layer is fractured limestone bedrock.

Representative profile of Tarrant clay in an area of Tarrant complex (1,200 feet east of gravel road and 1,700 feet north of the south boundary of section 19 and 3.4 miles northeast of the spillway at Lake Fort Phantom Hill):

A1—0 to 9 inches, dark grayish-brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate, very fine, subangular blocky and moderate, medium, granular structure; hard, firm, sticky, and plastic; about 55 percent of this horizon is limestone fragments that range from the size of a pebble to the size of a stone; limestone fragments coated with secondary calcium carbonate; calcareous; moderately alkaline; clear, irregular boundary.

A&R—9 to 14 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; about 5 to 10 percent, by volume, of this horizon is dark-brown clay in cracks between the broken limestone cobblestones and other stones; moderate, medium, granular structure; very hard, firm; 90 to 95 percent of this horizon is limestone cobblestones and other stones that have vertical cracks as large as 2 inches wide and horizontal cracks as large as ½ to 1 inch wide, and secondary calcium carbonate accumulations that are as much as 2 millimeters thick; calcareous; moderately alkaline; abrupt, wavy boundary.

R—14 to 20 inches +, fractured indurated and platy limestone bedrock in layers, 2 to 12 inches thick, that have soft calcium carbonate in the seams.

The A horizon ranges from 4 to 10 inches in thickness and from brown to dark grayish brown in color. It ranges from clay loam to clay, and the clay content is 36 to 48 percent.

Coarse limestone fragments make up 15 to 70 percent of the A1 horizon and 70 to 95 percent of the A&R horizon.

Depth to the R horizon ranges from 10 to 20 inches.

Tarrant complex (Ta).—The soils of this complex are on ridgetops and hillsides. The areas are irregular in shape and range from 20 to 200 acres. They are dissected by many drainageways. Slopes range from 1.5 to 6 percent.

Tarrant clay makes up about 55 percent of the mapping unit. It has the profile described as representative of the Tarrant series.

Making up about 15 percent of this complex is a soil that has a surface layer of brown, calcareous silty clay loam 7 to 10 inches thick. The next layer consists of plates of hard caliche that have brown, light clay in the cracks and crevices between the plates that make up about 5 to 10 percent of the layer. The underlying material is olive-gray shale that is less than 5 percent calcium carbonate.

A soil that has a surface layer of brown to dark-brown, subangular blocky, calcareous clay, about 7 to 10 inches thick, makes up about 15 percent of the unit. Below the surface layer is brown clay that is 25 percent concretions and soft masses of calcium carbonate. The underlying material is limestone bedrock.

Valera silty clay and a soil that is similar to Valera silty clay, except that it is shallow over limestone, make up about 15 percent of the unit. Valera silty clay has the profile described as representative of the Valera series.

Runoff is rapid on the soils of this complex. These soils are shallow over rock and are droughty. All of the acreage is used as range. Capability unit VIs–3; Very Shallow range site.

Tillman Series

The Tillman series consists of deep, well-drained, nearly level to gently sloping soils that are very slowly permeable. These soils have high available water capacity.

In a representative profile the surface layer is reddish-brown clay loam about 6 inches thick. Below, to a depth of about 46 inches, is reddish-brown calcareous clay. The next layer is red, calcareous clay about 6 inches thick. The underlying material, to a depth of 60 inches, is red weathered clay derived from red beds.

Representative profile of a Tillman clay loam (200 feet south of county road, 0.2 mile east, 3.3 miles south to U.S. Highway 277, and 0.8 mile southwest to junction with U.S. Highway 83):

Ap—0 to 6 inches, reddish-brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; weak, very fine, subangular blocky structure; hard, friable, sticky; mildly alkaline; abrupt, smooth boundary.

B21t—6 to 11 inches, reddish-brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate, fine, subangular blocky and moderate, fine, blocky structure; very hard, very firm, sticky; clay films on peds; mildly alkaline; clear, smooth boundary.

B22t—11 to 46 inches, reddish-brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate, medium, blocky structure; extremely hard, very firm, sticky and plastic; clay films on peds; a few medium to very fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

B23tca—46 to 52 inches, red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; moderate, fine, blocky structure; very hard, firm, sticky; a few patchy clay films on peds; a few, fine, soft masses of calcium carbonate and a few medium concretions of calcium carbonate; calcareous; moderately alkaline; gradual, wavy boundary.

C—52 to 60 inches +, red (2.5YR 5/6) weathered clay derived from red beds.

The A horizon ranges from 4 to 10 inches in thickness and from dark reddish brown to brown in color.

The B21t horizon ranges from 4 to 6 inches in thickness and from dark reddish brown to reddish brown in color.

The B22t horizon ranges from 20 to 40 inches in thickness and from red to dark reddish brown in color.

The B23tca horizon ranges from 4 to 16 inches in thickness. The content of calcium carbonate in this horizon ranges from 1 to 10 percent.

Depth to the C horizon ranges from 48 to 72 inches.

Tillman clay loam, 0 to 1 percent slopes (TcA).—This soil occurs on broad areas. The areas range from about 25 acres to several hundred acres. Slopes are dominantly 0.5 to 0.7 percent.

The surface layer is reddish-brown clay loam 8 to 10 inches thick. Below is reddish-brown, very firm clay about 40 inches thick. The next layer is red clay that has an accumulation of calcium carbonate. It is underlain by partly weathered clayey red beds.

The clay in this soil impedes the movement of water, roots, and air. Runoff is slow.

Most of the acreage of this soil is cultivated. Capability unit IIs–1; Deep Hardland range site.

Tillman clay loam, 1 to 3 percent slopes (TcB).—This soil has the profile described as representative of the series. The areas are dominantly about 300 acres in size, but they range from 25 to 3,000 acres.

The clay in this soil impedes the movement of water, roots, and air (fig. 8). The chief hazards are water erosion and compaction caused by tillage.

About one-half the acreage of this soil is cultivated and about one-half is used as range. Capability unit IIIe–1; Deep Hardland range site.

Tobosa Series

The Tobosa series consists of deep, moderately well drained, nearly level to gently sloping clays that are very slowly permeable. These soils are calcareous. They have high available water capacity.

In a representative profile the surface layer is dark grayish-brown clay about 10 inches thick. The next layer is dark grayish-brown, very firm clay about 32 inches thick. The underlying material, to a depth of 48 inches, is light-gray clay that contains soft masses of calcium carbonate. Below this is limestone.

Representative profile of a Tobosa clay (in a cultivated field 50 feet north of county road, 200 feet west, 2 miles south, and 0.8 mile west of the spillway at Lake Fort Phantom Hill):

Figure 8.—Water standing on an area of Tillman clay loam, 1 to 3 percent slopes.

A1—0 to 10 inches, dark-grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate, medium, subangular blocky structure; very hard, very firm, very sticky and plastic; calcareous; moderately alkaline; gradual, smooth boundary.

AC—10 to 42 inches, dark-grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate to strong, medium, blocky structure; extremely hard, very firm, very sticky and very plastic; prominent slickensides; a few soft masses of calcium carbonates, calcareous; moderately alkaline; gradual, wavy boundary.

Cca—42 to 48 inches, light-gray (10YR 7/2) clay, light grayish brown (10YR 6/2) moist; massive (structureless); hard, firm; this horizon is about 20 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline; abrupt, wavy boundary.

R—48 inches +, hard limestone bedrock.

The A horizon ranges from 8 to 20 inches in thickness and from grayish brown to very dark grayish brown in color.

The AC horizon ranges from 10 to 40 inches in thickness and from grayish brown to dark grayish brown in color.

The Cca horizon ranges from 6 to 12 inches in thickness and is to 15 to 40 percent calcium carbonate.

Depth to limestone bedrock ranges from 41 to 72 inches.

Tobosa clay, 0 to 1 percent slopes (ToA).—This soil has the profile described as representative of the series. It occurs in areas between natural drainageways. The areas are round to irregular in shape and range from 70 to 125 acres. Slopes are dominantly about 0.5 percent.

The clay in this soil impedes the movement of water, roots, and air. Compaction from tillage is the chief concern of management. When this soil is dry, cracks form that extend to a depth between 2 and 4 feet.

Most of the acreage of this soil is cultivated. Capability unit IIIs–1; Clay Flat range site.

Tobosa clay, 1 to 3 percent slopes (ToB).—This soil occurs in areas above and along natural drainageways. The areas generally are long and narrow and range from about 50 to 125 acres. Slopes are dominantly about 1.5 to 2 percent.

The surface layer is dark grayish-brown, calcareous clay about 10 inches thick. It is very hard when dry and very firm when moist. The next layer is dark grayish-brown, calcareous, very firm clay, 20 to 35 inches thick, that contains a few soft masses of calcium carbonate. The underlying material is light-gray clay, 6 to 12 inches thick, that has a high content of calcium carbonate. Limestone bedrock is at a depth of about 48 inches.

The clay in this soil impedes movement of water, roots, and air. Compaction from tillage is the chief concern of management. Water erosion is a hazard. When dry, this soil cracks to a depth between 2 and 4 feet.

Most of the acreage of this soil is cultivated. Capability unit IVe–1; Clay Flat range site.

Valera Series

The Valera series consists of moderately deep, well-drained, gently sloping soils that are moderately slowly permeable. These soils are calcareous. They have high available water capacity.

In a representative profile the surface layer is dark-brown silty clay to clay about 12 inches thick. The next layer is dark-brown clay about 14 inches thick. The underlying material is indurated calcium carbonate about 4 inches thick over fractured limestone bedrock.

Representative profile of Valera silty clay, 1 to 3 percent slopes (50 feet west of county road, then north 0.9 mile, and west 1.8 miles to spillway at Lake Fort Phantom Hill):

A11—0 to 5 inches, dark-brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; strong, fine, subangular blocky structure; hard, friable, sticky; a few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

A12—5 to 12 inches, dark-brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate, medium, subangular blocky and blocky structure; very hard, firm, sticky and plastic; calcareous; moderately alkaline; gradual, wavy boundary.

B—12 to 26 inches, dark-brown (7.53YR 4/3) clay, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; very hard, firm, sticky and plastic; a few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, irregular boundary.

Ccam—26 to 30 inches, pink (7.5YR 7/4) indurated caliche; abrupt, wavy boundary.

R—30 inches +, fractured indurated limestone bedrock.

The A horizon ranges from 10 to 20 inches in thickness, from dark brown to grayish brown in color, and from silty clay to clay in texture.

The B horizon ranges from 8 to 16 inches in thickness and from dark brown to reddish brown in color.

The Ccam horizon ranges from 2 to 6 inches in thickness.

Depth to limestone bedrock ranges from 24 to 40 inches.

Valera silty clay, 1 to 3 percent slopes (VaB).—This is the only Valera soil mapped in the county. The areas are round and are dominantly about 130 acres, but they range from 40 to 1,000 acres.

Compaction from tillage is the chief concern of management. Water erosion is a hazard on this soil. Most of the acreage is cultivated. Capability unit IIe–1; Deep Hardland range site.

Vernon Series

The Vernon series consists of well-drained, gently sloping to sloping soils that are calcareous. These soils are slowly permeable.

In a representative profile the surface layer is red clay about 6 inches thick. The next layer is red, extremely firm clay about 8 inches thick. The underlying material, to a depth of 24 inches, is weathered to unweathered red clay and shale.

Representative profile of a Vernon clay (in rangeland, 3.7 miles east of Funston and 150 feet north of U.S. Highway 180):

A—0 to 6 inches, red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; quartzite pebbles on surface of horizon; calcareous; moderately alkaline; gradual, smooth boundary.

B—6 to 14 inches, red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak, coarse, blocky structure: extremely hard, extremely firm, very sticky and very plastic; lower part of horizon is about 5 percent calcium carbonate concretions; calcareous; moderately alkaline; abrupt, smooth boundary.

C—14 to 24 inches +, red (2.5YR 4/6) weathered red beds that contain a few fragments of unweathered shale; a few soft masses and concretions of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 5 to 8 inches in thickness and from red to dark reddish brown in color. Pebbles of quartzite gravel on the surface of the horizon range from none to many.

The B horizon ranges from 7 to 14 inches in thickness and from red to reddish brown in color.

Depth to the C horizon is less than 20 inches.

Vernon clay, 2 to 8 percent slopes (VeC).—This is the only Vernon soil mapped in the county. It occurs in irregular areas that are dissected by natural drainageways. Some of the areas near the drainageways are eroded. The areas are dominantly about 90 acres, but they range from 10 to 600 acres.

This soil is droughty because much of the rainfall runs off the surface before it soaks into the ground. Water erosion is the principal hazard.

Most of the acreage of this soil is used as range. Capability unit VIe–1; Shallow Redland range site.

Weymouth Series

The Weymouth series consists of well-drained, gently sloping, calcareous clay loams. These soils are moderately permeable.

In a representative profile the surface layer is reddish-brown clay loam about 6 inches thick. Below is reddish-brown, friable clay loam about 12 inches thick. The next layer is reddish-yellow clay loam, about 22 inches thick, that has an accumulation of calcium carbonate. The underlying material, to a depth of 62 inches, is red clay loam and weathered silty, clayey, and shaly red beds.

Representative profile of Weymouth clay loam, 3 to 5 percent slopes (50 feet west of county road, at a point 3 miles east and 1.3 miles north of junction of State Highway 92 and Farm Road 1661):

Ap—0 to 6 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; strong, fine, subangular blocky structure; slightly hard, friable, sticky; calcareous; moderately alkaline; gradual, smooth boundary.

B2—6 to 18 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate, fine, subangular blocky structure; hard, friable, sticky and plastic; a few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

B3ca—18 to 40 inches, reddish-yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; weak, fine, subangular blocky structure; hard, friable, sticky; 30 percent, by volume, of this horizon is fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline; gradual, wavy boundary.

C—40 to 62 inches +, red (2.5YR 4/6) clay loam, red (2.5YR 4/6) moist; massive (structureless); weathered silty, clayey, and shaly red beds; calcareous; moderately alkaline.

The A horizon ranges from 4 to 8 inches in thickness and from reddish brown to brown, in values of 3 to 5.

The B2 horizon ranges from 10 to 16 inches in thickness and from reddish brown to brown in color.

The B3ca horizon ranges from 10 to 26 inches in thickness.

Depth to the C horizon ranges from 24 to 40 inches.

Weymouth clay loam, 1 to 3 percent slopes (WeB).—This soil occurs on convex ridges and in areas above drainageways. The areas are 200 to 800 feet wide and as much as 2 miles long. They are dominantly about 60 acres, but they range from 15 to 500 acres.

The surface layer is reddish-brown, calcareous clay loam about 6 inches thick. It is underlain by 12 inches of reddish-brown, friable clay loam. The next layer is reddish-yellow, friable clay loam that is about 30 percent

calcium carbonate. The underlying material is partly weathered red beds.

Water erosion is the principal hazard on this soil. Most of the acreage is cultivated, but a few areas are used as range. Capability unit IIIe–7; Deep Hardland range site.

Weymouth clay loam, 3 to 5 percent slopes (WeC).—This soil has the profile described as representative of the series. The areas are 200 to 1,000 feet wide and as much as half a mile long. They range from 10 to 85 acres.

Water erosion is the principal hazard on this soil. Most of the acreage is cultivated, but a few areas are used as range. Capability unit IVe–6; Deep Hardland range site.

Winters Series

The Winters series consists of deep, well-drained, nearly level to gently sloping soils that are moderately slowly permeable. These soils have high available water capacity.

In a representative profile the surface layer is reddish-brown fine sandy loam about 7 inches thick. The next layer, to a depth of 46 inches, is reddish-brown sandy clay in the upper part and red sandy clay in the lower part. The underlying material, to a depth of 60 inches, is light-red sandy clay loam.

Representative profile of a Winters fine sandy loam (100 feet south of private road, then 0.5 mile west to county road, 0.55 mile north, 4.7 miles west to U.S. Highway 83, and north 0.8 mile to junction with State Highway 92 in Hamlin):

Ap—0 to 7 inches, reddish-brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak, fine, granular structure; hard, friable, nonsticky; neutral; abrupt, smooth boundary.

B21t—7 to 24 inches, reddish-brown (2.5YR 4/4) sandy clay, dark reddish brown (2.5YR 3/4) moist; moderate, medium, blocky structure; very hard, firm, very sticky; thin continuous clay films; neutral; gradual, smooth boundary.

B22t—24 to 30 inches, red (2.5YR 4/6) sandy clay, dark red (2.5YR 3/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky; thin continuous clay films; neutral; gradual, smooth boundary.

B3—30 to 46 inches, red (2.5YR 5/8) sandy clay, red (2.5YR 4/8) moist; moderate, medium, blocky structure; very hard, very firm, sticky; calcareous; moderately alkaline; gradual, wavy boundary.

Cca—46 to 60 inches +, light-red (2.5YR 6/8) sandy clay loam, red (2.5YR 5/8) moist; massive (structureless); hard, friable, sticky; 30 percent of this horizon is an accumulation of calcium carbonate.

The A horizon ranges from 5 to 12 inches in thickness and from reddish brown to dark reddish brown in color.

The B2t horizon ranges from 18 to 42 inches in thickness and from dark reddish brown to yellowish red in color.

The B3 horizon ranges from 8 to 30 inches in thickness.

Depth to the Cca horizon ranges from 40 to 54 inches. Calcium carbonate accumulation ranges from 15 to 30 percent.

Winters fine sandy loam, 0 to 1 percent slopes (WnA).—This soil has the profile described as representative of the series. The areas are irregular in shape and generally are slightly higher than the surrounding areas. Slopes are dominantly less than 0.5 percent.

Soil blowing is the principal hazard on this soil. Almost all the acreage is cultivated. Capability unit IIe–4; Sandy Loam range site.

Winters fine sandy loam, 1 to 3 percent slopes (WnB).—Areas of this soil occur slightly below areas of Olton soils. They generally are round to irregular in shape and are as much as several hundred acres. Some of the areas are 300 to 1,000 feet wide and up to 2 miles long. Slopes are dominantly 1 to 2 percent.

The surface layer is reddish-brown fine sandy loam 5 to 8 inches thick. It is underlain by reddish-brown clay about 18 to 38 inches thick. The next layer, about 8 to 30 inches thick, is reddish-brown sandy clay in the upper part and red sandy clay in the lower part. The underlying material, to a depth of 40 inches, is light-red sandy clay loam that is 30 percent, by volume, accumulations of calcium carbonate.

Soil blowing and water erosion are the principal hazards on this soil. Almost all the acreage is cultivated. Capability unit IIIe–4; Sandy Loam range site.

Yahola Series

The Yahola series consists of deep, nearly level, calcareous soils that are moderately rapidly permeable. These friable soils are on bottom lands. They have moderate available water capacity.

In a representative profile the surface layer is reddish-brown fine sandy loam about 24 inches thick. The underlying material, to a depth of 60 inches, is yellowish-red fine sandy loam that contains strata of loamy fine sand.

Representative profile of Yahola fine sandy loam (30 feet south of county road, then 200 feet east, 250 feet north across river bridge, and 0.75 mile east to U.S. Highway 277 in Hawley):

A—0 to 24 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, fine, granular structure; loose, friable; calcareous; moderately alkaline; gradual, smooth boundary.

C—24 to 60 inches +, yellowish-red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive (structureless); loose, friable, nonsticky; calcareous; stratified layers of loamy fine sand and very fine sandy loam.

The A horizon ranges from reddish brown to reddish yellow in color.

Yahola fine sandy loam (Ya).—This is the only Yahola soil mapped in the county. It is on flood plains of the larger streams of the county. The areas are along meandering stream channels. They are long and narrow and are dominantly 50 acres, though some areas range from 15 to 100 acres. Slopes are 0 to 1 percent.

Water, roots, and air move readily through this soil. Soil blowing is the principal hazard. Flooding is infrequent, and water remains on the surface for less than 36 hours after a rainfall.

Most of the acreage of this soil is cultivated. Capability unit IIe–6; Loamy Bottomland range site.

Use and Management of the Soils for Crops

This section discusses use and management of the soils of Jones County for crops, for range, for wildlife, and for engineering purposes.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups

are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive land-forming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife. (None in Jones County.)

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral; for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Jones County are described, and suggestions are given for use and management of the soils. The names of all the soils in any given capability unit can be obtained by referring to the "Guide to Mapping Units" at the back of this survey. The capability units are not numbered consecutively, because not all the units used in Texas are in this county.

Capability unit I–1

Only Spur loam is in this capability unit. This soil is deep, well drained, nearly level and moderately permeable.

Spur loam is one of the most productive soils in the county. It is easy to till, and it is readily penetrated by roots, air, and moisture. Most of the acreage is cultivated. Cotton, grain sorghum, small grain, and grasses are well suited. The principal crops are cotton and grain sorghum, but forage sorghum, oats, and wheat are grown in a few areas.

The main concerns of management are conserving moisture, maintaining tilth by use of organic matter, and avoiding compaction by plowing when the soil is not too wet and by plowing to a different depth each growing season. Soil blowing is a slight hazard.

A suitable cropping system is one that provides wheat, grain sorghum, and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops gives good erosion control and helps to conserve moisture. The residue can be worked into the soil after the critical soil-blowing period in spring.

Capability unit IIe–1

This unit consists of deep, well-drained, gently sloping soils that are moderately slowly permeable. These soils have a surface layer of silty clay and clay loam underlain by clay and sandy clay.

The soils in this unit are well suited to large-scale farming. Most of the acreage is in cotton and grain sorghum, though oats, wheat, and forage sorghum are grown in small areas. These soils are also well suited to native grasses.

The main concerns of management are conserving moisture, controlling erosion, maintaining tilth by use of organic matter, and avoiding compaction by not plowing when the soil is too wet and by plowing to a different depth each growing season.

A suitable cropping system is one that includes wheat, grain sorghum, and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture and to maintain tilth. Terraces also help to conserve moisture and to control water erosion.

Capability unit IIe–4

This unit consists of deep and moderately deep, well-drained, nearly level soils. Permeability is moderate to moderately slow. These soils have a surface layer of fine sandy loam underlain by sandy clay loam and sandy clay.

The soils of this unit have moderate to high available water capacity. They are easy to till, and most areas are cultivated. Cotton and grain sorghum are the principal crops, but oats, wheat, and forage sorghum are grown in small areas. These soils are also well suited to native grasses.

The main concerns of management are conserving moisture, controlling erosion, and maintaining tilth. A suitable cropping system is one that includes wheat, grain sorghum, and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to control erosion and to conserve moisture. The residue can be worked into the soil after the critical soil-blowing period in spring. Level terraces also help to conserve moisture.

Capability unit IIe–5

Only Miles fine sandy loam, 1 to 3 percent slopes, is in this unit. It is deep, well drained, gently sloping, and moderately permeable. The material below the surface layer is sandy clay loam.

Most of the acreage is in cotton and grain sorghum, though oats, winter wheat, and forage sorghum are grown in small areas. This soil is also well suited to native grasses.

The main concerns of management are conserving moisture, controlling erosion, and maintaining tilth by use of organic matter, and avoiding compaction by not plowing when the soil is too wet and by plowing to a different depth each growing season.

A suitable cropping system is one that includes wheat, grain sorghum, and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture, to prevent soil blowing, and to maintain tilth. The residue can be worked into the soil after the critical soil-blowing period in spring. Terraces help to control water erosion.

Capability unit IIe–6

This unit consists only of Yahola fine sandy loam. This soil is deep, well drained, and moderately rapidly permeable. The material below the surface layer is fine sandy loam that contains strata of loamy fine sand.

This soil is easy to till, and it is readily penetrated by water, roots, and air. Most of the acreage is cultivated. The principal crops are cotton and grain sorghum, but small areas of wheat are grown. This soil is suited to native grasses, and they are grown in a few areas.

The main concerns of management are controlling soil blowing and conserving moisture. A suitable cropping system is one that includes grain sorghum, wheat, and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to control soil blowing and to conserve moisture. The residue can be worked into the soil after the critical soil-blowing period in spring.

Capability unit IIs–1

This unit consists only of Tillman clay loam, 0 to 1 percent slopes. This soil is deep, well drained, nearly level, and very slowly permeable. The surface layer is underlain by clay.

The clay in this soil impedes the movement of water, air, and roots. Most of the acreage is cultivated. Wheat and cotton are the principal crops, but small areas of grain sorghum and forage sorghum are grown. This soil also is suited to native grasses and to crops that grow well in cool seasons.

The main concerns of management are conserving moisture, maintaining tilth by use of organic matter, and avoiding compaction by not plowing when the soil is too wet and by plowing to a different depth each growing season. A suitable cropping system is one that includes wheat and other small grains that produce a large amount of residue. When left on the surface of the soil after harvest, the residue helps to conserve moisture. Allowing the soil to lay fallow in summer also conserves moisture.

Capability unit IIc–1

This unit consists of deep, well-drained, nearly level, moderately slowly permeable soils. These soils have a surface layer of clay loam underlain by clay and sandy clay.

Most areas are cultivated and are suitable for large-scale farming. Cotton, grain sorghum, small grain, and grasses are well suited. Cotton and grain sorghum are the principal crops, but oats, wheat, and forage sorghum are grown in a few areas.

The main concerns of management are conserving moisture, maintaining tilth by use of organic matter, and avoiding compaction by plowing when the soil is not too wet and by plowing to a different depth each growing season.

A suitable cropping system is one that provides wheat, grain sorghum, and other crops that produce a large amount of residue (fig. 9). The residue of these crops helps to conserve moisture and to maintain tilth.

Capability unit IIIe–1

This unit consists only of Tillman clay loam, 1 to 3 percent slopes. This soil is deep, well drained, gently sloping, and very slowly permeable. The surface layer is underlain by clay.

The clay in this soil impedes the movement of water, air, and roots. This soil is better suited to crops that grow well in cool weather than to other crops. Most of the acreage is cultivated. Wheat and cotton are the principal crops, but small areas of grain sorghum and forage sorghum are grown. This soil is also suited to native grasses.

The main concerns of management are conserving moisture, controlling erosion, maintaining tilth by use of organic matter, and avoiding compaction by not plowing when the soil is too wet and by plowing to a different depth each growing season. A suitable cropping system is one

Figure 9.—Stubble mulch on Rowena clay loam, 0 to 1 percent slopes.

that includes wheat and other small grains that produce a large amount of residue. Leaving the residue on the surface of the soil after harvest and allowing the soil to lay fallow in summer help to conserve moisture and to control erosion.

Capability unit IIIe–4

This unit consists of deep and moderately deep, well-drained, gently sloping soils. Permeability of these soils is moderate to moderately slow.

Most areas of these soils are cultivated. Cotton and grain sorghum are the principal crops, but oats, winter wheat, and forage sorghum are grown in a few areas.

The main concerns of management are conserving moisture, controlling erosion, maintaining tilth by use of organic matter, and avoiding compaction by plowing when the soil is not too wet and by plowing to a different depth each planting season. A suitable cropping system is one that provides wheat, grain sorghum, and other crops that produce a large amount of residue. When left on the surface after harvest, the residue of these crops helps to conserve moisture, to prevent soil blowing, and to maintain tilth. The residue can be worked into the soil after the critical soil-blowing period in spring. Terraces help to control water erosion.

Capability unit IIIe–6

This unit consists of deep, well-drained, nearly level to gently sloping soils that are moderately permeable. These soils have a surface layer of loamy fine sand. The material below is sandy clay loam.

Water, air, and roots move freely through these soils. Most of the acreage is cultivated. Cotton and grain sorghum are the principal crops, but small areas of wheat and forage sorghum are grown. Native grasses are also well suited to these soils.

The main concerns of management are maintaining fertility and tilth, controlling erosion, and conserving moisture. A suitable cropping system is one that includes wheat, grain sorghum, and other close-growing crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to prevent soil blowing and to conserve moisture. Deep plowing mixes the sandy clay loam of the lower layers with the loamy fine sand of the surface layer and thus helps to control soil blowing.

Capability unit IIIe–7

This unit consists only of Weymouth clay loam, 1 to 3 percent slopes. This soil is well drained, gently sloping, and moderately permeable. It is clay loam throughout. The underlying material is red beds.

This soil is droughty. It therefore is suited to crops that grow well in cool seasons. Most of the acreage is cultivated, and wheat, cotton, and grain sorghum are the principal crops.

The main concerns of management are conserving moisture, controlling erosion, maintaining fertility and tilth, and preventing compaction by use of proper tillage practices. A suitable cropping system is one that includes wheat and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture and to prevent erosion and compaction. Terraces help to control erosion and to conserve moisture.

Capability unit IIIw–1

This unit consists only of Roscoe clay. This soil is deep, level to nearly level, and very slowly permeable. It remains wet for longer periods after rains than surrounding soils.

Wetness makes this soil well suited to crops grown in warm weather. Most of the acreage is planted to cotton, but small areas of grain sorghum and wheat are grown.

The main concerns of management are maintaining tilth by use of organic matter, avoiding compaction by not plowing too deeply and by varying the depth of plowing each growing season, and controlling surface water. A suitable cropping system is one that includes grain sorghum and other crops that produce a large amount of residue. The residue of these crops helps to maintain tilth and to prevent compaction.

Capability unit IIIs–1

This unit consists of nearly level to gently sloping clays. Permeability is very slow.

The clay in these soils impedes the movement of water, air, and roots. These soils are difficult to till and form a poor seedbed unless the surface soil contains the right amount of moisture. Most of the acreage is used as range and has a cover of tobosa grass. The few areas that are cultivated are planted mostly to wheat.

The main concerns of management are conserving moisture, maintaining tilth by use of organic matter, and avoiding compaction. A suitable cropping system is one that includes wheat and other crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture and to maintain tilth.

Capability unit IVe–1

This unit consists only of Tobosa clay, 1 to 3 percent slopes. It is gently sloping and very slowly permeable.

The clay in this soil impedes the movement of water, air, and roots. This soil is difficult to till. It forms a poor seedbed unless the surface soil contains the right amount of moisture. Most of the acreage is used as range. The small areas that are cultivated are planted mostly to wheat.

The main concerns of management are conserving moisture, maintaining tilth by use of organic matter, and avoiding compaction. A suitable cropping system is one that includes wheat and other close-growing crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture and to maintain tilth.

Capability unit IVe-5

This unit consists only of Gomez fine sandy loam. This soil is deep, well drained, and moderately rapidly permeable. The surface layer is underlain by fine sandy loam.

Water, air, and roots move freely through this soil. Available water capacity is moderate. Soil blowing is a hazard. Most of the acreage of this soil is used as range. The small areas that are cultivated are planted mostly to grain sorghum and forage sorghum.

The main concerns of management are controlling erosion, conserving moisture, and maintaining fertility. A suitable cropping system is one that includes crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to control erosion and to conserve moisture.

Capability unit IVe-6

This unit consists only of Weymouth clay loam, 3 to 5 percent slopes. This soil is gently sloping and moderately permeable.

Most of the acreage is used as range. The few small areas that are cultivated are planted mostly to wheat.

The main concerns of management are conserving moisture, maintaining tilth, maintaining fertility, and controlling erosion. A suitable cropping system is one that includes crops that are drill seeded and that produce a large amount of residue. When left on the surface of the soil after harvest, the residue of these crops helps to conserve moisture, to maintain tilth, and to control erosion.

Capability unit IVe-9

This unit consists of shallow to deep, well-drained, gently sloping to sloping soils. These soils are moderately permeable. The surface layer is fine sandy loam, and the next layer is sandy clay loam. The underlying material is cemented sandstone or gravel and caliche.

Most of the acreage of these soils is cultivated. The main concerns of management are conserving moisture, controlling erosion, and maintaining tilth and fertility. A suitable cropping system is one that includes close-growing crops that produce a large amount of residue. When left on the surface of the soil after harvest, the residue helps to maintain fertility, to prevent erosion, and to conserve moisture.

Capability unit IVw-1

This unit consists only of Randall soils. These soils are deep, somewhat poorly drained, and very slowly permeable. They are clay throughout and occur in depressed areas. Water is likely to stand on the surface of these soils for several months after heavy rains.

Most areas of Randall soils are idle and are infested with sedges and other plants that tolerate wetness. During dry years grain sorghum and forage sorghum are grown on some areas. If wheat is planted, the crop is likely to be lost during the spring rains.

The main concerns of management are controlling wetness and maintaining tilth. Artificial drainage is needed if this soil is cultivated. A suitable cropping system is one that includes crops that provide a large amount of residue. The residue of these crops helps to maintain tilth.

Capability unit IVs-1

This unit consists only of the Acme-Cottonwood complex. The soils of this complex are nearly level, moderately well drained to well drained, and moderately permeable. They are shallow to very shallow over underlying material. The surface layer is clay loam. The underlying material consists of gypsum beds.

These soils are better suited to crops that grow well in cool weather than to other crops. About one-half of the acreage is planted to wheat and about one-half is used as range.

The main concerns of management are conserving moisture, maintaining tilth and fertility by use of organic matter, and avoiding compaction by use of proper tillage practices. A suitable cropping system is one that includes winter wheat and other crops that produce a large amount of organic matter.

Capability unit Vw-1

This unit consists only of Spur soils, broken. These soils are deep and moderately permeable. They are along the channels of rivers and creeks and of smaller drainageways.

Spur soils, broken, are subject to frequent flooding. The erosion hazard is slight. Fresh sediment is deposited on the areas after each significant rain, but the vegetation seldom is destroyed by flooding. These soils are suitable for improved pasture and range and for use as a source of food and shelter for wildlife.

Capability unit VIe-1

This unit consists of gently sloping to steep soils that are shallow to underlying material. Permeability is slow to very slow. These soils are clay throughout and are underlain by red beds of shale and clay.

These soils are too shallow, too steep, and generally too dissected to be cultivated. A cover of grass is needed to help control water erosion.

Capability unit VIe-5

This unit consists of deep, moderately well drained and somewhat excessively drained, nearly level to gently sloping and hummocky soils. These soils are sandy and are moderately slowly permeable to rapidly permeable. Some of the soils are eroded or severely eroded.

These soils are not suitable for cultivation. They have high to low available water capacity. The hazard of soil blowing is severe. Some of the areas of these soils that were formerly cultivated are now used as grassland. A good cover of growing plants is needed to prevent soil blowing.

Capability unit VIs–1

This unit consists only of Gravelly land. The areas are gently sloping to strongly sloping. Gravel beds extend from the surface to a depth of 5 to 15 feet.

The slopes and gravelly surface make this land type unsuitable for cultivation. The areas support a sparse cover consisting mostly of short grasses.

Capability unit VIs–3

This unit consists only of the Tarrant complex. This complex is made up of sloping clays that are shallow over rock. The content of limestone pebbles and cobblestones is high throughout the profile.

Areas of this complex are not suitable for cultivation. Most of the acreage is used as range. An adequate cover of grass is needed to reduce runoff, to conserve moisture, and to control erosion.

Capability unit VIIIs–1

This unit consists of areas where geological erosion is still active and of areas that have been extensively altered by man. They are not suitable for farming.

Estimated Yields

Crop yields in Jones County depend on the kind of management the soils receive. Consistent high yields can be obtained under management that improves the soils or keeps them in good condition. Table 2 gives estimated average yields per acre under a high level of management for the soils in the county that are suitable for cultivation. Under a high level of management all of the best methods of farming are used. Following are some of these practices:

1. Rainfall is conserved by using all necessary conservation measures, including a properly maintained system of terraces, contour farming, and stubble mulch tillage.
2. Crop residue is managed for effective control of erosion.
3. Soil tilth is adequately maintained by using a cropping sequence that maintains an adequate supply of organic matter; performing all tillage, harvesting, and grazing operations at optimum soil moisture to avoid soil compaction; doing all tillage only when necessary to prepare the seedbed or to control weeds; and varying the depth of tillage.
4. Using suitable measures for controlling insects, diseases, and weeds at the proper time.
5. Planting improved crop varieties or strains.

Irrigation

Irrigation is a fairly new practice in Jones County. Most of the wells that provide water for irrigation are in the south-central part of the county, north of the Clear Fork Brazos River. The source for this water is in Quaternary alluvium that ranges from as little as a knife's edge in thickness to as much as 150 feet thick and averages about 50 feet. The yield of water from the wells ranges from small to moderate (*4*).

Irrigation is mostly a supplemental practice. The amount of water applied and the number of acres irrigated depend on the capacity of each well. Both furrow and sprinkler methods are used to apply the water. Because irrigation is new and is used only to a minor extent, yield data and management of irrigated soils are not discussed in this survey.

TABLE 2.—*Estimated average yields, per acre, of principal crops grown under a high level of management*

[Only the arable soils are listed in this table. Absence of data indicates that the crop is not suited to the soil specified or is not grown on it]

Soil	Cotton	Grain sorghum	Wheat
	Lb. of lint	*Lb.*	*Bu.*
Abilene clay loam, 0 to 1 percent slopes	325	30	25
Abilene clay loam, 1 to 3 percent slopes	300	25	25
Acme clay loam [1]	125	15	10
Cobb fine sandy loam, 0 to 1 percent slopes	250	30	25
Cobb fine sandy loam, 1 to 3 percent slopes	225	20	20
Cosh fine sandy loam, 1 to 3 percent slopes	120	15	10
Gomez fine sandy loam	120	15	10
Meno loamy fine sand	225	20	20
Miles fine sandy loam, 0 to 1 percent slopes	275	25	20
Miles fine sandy loam, 1 to 3 percent slopes	250	25	20
Miles fine sandy loam, 3 to 5 percent slopes	225	20	20
Miles loamy fine sand, 0 to 3 percent slopes	225	20	20
Miles complex	150	15	10
Nimrod fine sand		20	12
Olton clay loam, 0 to 1 percent slopes	300	30	25
Olton clay loam, 1 to 3 percent slopes	275	25	25
Roscoe clay	225	20	20
Rowena clay loam, 0 to 1 percent slopes	300	30	25
Rowena clay loam, 1 to 3 percent slopes	275	25	25
Spur loam	350	30	25
Stamford clay, 0 to 2 percent slopes			15
Tillman clay loam, 0 to 1 percent slopes	275	25	20
Tillman clay loam, 1 to 3 percent slopes	250	25	20
Tobosa clay, 0 to 1 percent slopes	225	20	20
Tobosa clay, 1 to 3 percent slopes	175	26	18
Valera silty clay, 1 to 3 percent slopes	250	25	20
Weymouth clay loam, 1 to 3 percent slopes	200	20	20
Weymouth clay loam, 3 to 5 percent slopes	175	15	15
Winters fine sandy loam, 0 to 1 percent slopes	275	25	20
Winters fine sandy loam, 1 to 3 percent slopes	250	20	20
Yahola fine sandy loam	275	25	20

[1] In Acme-Cottonwood complex.

Range Management [3]

In Jones County, native grasses cover about 214,000 acres, or 35 percent of the acreage in farmland. Ranching is second only to farming as the leading enterprise in the county. At the time this survey was made, 31 ranches were in the county, and they ranged from 750 to 7,300

[3] By JOE B. NORRIS, JR., range conservationist, Soil Conservation Service.

acres in size. On most of the ranches, supplemental forage, hay, and such other feed as grain sorghum, small grains, and hybrid sorghum are produced.

Most of the ranches are of the cow-calf type. The calves generally are marketed at weaning age or shortly thereafter. During years when excess forage is produced, winter stockers are run on a few ranches or calves are carried over from the base herd.

Jones County consists mainly of hardland that is well suited to short and mid grasses, but the kinds of grasses vary throughout the county. The southeast corner of the county is made up of rolling red hills that extend up the east side and across the northern part of the county. These shallow soils produce sparse mid and short grasses similar to those grown on the hardlands. Paralleling the Clear Fork Brazos River on the north are three distinct areas of sandy soils that are capable of producing an abundance of tall grasses. A variety of less desirable grasses and brush grow on the bottom lands along and adjacent to the Clear Fork Brazos River and California Creek.

Small tracts of grass occur along the smaller drainageways throughout areas of cropland. These tracts generally are too shallow or too steep, or for other reasons, are unsuitable for crops. They are, however, suitable for grazing by livestock, especially in years when the production of forage is low.

The native grassland of Jones County has been heavily grazed for several generations. As a result, the hardlands and the rolling red hills are covered by buffalograss and mesquite trees. The sandyland area is heavily infested by post oak, shin oak, and blackjack oak. About 70 percent of the plant community in the sandyland area is oak brush. Goats are used to help to control oak sprouts. Even though most of the grasses of the county have been heavily grazed, a few sites produce a combination of grasses similar to the original, or climax, plants.

Range Sites and Condition Classes

Range sites are distinctive kinds of rangeland that have a different potential for producing native plants. Within a given climate, the sites differ significantly only in the kind or amount of plants they produce. A significant difference is one that is great enough to require different management to maintain or improve the vegetation.

The kind and the amount of plants a site produces depend on the level of fertility, on the amount of air that enters the soil, and on the amount of water that is taken in and retained in the root zone. A range site therefore can be identified by the kinds of soil known to have the capability for producing the plants that make up the distinctive plant community characteristic of a specific site.

In Jones County heavy grazing has materially altered the plant composition of the range sites, or the range condition. *Range condition* is the present state of the plants of a range site in relation to the potential plant cover for that site. *Range condition classes* measure the degree to which the plant composition, expressed in percentage, resembles that of the potential plant community of a range site. A range is in *excellent condition* if more than 75 percent of the existing plants consists of the original, or climax, plants; in *good condition* if 50 to 75 percent consists of climax plants; in *fair condition* if 25 to 50 percent consists of climax plants; and in *poor condition* if less than 25 percent consists of climax plants. For most range sites and most range livestock operations, the higher the range condition class, the greater the quality and amount of available forage.

Livestock tend to graze the most palatable and nutritious plants first; consequently, these plants are destroyed or damaged first. In determining the condition class of their range sites, farmers and ranchers group plants in accordance with their response to the degree of grazing they receive. These groups of plants are called *decreasers*, *increasers*, and *invaders*.

Decreaser plants are members of the potential community that decrease under continued moderately heavy to heavy grazing. Most of these plants have a high grazing preference. The total of all such species is counted in determining range condition class.

Increasers are plants present in the potential plant community that increase in abundance under continued moderately heavy to heavy grazing. Some increasers of moderately high grazing preference initially increase and then decrease as grazing continues. Others of low grazing preference continue to increase. Only the percentage of increaser plants expected to occur in the potential plant community are counted in determining range condition.

Invader plants are not members of the potential plant community. They invade the community as the condition of the range declines. Invaders consist of annuals, perennials, grasses, weeds, or woody plants. A few have high grazing value, but many are worthless. Invader plants are not counted in determining range condition class.

Descriptions of the Range Sites

Ten range sites are recognized in Jones County. They are described in the pages that follow. Each description provides important soil characteristics, principal plants, suggestions for management, and estimates of total annual yields of herbage. In general, however, yields depend upon the annual rainfall.

The "Guide to Mapping Units" shows the range site classification for each soil in the county.

Loamy Bottomland range site

This site consists of loamy soils on lowlands along the banks of the Clear Fork Brazos River and the county's major creeks, intermittent streams, and small draws. These soils receive runoff from surrounding higher areas. They are occasionally to frequently flooded, but they remain under water for only short periods. In most areas damage to plants results from sedimentation rather than from wetness.

If this site is in good to excellent condition, tall and mid grasses grow in abundance. Elm, hackberry, and cottonwood trees are scattered along the banks of the major streams. Overgrazed areas of the site deteriorate rapidly. Tall grasses die out first. Mid grasses follow and are replaced by perennial weeds, annuals, and heavy stands of brush. Eventually all forage suitable for grazing is destroyed.

The composition of the climax vegetation varies from place to place, depending on the origin of the alluvial deposits. About 70 percent of the plant cover consists of original decreasers, that is, big bluestem, sand bluestem, little bluestem, indiangrass, switchgrass, Canada wildrye,

and side-oats grama. About 30 percent consists of increasers, mainly western wheatgrass, vine-mesquite, silver bluestem, blue grama, and buffalograss.

If the climax plants are depleted, the site is invaded by noxious plants that develop from seeds washed in from higher areas. These invaders, mainly annuals common in cultivated fields, include sunflower, cocklebur, buffalo-bur, hairy caltrop, common broomweed, crotons, thistles, and sandbur. Other invaders are mesquite, sand dropseed, three-awns, windmillgrass, Texas grama, hairy tridens, inland saltgrass, and perennial forbs.

Basal treatment of brush with oil or a combination of oil and chemical herbicide is an effective means of controlling invading brush. On the more open stands, a bulldozer can be used to remove the brush.

In areas where flooding is not a problem, the soils of this site respond favorably to range seeding. The extra water from surrounding higher areas makes seeding less hazardous on this site than on upland sites.

If this site is in excellent condition, the total annual yield of air-dry herbage ranges from 2,000 to 3,600 pounds per acre.

Sandyland range site

This site consists of nearly level to gently sloping soils that have moderate available water capacity. A cover of growing plants is needed to prevent soil blowing.

If this site is well managed, it will produce a good stand of mid and tall grasses. About 75 percent of the climax plants are decreasers such as sand bluestem, switchgrass, indiangrass, little bluestem, Canada wildrye, sand lovegrass, side-oats grama, and Texas bluegrass. About 25 percent are increasers, mainly silver bluestem, sand dropseed, hairy grama, blue grama, and perennial three-awns. A few woody plants, such as sand plum and sand sagebrush, grow on some areas.

Deterioration of this site results in the rapid growth of small soapweed (yucca), shin oak, and annuals. Invading grasses include annual three-awns, fringed signalgrass, tumble windmillgrass, gummy lovegrass, red lovegrass, tumble lovegrass, and low-growing paspalums. The chief invading weeds are western ragweed, wax goldenweed, tumble ringwing, annual wildbuckwheat, rosering gaillardia, prairie sunflower, woollywhite, beebalm, prickle-poppy, curlycup gumweed, Riddell groundsel, and queens-delight.

Shin oak invades on this site, and on many ranches it must be controlled before the grasses can recover. Mechanical methods of controlling shin oak are not feasible, because of soil blowing. The site responds favorably to control by chemical methods. If the response is slow, overseeding by the best known methods hastens recovery. Under proper management the site can regain good to excellent condition within a few years (fig. 10) if a source of desirable seed plants is available.

This site has a high production potential. If it is in excellent condition, the total annual yield of air-dry herbage ranges from 1,700 to 3,200 pounds per acre.

Deep Hardland range site

In this site are nearly level to gently sloping, smooth clays, silty clays, and clay loams that are very slowly permeable to moderately permeable. These soils have high to low available water capacity. They are on uplands. In many places in these soils the moisture intake is reduced because of surface crusting and compaction caused by trampling. A large amount of litter and a cover of plants are needed on these soils to reduce surface crusting and to prevent erosion.

Figure 10.—**Recovered little bluestem on an area of a Miles loamy fine sand.**

The potential plant community on this site consists of mid and short grasses. Blue grama makes up about 70 percent of the climax plants. Other decreasers are western wheatgrass, vine-mesquite, white tridens, and side-oats grama. Increasers make up about 30 percent of the plants. The chief increasers are buffalograss and silver bluestem.

Continuous overgrazing results in an immediate decrease in side-oats grama and blue grama. The site is then invaded by perennial three-awns, hairy tridens, sand dropseed, Texas grama, tumblegrass, pricklypear, and many annuals. If the site is in poor condition during years when rainfall is heavy in spring, invading annuals occupy the bare spots. Common invading annuals include Texas filaree, evax, various plantains, bladderpod, little barley, plains greenthread, bitterweed actinea, common broomweed, and Japanese brome. Common invading perennial forbs include western ragweed, silverleaf nightshade, and Dakota verbena. If the range is in poor condition, recovery is slow because of the lack of desirable seed plants, crusted soils, and heavy infestations of mesquite. If the site is in excellent condition, the total annual yield of air-dry herbage ranges from 1,500 to 2,500 pounds per acre.

Sandy Loam range site

This site consists of nearly level to gently sloping fine sandy loams. These soils are on uplands. They can use rainfall effectively. A cover of plants is needed on these soils to prevent surface crusting and compaction.

This site can support a wide variety of plants. Decreasers make up about 70 percent of the potential plant commu-

nity. They include side-oats grama, little bluestem, Arizona cottontop, and plains bristlegrass. Increasers make up about 25 to 30 percent of the plants. Major increasers are buffalograss, blue grama, sand dropseed, perennial three-awns, hairy grama, and silver bluestem. Woody increasers make up about 5 percent of the potential plant community. They include sand sagebrush, agarita, skunkbush, and mimosa.

Following a decrease in the climax plants, sand dropseed, three-awns, and many annuals invade the area. Overseeding hastens recovery of grasses that respond slowly to other practices. Range seeding, used along with mechanical methods of brush control, increases production and provides a variety of grasses.

If this site is in excellent condition, the total annual yield of air-dry herbage ranges from 1,800 to 3,000 pounds per acre.

Clay Flat range site

This site consists of nearly level and gently sloping clays. The areas of these soils are broad and flat. Small salty spots that resemble scald marks are on some areas of this site. These spots are rarely more than 25 feet in diameter.

This site has a small, scrubby appearance because of sparse stands of mesquite and heavy stands of tobosa grass. Tobosa grass generally makes up about 40 percent of the potential plant community. If the site is overgrazed, however, tobosa grass increases to as much as 90 percent. Other increasers are buffalograss and alkali sacaton, in the saline areas. Decreasers are blue grama, side-oats grama, western wheatgrass, white tridens and vine-mesquite. Plants that invade the site if the range deteriorates include mesquite, pricklypear, cholla cactus, lotebush, annuals, and inland saltgrass, in the saline areas.

This site has a limited production potential. If it is in excellent condition, the total annual yield of air-dry herbage ranges from 800 to 2,400 pounds per acre.

Deep Sand range site

This site consists of deep, nearly level to gently undulating and hummocky sands that are moderately rapidly and rapidly permeable. If these soils are protected by a cover of growing plants to control soil blowing, they have a high moisture intake, and runoff is slight. Many areas of this site, particularly along old fence rows, resemble stabilized dunes.

Dominant plants are tall grasses, but a few mid grasses grow on this site. Decreasers make up about 75 percent of the climax plants. They include sand bluestem, little bluestem, indiangrass, switchgrass, sand lovegrass, and giant dropseed. Increasers make up about 25 percent of the climax plants. Principal increasers are side-oats grama, silver bluestem, hairy grama, Texas wintergrass, and dropseed, and perennial three-awns. Other increasers are woody plants, such as sand plum, shin oak, and skunkbush. Invaders are western ragweed, wax goldenweed, tumble ringwing, annual wild-buckwheat, rosering gaillardia, prairie sunflower, woollywhite, beebalm, pricklepoppy, curlycup gumweed, Riddell groundsel, and queensdelight.

This site deteriorates rapidly under intensive grazing, but it responds favorably to good management.

If Deep Sand range site is in excellent condition, the total annual yield of air-dry herbage ranges from 1,700 to 3,400 pounds per acre.

Sandyland Savannah range site

This site consists of nearly level to gently sloping soils that give the site a flat to rolling appearance. The areas that formerly were used for crops, but that now are planted to native grasses, are hummocky. In places these areas resemble blowouts.

The potential plant community consists of tall grasses and motts of post oak and blackjack oak. Decreasers make up about 75 percent of the climax plants. These plants include sand bluestem, purpletop tridens, switchgrass, little bluestem, and sand lovegrass. Increasers make up the remaining 25 percent of the climax plants. They are side-oats grama, hairy grama, silve bluestem, hooded windmillgrass, sand paspalum, sand dropseed, fall witchgrass, post oak, blackjack oak, sand plum, and skunkbush sumac. Invaders are gummy lovegrass, tumblegrass, tumble lovegrass, tumble windmillgrass, fringed signalgrass, and various annuals.

If the site deteriorates, post oaks and blackjack oaks spread rapidly. Continuous overgrazing reduces the grasses, and shin oaks and brush invade the site. Once the brush has been controlled, the site can be effectively seeded. Intensive management is required, however, for sprout control (fig. 11).

If Sandyland Savannah range site is in excellent condition, the total annual yield of air-dry herbage ranges from 1,700 to 3,450 pounds per acre.

Shallow Redland range site

This site generally is near the Deep Hardland range site. It consists of gently sloping to steep gullied soils that formed in red beds. These soils have low available water capacity, and water and roots move slowly through them. A cover of plants is needed to reduce evaporation and to control water erosion.

The potential plant community consists of mid and short grasses. Decreasers, of which sideoats grama is the dominant species, make up about 65 percent of the climax plants. Other decreasers are blue grama, vine-mesquite, and little bluestem. Sand bluestem and indiangrass grow on areas that have northern and eastern exposures where moisture conditions are favorable. Forbs are groundplum, milkvetch, dalea, prairieclover, scurfpea, heath aster, engelmanndaisy, dotted gayfeather, penstemon, sagewort, and gaura. These forbs are important indicators in determining trends in the condition of the range. Desert shrubs include acacia, mimosa, vine ephedra, agarita, and skunkbush.

Increasers make up about 35 percent of the climax plants. Important species are hairy grama, silver bluestem, buffalograss, perennial three-awn, and tobosa.

Chief woody invaders are mesquite, grassland croton, pricklypear, and lotebush. Common invading perennial grasses are hairy tridens, sand dropseed, Texas grama, red grama, and tumblegrass. Chief invading forbs are broom snakeweed, wavyleaf thistle, plains actinea, gray goldaster, hoary blackfoot, threadleaf groundsel, and Texas stillingia. Other invading forbs are common broomweed, bitterweed actinea, oneseed croton, Texas filaree, evax, plaintain, plains greenthread, and bladderpod.

If this site is in excellent condition, the total annual yield of air-dry herbage ranges from 1,200 to 1,800 pounds per acre.

Figure 11.—**Sand lovegrass on an area of Eufaula fine sand in the Sandyland Savannah range site, following control of invading brush.**

Very Shallow range site

This site consists only of the Tarrant complex. The soils of this complex are gently sloping to sloping and are shallow to fractured limestone. Limestone rock is on the surface of these soils and occurs throughout the profile. Knolls and fairly steep escarpments occur in some places. If this soil is not protected by a cover of growing plants, the sloping areas are highly susceptible to water erosion.

The cover of grass is sparse, but this site generally is in better condition than nearby sites. The more desired grasses seldom are grazed out. Generally enough of the desirable grasses are present in the stands to use an effective management program for improving the plants on the site.

Decreasers make up about 70 percent of the potential plant community. If side-oats grama is dominant, the site resembles a mid-grass site. Other major decreasers are blue grama, Arizona cottontop, and little bluestem. Sand bluestem, indiangrass, vine-mesquite, plains bristlegrass, and other decreasers grow on northern slopes and on areas where moisture is favorable. Increasers make up about 30 percent of the climax plants. They include hairy grama, black grama, buffalograss, silver bluestem, sand dropseed, perennial three-awns, and slim and rough tridens.

Principal invaders are hairy tridens, Texas grama, red grama, tumblegrass, mesquite, pricklypear, lotebush, yucca, and various annuals.

If this site is in excellent condition, the total annual yield of air-dry herbage ranges from 800 to 1,700 pounds per acre. Yields do not fluctuate so much as those on surrounding sites, because the soils of the Very Shallow range site require little moisture.

Gravelly range site

Only Gravelly land is in this site. It consists of gently sloping to strongly sloping areas on convex ridges. The areas are round to irregular and are interspersed with gravel throughout. In some places gravel paves the areas.

The gravel in the areas of this site permits a good relationship between soil, plants, water, and air. Consequently, the site has the potential to produce a wide variety of plants, but plants are sparse. As the site deteriorates and areas become eroded, the production potential of the site is greatly reduced. Many areas are little more than gravel beds.

Decreasers make up 70 percent of the potential plant community. The principal decreasers include side-oats grama, blue grama, little bluestem, and Arizona cottontop. Small amounts of sand bluestem, indiangrass, and switchgrass grow in places where moisture conditions are favorable. Increasers include hairy grama, buffalograss, silver bluestem, Texas wintergrass, and a few shin oaks. Invaders are Texas grama, sand muhly, hairy tridens, fall witchgrass, agrito, mesquite, catclaw, pricklypear, and many annuals.

If the site is in excellent condition, the total annual air-dry herbage ranges from 1,100 to 1,800 pounds per acre.

Wildlife

Many farmers and ranchers in Jones County find that under good management the soils of the county can be used profitably for wildlife. The demand for places to hunt and

to fish is increasing each year. About 35 percent of the acreage in the county is used as range; much of this is sandy or rough and is well suited to wildlife. About 65 percent of the acreage is cultivated, and, if properly managed, most of these areas are also suitable for wildlife.

Originally buffalo, deer, antelope, turkey, prairie chicken, and quail were abundant in the county. Early hunters exterminated the buffalo. After livestock was introduced, overgrazing, fencing, and cultivation greatly reduced the number of deer, antelope, turkeys, and prairie chickens. Still living in the county are many quail, doves, songbirds, small animals, and predators. Also, the lakes, streams, ponds, and grainfields attract many ducks and a few geese in the migration season. In addition, opportunities for fishing are available in the lakes and in the many farm and ranch ponds in the county.

Kinds of Wildlife

In Jones County, the wildlife of greatest interest to farmers and ranchers are quail, doves, ducks, geese, deer, and fish. Careful management is required to maintain a good population of these species. General management requirements for each species are discussed in the paragraphs that follow:

Quail. Quail need a year-round supply of food, cover, and water or their numbers decrease rapidly. Principal food sources are seeds from weeds, grasses, legumes, small grains, and sorghum. Insects are an important source of food in summer. Low-growing shrubs and brush provide shade, escape cover from predators, and dusting and loafing areas. Overgrown fence rows and field borders provide cover, food, and protected trails for the birds as they move from place to place. Several kinds of shrubs are adapted to each soil in the county. In areas where there is a shortage of shrubs for cover, shrubs can be planted in strategic areas. On soil suitable for cultivation, such crops as millet, sesame, and field peas can be grown to provide food for quail. Cultivated crops are especially important if native food is in short supply. All plantings made to develop food for quail should be placed close to good quail cover.

Doves. The mourning dove nests throughout the county. In addition, doves from the north move into and through the county in fall and winter. A good food supply is needed to keep the mourning dove in an area. This bird likes about the same kind of plant seeds as quail. Native grasses, weed seed, small grains, and grain sorghum are the major food plants. The mourning dove also eats the waste grain in harvested fields. Areas suitable for cultivation can be planted to any one of these plants or to a mixture of such plants to provide an abundant food supply to attract the mourning dove during the hunting season and in winter.

Ducks and Geese. Migrating ducks and geese use the water areas of the county for feeding and roosting. They roam into surrounding cultivated fields in search of food. Both ducks and geese feed on waste grain. Geese also like winter weeds and young wheat in cultivated fields. Ducks eat seeds from such plants as barnyardgrass and smartweed that grow around margins of ponds, along streambanks, and in playa lakes.

Deer. Only a few deer live in the county. Deer like to live in wooded areas along streams. They prefer to eat legumes, weeds, vines, certain grasses, and the leaves, twigs, buds, and fruits of various shrubs. They also like to graze on winter grain and on plantings of winter legumes. Good habitat for deer can be developed by planting these crops on soils of the bottom lands and on suitable soils nearby.

Fish. In Jones County habitat for fish is provided in the many farm and ranch ponds and in Lake Fort Phantom Hill, Anson Lake, and Lake Hamlin. Fish adapted to these waters are largemouth bass, channel catfish, and bream.

If properly constructed and managed, farm and ranch ponds are excellent for producing fish. The chief concerns of management are providing a large amount of food for the bream, a source of food for bass and catfish, and controlling the fish population.

Ponds should be at least a quarter of an acre in size. Shallow areas should be eliminated because they encourage the growth of aquatic plants, which harbor many small bream that can cause a pond to become overstocked. Fertilizer applied to ponds stimulates the growth of microscopic plants and animals. These plants and animals shade the bottom of ponds and discourage the growth of aquatic plants. The number of fish produced in fertilized ponds is likely to be more than double the number produced in unfertilized ponds. Fences and other enclosures protect ponds from livestock, and fishing regularly helps to control the fish population.

Descriptions of Wildlife Sites

The soils of Jones County are grouped into five wildlife sites. In each site the soils are similar in relief, in potential productivity, in water supply, in kind and amount of vegetation, and in abundance and kinds of wildlife. They also require similar management to maintain or to improve the site for the desired wildlife habitat.

The wildlife sites in this county are described, by soil associations, in the paragraphs that follow. Each soil association is described in the section "General Soil Map," and its location is shown on the general soil map at the back of this publication. Further information on developing wildlife habitats and managing fish ponds can be obtained from local technicians of the Soil Conservation Service, from the Texas Agricultural Extension Service, and from the Texas Parks and Wildlife Department.

Wildlife site 1

This site is made up mostly of soils of the Nobscot-Miles association. These are deep, nearly level to undulating, sandy soils.

Areas of this site provide ample food, cover, and water for wildlife. The native plants are mainly such mid and tall grasses as side-oats grama, little bluestem, sand bluestem, indiangrass, switchgrass, and giant dropseed. Among the woody plants are sand plum, skunkbush, and shin oak.

The principal kinds of wildlife that live on this site are rabbit, coyote, skunk, bobcat, opposum, badger, and raccoon. Quail, doves, and songbirds are the main kinds of birds.

Wildlife site 2

In this site are soils of the Eufaula-Nimrod association. This association consists of deep, nearly level to gently sloping and hummocky fine sands.

This site provides good food and cover for wildlife. The native plants are mainly side-oats grama, little bluestem, sand bluestem, switchgrass, lovegrass, and silver bluestem. Among the woody plants are post oak, sand plum, and skunkbush.

Rabbit, coyote, skunk, and bobcat inhabit this site. The main kinds of birds are quail, doves, and various songbirds.

Wildlife site 3

This site is made up of soils of the Miles-Winters and Spur associations. In these associations are nearly level to gently sloping loams and fine sandy loams. Most of the acreage is cultivated, but a few areas are used as range.

Under good management this site is fair for wildlife. The native plants are mainly blue grama, side-oats grama, buffalograss, sand dropseed, silver bluestem, and switchgrass. Mesquite, sand sagebrush, skunkbrush, and mimosa are the main woody plants. Food is plentiful on this site in summer, but sufficient cover is not always available.

Rabbit, coyote, and skunk are the main animals living on this site. Doves, ducks, and songbirds are the principal birds.

Wildlife site 4

This site consists mainly of soils of the Rowena-Olton association and of the Tillman-Vernon association. In these associations are shallow to deep, nearly level to sloping clay loams and clays on uplands. Also included in this site are a few narrow areas of soils on bottom lands along the creeks and intermittent drainageways. Most of the acreage is cultivated, but the steep and shallow soils are used as range.

The native plants on this site are mainly buffalograss, blue grama, side-oats grama, tobosa grass, and silver bluestem. Woody plants are mesquite, lotebush, and pricklypear. Sufficient cover for wildlife is not always available on this site. The supply of food is good in some years, but it is limited in dry seasons.

Rabbit, coyote, skunk, and opossum are the main animals living on this site. The principal birds are doves, quail, songbirds, and ducks.

Wildlife site 5

This site is made up of the soils of the Tarrant-Valera association. This association consists mostly of well-drained, nearly level to sloping clays and silty clays that are shallow to moderately deep over limestone. Also included are a few areas of soils on bottom lands along the banks of rivers and creeks. The cover of grass is sparse on this site, except along the bottom lands and on a few stony areas. Most of the acreage is used as range.

The principal grasses on this site are side-oats grama, black grama, blue grama, little bluestem, and buffalograss. Woody plants are mainly pricklypear, mesquite, and lotebush. In most places, the rough terrain and woody plants provide excellent cover for wildlife, but the food supply is short in some years.

On this site the principal kinds of wildlife are deer, coyote, bobcat, rabbit, opossum, skunk, and racoon. Among the birds are quail, doves, ducks, geese, and songbirds.

416-630—72——3

Engineering Uses of the Soils[4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, and pipelines; the foundations of buildings; facilities for storing water; structures for controlling erosion; drainage systems; and systems for disposing of sewage. Among the properties most important to the engineer are permeability, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and reaction. Also important are depth to bedrock or to sand and gravel, flooding hazard, and relief. Such information is made available in this section. Engineers can use it to—

1. Make studies that will aid in selecting and developing sites for industries, businesses, residences, and recreational areas.
2. Make estimates of the engineering properties of soils for use in the planning of agricultural drainage systems, waterways, farm ponds, irrigation systems, terraces and diversions, and other structures for conserving soil and water.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, cables, and sewage disposal fields and in planning more detailed surveys of the soils at the selected locations.
4. Locate probable sources of sand, gravel, and other materials for use in construction.
5. Correlate performance of engineering structures with the soil mapping units and thus develop information for overall planning that will be useful in designing and maintaining the structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and of construction equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

The engineering interpretations in this section can be used for many purposes. It should be emphasized, however, that the interpretations made in this soil survey are not a substitute for the sampling and testing needed at a site chosen for a specific engineering work that involves heavy loads or at a site where excavations are to be deeper than the depths of the layers here reported. Also, engineers should not apply specific values to the estimates for bearing capacity given in this survey. Nevertheless, by using this survey, an engineer can select and concentrate on those soil units most important for his proposed kind of construction, and in this manner reduce the number of soil samples taken for laboratory testing and complete an adequate soil investigation at minimum cost.

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—such as gravel, sand, silt, and clay—may have special meaning in soil science. These and other special terms used in the soil survey are defined in the Glossary at the back of this

[4] By Robert L. Gray, area engineer, Soil Conservation Service.

survey. Most of the information about engineering is given in tables 3 and 4.

Engineering Classification Systems

Soil scientists of the United States Department of Agriculture (USDA) classify soils according to texture (*6*). In some ways this system of naming textural classes is comparable to the systems most commonly used by engineers for classifying soils. These are the systems of the American Association of State Highway Officials (AASHO) (*1*) and the Unified system developed by the Corps of Engineers, U.S. Department of Defense (*8*).

Most highway engineers classify soil material in accordance with the AASHO system. In this system soil materials are classified in seven principal groups. The groups range from A–1 (gravelly soils having high bearing capacity, the best soils for subgrade), to A–7 (clayey

TABLE 3.—*Estimated engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear

Soil series and map symbols	Hydrologic soil group	Depth to bedrock	Depth from surface of typical profile	Classification: USDA texture
		In.	*In.*	
Abilene: AbA, AbB	C	>60	0–7	Clay loam
			7–36	Clay
			36–64	Clay loam
*Acme: Ac	C	10–20	0–18	Clay loam
			18–30	Gypsum.
(For properties of Cottonwood soils in this mapping unit, refer to the Cottonwood series in this table.)				
*Badland: Bv.[2]				
(For properties of Vernon soils in this mapping unit, refer to the Vernon series in this table.)				
Cobb: CbA, CbB	B	20–46	0–8	Fine sandy loam
			8–34	Sandy clay loam
			34	Weakly cemented sandstone.
Cosh: CoB	C	12–20	0–8	Fine sandy loam
			8–15	Sandy clay loam
			15–18	Sandstone.
*Cottonwood	C	4–10	0–6	Clay loam
			6	Weakly consolidated clay loam.
(Mapped only in a complex with Acme soils.)				
*Eufaula: Eu, EsB2	A	>60	0–100	Fine sand
(For properties of Selden soils in unit EsB2, refer to the Selden series in this table.)				
Gomez: Gf	B	>60	0–28	Fine sandy loam
			28–64	Clay loam
Gravelly land: Gn.[2]				
Gravel pit: Gp.[2]				
Meno: Me	C	>60	0–21	Loamy fine sand
			21–29	Sandy clay loam
			29–37	Clay loam
			37–66	Loam
Miles: MnA, MnB, MnC, MmB, Mp	B	>60	0–11	Fine sandy loam
			11–18	Sandy clay loam
			18–68	Sandy clay loam
			68–78	Clay loam
*Nimrod: Ne, Nf3	C	>60	0–24	Fine sand
			24–62	Sandy clay loam
(For properties of Eufaula soils in these units, refer to the Eufaula series in this table.)			62–72	Sandy clay
Nobscot: No, Ns[3]	A	>60	0–36	Fine sand
			36–52	Fine sandy loam
			52–70	Loamy fine sand

See footnotes at end of table.

soils having low strength when wet, the poorest soils for subgrade). If the soil material is near a classification boundary, it is given a symbol showing both classes, for example, A–2 or A–4.

In the Unified classification, the soils are grouped on the basis of their texture and plasticity and their performance as material for engineering structures. Soil materials are identified as gravel (G), sand (S), silt (M), clay (C), organic (O), and highly organic (Pt). Clean sands are identified by the symbols SW and SP; sands mixed with fines of silt and clay are identified by the symbols SM and SC; silts and clays that have low liquid limit are identified by the symbols ML and CL; and silts and clays that have high liquid limit are identified by the symbols MH and CH.

Table 3 shows the estimated classification of the soils in the county according to all three systems of classification.

properties of the soils [1]

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for in the first column of this table]

Classification—Continued		Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4	No. 10	No. 40	No. 200				
						In./hr.	*In./in. of soil*	*pH value*	
CL	A–6	100	100	95–99	75–95	0. 20–0. 63	0. 15–0. 19	6. 6–7. 8	Moderate.
CL	A–7	100	100	95–99	90–95	0. 20–0. 63	0. 14–0. 18	7. 4–7. 8	Moderate.
CL	A–6 or A–7	100	90–100	90–98	70–92	0. 20–0. 63	0. 12–0. 16	7. 9–8. 4	Moderate.
CL	A–6	95–100	90–100	80–95	60–75	0. 63–2. 0	0. 14–0. 18	7. 4–8. 4	Low.
SM	A–4	100	95–100	75–85	40–50	2. 0–6. 3	0. 10–0. 13	6. 6–7. 3	Low.
SC or CL	A–6	100	95–99	90–98	40–55	0. 63–2. 0	0. 12–0. 15	6. 6–7. 8	Low.
SM	A–4	95–100	90–100	70–85	40–50	2. 0–6. 3	0. 10–0. 13	7. 4–7. 8	Low.
SC or CL	A–6	90–98	90–98	90–98	40–55	0. 63–2. 0	0. 12–0. 15	7. 4–7. 8	Low.
CL	A–6	100	100	90–100	65–75	0. 63–2. 0	0. 11–0. 14	7. 9–8. 4	Low.
SM	A–2–4	100	100	70–80	12–20	6. 30–20. 0	0. 05–0. 07	5. 6–7. 3	Very low.
SM	A–4	100	100	70–85	40–50	2. 0–6. 3	0. 10–0. 12	7. 9–8. 4	Low.
CL	A–6	100	100	90–100	70–80	2. 0–6. 3	0. 14–0. 16	7. 9–8. 4	Low.
SM	A–2–4	100	100	50–70	20–30	2. 0–6. 30	0. 09–0. 11	6. 1–6. 5	Very low.
SC or CL	A–6	100	100	80–90	35–55	0. 63–2. 0	0. 13–0. 16	6. 1–6. 5	Low.
CL	A–6	100	100	90–100	70–80	0. 63–2. 0	0. 12–0. 15	7. 9–8. 4	Low.
CL	A–4	100	100	85–95	60–75	0. 63–2. 0	0. 12–0. 14	7. 9–8. 4	Low.
SM	A–2 or A–4	100	100	75–85	30–50	2. 0–6. 3	0. 11–0. 15	6. 6–7. 3	Low.
SC or CL	A–6	100	100	90–95	35–55	0. 63–2. 0	0. 13–0. 16	6. 6–7. 3	Low.
SC or CL	A–6	100	100	85–90	35–55	0. 63–2. 0	0. 12–0. 16	6. 6–7. 8	Low.
CL	A–6	100	100	90–100	70–80	0. 63–2. 0	0. 12–0. 16	7. 9–8. 4	Low.
SM	A–2–4	100	100	90–100	12–20	6. 30–20. 0	0. 05–0. 07	6. 6–7. 3	Very low.
SC	A–6	100	100	90–100	35–50	0. 20–0. 63	0. 14–0. 16	5. 1–6. 0	Low.
CL or SC	A–6	100	100	90–100	45–60	0. 20–0. 63	0. 14–0. 16	5. 1–6. 0	Low.
SM	A–2–4	100	100	65–80	12–20	6. 30–20. 0	0. 05–0. 07	6. 1–7. 3	Very low.
SM	A–2–4	100	100	70–85	20–35	2. 0–6. 30	0. 07–0. 11	6. 1–7. 3	Low.
SM	A–2–4	100	100	50–70	15–30	2. 0–6. 30	0. 05–0. 08	6. 1–7. 3	Very low.

TABLE 3.—*Estimated engineering*

Soil series and map symbols	Hydrologic soil group	Depth to bedrock	Depth from surface of typical profile	Classification
				USDA texture
		In.	*In.*	
Oil-waste land: Os.[2]				
Olton: OtA, OtB	C	>60	0–12	Clay loam
			12–38	Sandy clay
			38–52	Clay loam
			52–64	Sandy clay loam
*Owens: Ov	D	10–20	0–14	Clay
			14–22	Shaly clay.
(For properties of Vernon soils in this unit, refer to the Vernon series in this table.)				
Quarry: Qu [2]				
Randall: Rd	D	>60	0–48	Clay
			48–60	Clay loam
Roscoe: Ro	D	>60	0–62	Clay
Rowena: RwA, RwB	D	>60	0–10	Clay loam
			10–36	Clay
			36–64	Clay
			64–70	Clay
*Selden	C	>60	0–10	Fine sand
			10–64	Sandy clay loam
(Mapped only in an undifferentiated unit with Eufaula soils.)			64–70	Clay
Spur: Sp, Sr	B	>60	0–18	Loam
			18–60	Clay loam
Stamford: StA	D	30–50	0–58	Clay
			58	Clayey shale.
Tarrant: Ta	C	10–20	0–14	Clay
			14	Fractured limestone.
Tillman: TcA, TcB	C	>60	0–6	Clay loam
			6–46	Clay
			46–52	Clay
			52–60	Weathered shale.
Tobosa: ToA, ToB	D	41–72	0–48	Clay
			48	Hard limestone.
Valera: VaB	C	24–40	0–5	Silty clay
			5–26	Clay
			26–30	Indurated caliche.
			30	Indurated limestone.
Vernon: VeC	D	12–20	0–14	Clay
			14–24	Weathered clayey red beds.
Weymouth: WeB, WeC	B	>60	0–40	Clay loam
			40–62	Clay loam
				Weathered red beds.
Winters: WnA, WnB	C	>60	0–7	Fine sandy loam
			7–46	Sandy clay
			46–60	Sandy clay loam
Yahola: Ya	B	>60	0–60	Fine sandy loam

[1] Refer to the section "Descriptions of the Soils" for information about kind of underlying rock and other pertinent details about the soils.

properties of the soils [1]—Continued

Classification—Continued		Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 4	No. 10	No. 40	No. 200				
						In./hr.	*In./in. of soil*	*pH value*	
CL	A–6	100	100	85–100	70–80	0. 20–0. 63	0. 17–0. 20	7. 4–7. 8	Low.
CL	A–6 or A–7–6	100	100	85–100	80–90	0. 20–0. 63	0. 17–0. 19	6. 6–8. 4	Moderate.
CL	A–6	100	100	85–100	80–90	0. 20–0. 63	0. 17–0. 20	7. 9–8. 4	Moderate.
CL or SC	A–6	100	100	80–90	45–55	0. 63–2. 0	0. 10–0. 15	7. 9–8. 4	Low.
CH	A–7–6	100	100	90–100	80–95	<0. 06	0. 14–0. 18	7. 9–8. 4	Very high.
CH	A–7–6	100	100	96–100	75–95	<0. 06	0. 15–0. 18	6. 6–8. 4	Very high.
CH	A–7–6	100	100	96–100	70–80	0. 06–0. 20	0. 14–0. 16	7. 9–8. 4	Very high.
CH	A–7–6	100	100	90–100	75–95	<0. 06	0. 16–0. 18	7. 9–8. 4	Very high.
CH or CL	A–7–6	100	100	85–100	70–80	0. 20–0. 63	0. 17–0. 20	7. 9–8. 4	High.
CH or CL	A–7–6	100	100	90–100	75–95	0. 20–0. 63	0. 17–0. 20	7. 9–8. 4	High.
CH or CL	A–7–6	100	100	90–100	70–80	0. 20–0. 63	0. 17–0. 20	7. 9–8. 4	High.
CH or CL	A–7–6	100	100	90–100	75–95	0. 20–0. 63	0. 17–0. 20	7. 9–8. 4	High.
SM	A–2–4	100	100	90–100	12–25	2. 0–6. 3	0. 05–0. 07	6. 1–7. 3	Very low.
SC	A–6	100	100	90–100	35–50	0. 20–0. 63	0. 14–0. 16	5. 6–6. 5	Low.
CH	A–7	100	100	90–100	75–95	<0. 06	0. 17–0. 20	5. 6–6. 0	High.
CL or ML–CL	A–4 or A–6	100	100	85–95	70–80	0. 63–2. 0	0. 14–0. 18	7. 9–8. 4	Low.
CL	A–6	100	100	90–100	70–80	0. 63–2. 0	0. 15–0. 18	7. 9–8. 4	Low.
CH	A–7–6	100	100	90–100	75–95	<0. 06	0. 15–0. 19	7. 9–8. 4	Very high.
CH	A–7–6	85–100	85–100	70–95	70–95	0. 20–0. 63	0. 15–0. 19	7. 9–8. 4	High.
CL	A–6 or A–7–6	100	100	85–100	70–80	0. 20–0. 63	0. 15–0. 18	7. 4–7. 8	Moderate.
CH	A–7–6	100	100	90–100	75–95	<0. 06	0. 15–0. 18	7. 4–8. 4	High.
CL	A–6 or A–7–6	100	100	85–100	70–80	0. 20–0. 63	0. 15–0. 18	7. 9–8. 4	Moderate.
CH	A–7–6	100	100	90–100	75–95	<0. 06	0. 17–0. 19	7. 9–7. 8	Very high.
CH	A–7–6	100	100	85–95	80–90	0. 20–0. 63	0. 17–0. 19	7. 9–8. 4	High.
CH	A–7–6	100	100	85–95	80–90	0. 20–0. 63	0. 17–0. 19	7. 9–8. 4	
CH	A–7–6	100	100	90–100	75–95	0. 06–0. 20	0. 15–0. 18	7. 9–8. 4	High.
CL	A–6	100	100	85–100	75–85	0. 63–2. 0	0. 14–0. 16	7. 9–8. 4	Low.
CL or CH	A–7–6	100	100	90–100	75–95	0. 63–2. 0	0. 15–0. 18	7. 9–8. 4	Low.
SM–SC	A–4	100	100	70–85	40–50	0. 63–2. 0	0. 12–0. 14	6. 6–7. 3	Low.
CL or SC	A–7–6 or A–6	100	100	85–95	45–60	0. 20–0. 63	0. 15–0. 18	6. 6–8. 4	Moderate.
CL	A–6	100	100	80–90	50–65	0. 20–0. 63	0. 15–0. 18	7. 9–8. 4	Moderate.
ML or SM	A–4	100	100	80–90	40–55	2. 0–6. 3	0. 11–0. 13	7. 9–8. 4	Low.

[2] Not estimated; characteristics too variable to rate.
[3] Blown-out land part of unit Ns is too variable to rate.

TABLE 4.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil	Road subgrade	Highway location	Foundations for low buildings	Septic tank filter fields
Abilene: AbA, AbB	Fair: clay loam 6 to 20 inches thick.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair bearing capacity; moderate shrink-swell potential.	Severe: moderately slow permeability.
*Acme: Ac (For interpretations of Cottonwood soils in this unit, refer to the Cottonwood series in this table).	Fair: clay loam 6 to 20 inches thick.	Poor: 10 to 20 inches to soft gypsite.	Severe: soft gypsite at a depth of 10 to 20 inches.	Severe: soft gypsite at a depth of 10 to 20 inches.	Severe: soft gypsite at a depth of 10 to 20 inches.
*Badland: Bv (For interpretations of Vernon soils in this unit, refer to the Vernon series in this table.)	Poor: clay texture.	Poor: poor traffic-supporting capacity; high shrink-swell potential.	Severe: poor traffic-supporting capacity; high shrink-swell potential; slopes.	Severe: poor bearing capacity; high shrink-swell potential; slopes.	Severe: very slow permeability; slopes.
*Blown-out land (Mapped only with Nobscot soils.)	Fair: sandy clay loam texture.	Good	Slight	Slight	Slight
Cobb: CbA, CbB	Fair: 6 to 20 inches of material.	Fair: fair traffic-supporting capacity; 20 to 46 inches of material.	Moderate: fair traffic-supporting capacity; bedrock at a depth of 36 to 46 inches. Severe: bedrock at a depth of 20 to 36 inches.	Moderate: fair bearing capacity; bedrock at a depth of 36 to 46 inches. Severe: bedrock at a depth of 20 to 36 inches.	Severe: bedrock at a depth of 20 to 46 inches.
Cosh: CoB	Fair: 6 to 20 inches of material.	Poor: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.
*Cottonwood (Mapped only in a complex with the Acme soils.)	Poor: gypsite at a depth of 4 to 10 inches.	Poor: gypsite at a depth of 4 to 10 inches.	Severe: soft gypsite at a depth of 4 to 10 inches.	Severe: soft gypsite at a depth of 4 to 10 inches.	Severe: soft gypsite at a depth of 4 to 10 inches.
*Eufaula: Eu, EsB2 (For interpretations of Selden soils in unit EsB2, refer to the Selden series in this table.)	Poor: fine sand texture.	Good	Slight	Slight	Severe: inadequate filtration.
Gomez: Gf	Poor: about 20 percent calcium carbonate.	Good	Slight	Slight	Slight

See footnotes at end of table.

interpretations of the soils

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Degree of limitations and soil features affecting—Continued			Soil features affecting—			Corrosivity	
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Co crete
	Reservoir areas	Embankments					
Slight	Moderate: moderately slow permeability.	Moderate: medium compressibility.	Slow intake rate.	All features favorable.	All features favorable.	High: clay loam texture.	Low.
Severe: permeable gypsite at a depth of 10 to 20 inches.	Severe: permeable gypsite at a depth of 10 to 20 inches.	Severe: 10 to 20 inches of material.	Gypsite at a depth of 10 to 20 inches.	Gypsite at a depth of 10 to 20 inches.	Gypsite at a depth of 10 to 20 inches.	High: conductivity.	Low.
Severe: slopes	Slight	Moderate: fair stability; high compressibility.	Highly erodible; slopes; very slow intake rate.	Highly erodible.	Highly erodible.	High: texture.	Low.
Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: poor resistance to piping and erosion.	Rapid intake rate; undulating relief.	Severe hazard of soil blowing; undulating relief.	Severe hazard of soil blowing; undulating relief.	Low	Low.
Severe: bedrock at a depth of 20 to 46 inches.	Moderate: bedrock at a depth of 36 to 46 inches. Severe: bedrock at a depth of 20 to 36 inches.	Moderate: bedrock at a depth of 20 to 46 inches.	Bedrock at a depth of 20 to 46 inches.	Bedrock at a depth of 20 to 46 inches.	Bedrock at a depth of 20 to 46 inches.	Moderate: texture.	Low.
Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Moderate: texture.	Low.
Severe: permeable gypsite at a depth of 4 to 10 inches.	Severe: permeable gypsite at a depth of 4 to 10 inches.	Severe: gypsite at a depth of 4 to 10 inches.	Gypsite at a depth of 4 to 10 inches.	Gypsite at a depth of 4 to 10 inches.	Gypsite at a depth of 4 to 10 inches.	High: conductivity.	Low.
Severe: rapid permeability.	Severe: rapid permeability.	Severe: poor stability; resistance to piping; subject to erosion.	Very rapid intake rate.	Poor stability; erodible.	Poor stability; erodible.	Low	Low.
Severe: moderately rapid permeability.	Severe: moderately rapid permeability; calcareous.	Moderate: fair resistance to piping and erosion.	Rapid intake rate.	Poor stability; erodible.	Poor stability; erodible.	Moderate: texture.	Low.

TABLE 4.—*Engineering*

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil	Road subgrade	Highway location	Foundations for low buildings	Septic tank filter fields
Gravelly land: Gn	Poor: more than 50 percent gravel.	Good	Slight: 3 to 6 percent slopes. Moderate: 6 to 12 percent slopes.	Slight: 3 to 6 percent slopes. Moderate: 6 to 12 percent slopes.	Severe: inadequate infiltration.
Gravel pit: Gp.[1]					
Meno: Me	Poor: loamy fine sand texture.	Good	Slight	Slight	Slight
Miles: MnA, MnB, MnC, Mp	Fair: 6 to 20 inches of material.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: fair bearing capacity.	Slight
MmB	Poor: loamy fine sand texture.	Good	Slight	Slight	Slight
*Nimrod: Ne, Nf3 (For interpretations of Eufaula soils in these units refer to the Eufaula series in this table.)	Poor: fine sand texture.	Fair: 20 to 40 inches of material.	Moderate: fair traffic-supporting capacity; wetness.	Moderate: fair bearing capacity; wetness.	Severe: moderately slow permeability.
*Nobscot: No, Ns (For interpretations of Blown-out land in unit, Ns, refer to Blown-out land in this table.)	Poor: fine sand texture.	Good	Slight	Slight	Slight
Oil-waste land: Os	Poor: salinity	(2)	(2)	(2)	(2)
Olton: OtA, OtB	Fair: 6 to 20 inches of material.	Fair: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential; fair bearing capacity.	Severe: moderately slow permeability.
*Owens: Ov (For interpretations of Vernon soils in this unit, refer to the Vernon series in this table.)	Poor: clay texture.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity; 15 to 20 percent slopes.	Severe: high shrink-swell potential; poor bearing capacity; 15 to 20 percent slopes.	Severe: very slow permeability; 10 to 20 percent slopes.
Quarry: Qu.[1]					

See footnotes at end of table.

interpretations of the soils—Continued

Degree of limitations and soil features affecting—Continued			Soil features affecting—			Corrosivity	
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
	Reservoir areas	Embankments					
Severe: rapid permeability; 7 to 12 percent slopes.	Severe: rapid permeability.	Severe: rapid permeability.	Gravelly: slopes.	Hilly relief	Gravelly; hilly relief.	Low	Low.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	Rapid initial intake rate.	Poor stability; erodible.	Poor stability; erodible.	Moderate: loamy fine sand texture.	Low.
Moderate: moderate permeability; 2 to 5 percent slopes.	Moderate: moderate permeability.	Moderate: medium compressibility; fair stability.	Slopes of 2 to 5 percent.	All features favorable.	All features favorable.	Moderate: loamy fine sand texture.	Low.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair stability.	Rapid intake rate.	Moderate hazard of soil blowing.	Moderate hazard of soil blowing.	Moderate: loamy fine sand texture.	Low.
Moderate: sandy texture.	Moderate: moderately slow permeability.	Moderate: poor resistance to piping and erosion.	Rapid intake rate.	Poor stability; erodible.	Poor stability; erodible.	Moderate: wetness.	Moderate: pH 5.1 to 6.0.
Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: poor resistance to piping and erosion.	Rapid intake rate.	Severe hazard of soil blowing; undulating relief.	Severe hazard of soil blowing.	Low	Low.
(2)	(2)	(2)	Severe salinity	(2)	(2)	High: salinity.	High: salinity.
Slight	Moderate: moderately slow permeability.	Moderate: medium compressibility.	Slow intake rate.	All features favorable.	All features favorable.	High: clay texture.	Low.
Moderate: 3 to 7 percent slopes. Severe: 7 to 20 percent slopes.	Slight	Severe: more than 3 percent stones on surface.	Shallow to shale; very slow intake rate; slope.	Shallow to shale.	Shallow to shale; difficult to grow needed plants.	High: clay texture.	Low.

TABLE 4.—*Engineering*

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil	Road subgrade	Highway location	Foundations for low buildings	Septic tank filter fields
Randall: Rd	Poor: clay texture; wetness.	Poor: very high shrink-swell potential; poor traffic-supporting capacity; wetness.	Severe: very high shrink-swell potential; poor traffic-supporting capacity; wetness; flood hazard.	Severe: very high shrink-swell potential; poor bearing capacity; wetness; flood hazard.	Severe: very slow permeability; flood hazard.
Roscoe: Ro	Poor: clay texture.	Poor: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor bearing capacity.	Severe: very slow permeability.
Rowena: RwA, RwB	Fair: clay loam texture; 6 to 20 inches of material.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor bearing capacity.	Severe: high shrink-swell potential; poor bearing capacity.	Severe: moderately slow permeability.
*Selden (Mapped only in an undifferentiated unit with Eufaula soils.)	Poor: fine sand texture.	Fair: fair traffic-supporting capacity; wetness.	Moderate: fair traffic-supporting capacity; wetness.	Moderate: wetness.	Severe: moderately slow permeability.
Spur: Sp, Sr	Fair: clay loam texture.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; flood hazard.	Severe: flood hazard.	Severe: flood hazard.
Stamford: StA	Poor: clay texture.	Poor: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor bearing capacity.	Severe: very slow permeability.
Tarrant: Ta	Poor: clay texture.	Poor: bedrock at a depth of 10 to 20 inches; more than 15 percent stones.	Severe: bedrock at a depth of 10 to 20 inches; more than 15 percent stones.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.
Tillman: TcA, TcB	Poor: 4 to 10 inches of material.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor bearing capacity.	Severe: very slow permeability.
Tobosa: ToA, ToB	Poor: clay texture.	Poor: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor traffic-supporting capacity.	Severe: very high shrink-swell potential; poor bearing capacity.	Severe: very slow permeability.

See footnotes at end of table.

interpretations of the soils—Continued

Degree of limitations and soil features affecting—Continued			Soil features affecting—			Corrosivity	
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
	Reservoir areas	Embankments					
Slight	Slight	Moderate: high compressibility; fair stability.	Very slow intake rate; ponded.	(3)	(3)	Very high: clay texture; wetness.	Low.
Slight	Slight	Moderate: high compressibility; fair stability.	Very slow intake rate.	(3)	(3)	High: clay texture; wetness.	Low.
Slight	Slight	Moderate: high compressibility.	Slow intake rate.	All features favorable.	All features favorable.	High: clay texture.	Low.
Slight	Moderate: moderately slow permeability.	Slight	Rapid initial intake rate.	Poor stability; erodible.	Poor stability; erodible.	Moderate: texture; drainage.	Moderate: pH 5.6 to 6.5.
Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: medium compressibility.	Flood hazard	Flood hazard	Flood hazard	Moderate: clay loam texture.	Low.
Slight	Slight	Moderate: high compressibility; fair stability.	Very slow intake rate.	All features favorable.	Erodible	High: clay texture.	Low.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: permeable fractured bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; more than 3 percent stones.	Stony; bedrock at a depth of 10 to 20 inches.	Stony; bedrock at a depth of 10 to 20 inches.	Stony; bedrock at a depth of 10 to 20 inches.	High: clay texture.	Low.
Slight	Slight	Moderate: medium compressibility.	Slow intake rate.	All features favorable.	All features favorable.	High: clay texture.	Low.
Slight	Slight	Moderate: high compressibility; fair stability.	Very slow intake rate.	All features favorable.	Erodible	High: clay texture.	Low.

TABLE 4.—*Engineering*

Soil series and map symbols	Suitability as source of—		Degree of limitations and soil features affecting—		
	Topsoil	Road subgrade	Highway location	Foundations for low buildings	Septic tank filter fields
Valera: VaB	Poor: clay texture.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity; bedrock at a depth of 24 to 40 inches.	Severe: high shrink-swell potential; poor bearing capacity; bedrock at a depth of 24 to 40 inches.	Severe: moderately slow permeability; bedrock at a depth of 24 to 40 inches.
Vernon: VeC	Poor: clay texture.	Poor: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential; poor bearing capacity.	Severe: slow permeability.
Weymouth: WeB, WeC	Fair: clay loam texture.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: fair bearing capacity.	Slight.
Winters: WnA, WnB	Fair: 6 to 20 inches of material.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair bearing capacity; moderate shrink-swell potential.	Severe: moderately slow permeability.
Yahola: Ya	Good.	Good.	Moderate: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.

[1] Too variable to be estimated.
[2] Too variable to rate for purpose listed.

interpretations of the soils—Continued

Degree of limitations and soil features affecting—Continued			Soil features affecting—			Corrosivity	
Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
	Reservoir areas	Embankments					
Severe: bedrock at a depth of 24 to 40 inches.	Severe: bedrock at a depth of 24 to 40 inches.	Moderate: bedrock at a depth of 24 to 40 inches; high compressibility.	Slow intake rate.	Bedrock at a depth of 24 to 40 inches.	Bedrock at a depth of 24 to 40 inches.	High: clay texture.	Low.
Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes more than 7 percent.	Slight	Moderate: high compressibility; poor stability.	Less than 20 inches to shale; slow intake rate.	Less than 20 inches to shale.	Less than 20 inches to shale.	High: clay texture.	Low.
Moderate: moderate permeability; slopes of 2 to 5 percent.	Moderate: moderate permeability.	Moderate: medium compressibility.	Slopes	All features favorable.	All features favorable.	Moderate: clay loam texture.	Low.
Slight	Slight	Moderate: medium compressibility.	Slow intake rate.	All features favorable.	All features favorable.	High: fine sandy loam texture.	Low.
Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: fair stability; poor resistance to piping and erosion.	Moderately rapid permeability.	All features favorable.	All features favorable.	Low	Low.

[3] Not applicable or not needed.

Engineering Properties of the Soils

In table 3 the soil series of the county and the symbols for mapping units are listed, and estimates of the properties significant to engineering are given. These estimates are based on the results of field tests and on experience with similar soils in this and in other counties. Information about drainage has not been included in the table, because drainage is not a major problem in soils of the county.

The soils are placed in hydrologic groups in table 3. The groupings are based on estimates of the intake of water during the latter part of a storm of long duration. The estimates are of the intake of water in a soil without protective vegetation after the soil profile is wet and has swelled. The groups range from tight clays (highest runoff potential—group D) to open sands (lowest runoff potential—group A).

Soils in group A have a high infiltration rate, even when thoroughly wet. They have a high rate of water transmission and low runoff potential. The soils of this group are deep and well drained or excessively drained, and they consist chiefly of sand, gravel, or both.

Soils in group B have a moderate infiltration rate when thoroughly wet. Their rate of water transmission and their runoff potential are moderate. These soils are moderately deep or deep, moderately well drained or well drained, and fine textured to moderately coarse textured.

Soils in group C have a slow infiltration rate when thoroughly wet. Their rate of water transmission is slow, and their potential runoff is high. These soils are moderately fine textured to fine textured. Most of them have a layer that impedes the downward movement of water.

Soils in group D have a very slow infiltration rate when thoroughly wet. Their rate of water transmission is very slow, and runoff potential is very high. The soils in this group are chiefly clays that have a high shrink-swell potential. Most of them have a permanent high water table and a claypan or clay layer at or near the surface. Many of the soils are shallow over nearly impervious material.

Depth to bedrock in table 3 is the depth at which consolidated material occurs.

The columns headed "Percentage passing sieve—" show the percentage of soil material that is smaller in diameter than the openings in the given sieve.

Estimates of permeability in table 3 indicate the rate at which water moves downward through undisturbed soil material. The estimates are based on structure and porosity of the soil material as it occurs in place. Not included in the estimates are such factors as lateral seepage, or qualities that result from use of the soils, such as surface crusting or a plowpan.

Available water capacity, expressed as inches of water per inch of soil, refers to the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point.

Reaction, as shown in the table, is the estimated range in pH values for each major horizon as determined in the field. It indicates the acidity or alkalinity of the soils. A pH of 7, for example, indicates a neutral soil, a lower pH value indicates acidity, and a higher value indicates alkalinity.

Shrink-swell potential, in table 3, refers to the change in volume of the soil that results from a change in moisture content. It is estimated on the basis of the amount and type of clay in the soil layers. In general, soils classified as A–7 and CH have high shrink-swell potential. Clean sands and gravels and those having a small amount of nonplastic to slightly plastic fines have low shrink-swell potential, as does most other nonplastic to slightly plastic soil material. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to maintenance of structures constructed in, on, or with such materials.

Engineering Interpretations of the Soils

Table 4 rates the soils according to their suitability as a source of topsoil and road subgrade material. It also gives facts that would affect use of the soils as sites for highways, buildings, and sewage disposal systems and for agricultural engineering. The information is based on estimated engineering properties of the soils given in table 3 and on experience with the performance of these soils in the field. It applies only to the soil depths indicated in table 3, though the information is reasonably reliable to a depth of 6 feet for most of the soils.

Ratings of the suitability of the soils as a source of sand and gravel are not given in the table. Most of the soils are not suited to this use. The Eufaula and Nobscot soils, however, are sources of sand, and Gravelly land is a source of gravel.

Topsoil is fertile soil material ordinarily rich in organic matter, used as a topdressing for lawns, gardens, roadbanks, and the like. Some soil features that affect the ratings for this use are texture, thickness, and the content of organic matter and carbonates.

The ratings for road subgrade in table 4 indicate the performance of soil material moved from borrow areas for building embankments. Some soil features that affect the rating are traffic-supporting capacity, shrink-swell potential, and thickness.

In table 4 the soils are rated according to their suitability as sites for highways. Suitability of the soils for the location of highways is influenced by features of the undisturbed soils that affect the construction and maintenance of highways. Some features that affect the ratings are traffic-supporting capacity, shrink-swell potential, slope, and depth to bedrock.

The ratings in table 4 for foundations for low buildings are for structures not more than three stories high. Some soil properties important in rating the soils are bearing capacity, shrink-swell potential, flooding hazard, depth to bedrock, and slope.

Among the features that affect the suitability of a specific site for septic tank filter fields are permeability, depth to the water table, hazard of flooding, depth to bedrock, and slope. In table 4 the soils are rated as to their suitability for filter fields, and the principal reasons for moderate or severe limitations are given.

Suitability of the soils as sites for sewage lagoons is affected by such soil features as permeability, location of water table, depth to bedrock, and slope. The degree of

limitation for the soils is given in table 4, and the principal reasons for moderate or severe limitations are shown.

The main features considered in choosing a site to be used as a reservoir for a farm pond are the rate of seepage, permeability, and depth to rock and underlying material. Among the features considered in rating the suitability of the soils for use as embankment material are depth of the material over bedrock, compressibility, and resistance to piping and erosion.

The suitability of the soils for irrigation depends largely on rate of water intake, depth to bedrock, slope, available water capacity, susceptibility to water erosion, flooding hazard, and content of stones.

Among the soil features that affect the suitability of the soils for terraces or diversions and for waterways are slope, depth to bedrock, the hazards of water erosion and soil blowing, texture, and stability of the soil material.

Estimates of the corrosion potential of the soils in relation to metal pipe and concrete conduits laid underground are also provided in table 4. Steel pipe placed in any soil of the county should be given a protective coating to help retard corrosion. In most of the soils, however, the corrosion potential for concrete conduits is low.

Formation and Classification of Soils

In this section the factors that affect the formation of the soils in Jones County are discussed and important processes in the differentiation of soil horizons are briefly described. Then the current system of classification used in the United States is explained, and each soil series represented in the county is placed in some of the categories of that system. The soil series in the county, including a profile representative of each series, are described in the section "Descriptions of the Soils."

Factors of Soil Formation

Soil is the product of the interaction of the five major factors of soil formation. These are parent material, climate, plants and animals, relief, and time. If a factor, such as climate or vegetation, varies from place to place, different kinds of soil form.

Parent material.—Parent material is the unconsolidated mass from which a soil forms. It determines the limits of the chemical and mineral composition of the soil. The parent materials of the soils of Jones County consist of red-bed shale; marl; dolomite, or limestone; sandstone; and alluvium.

Stamford, Tillman, and Vernon soils are examples of soils formed in material weathered from red-bed shale and marl of the Clear Fork Group of Lower Permian age. Tarrant, Tobosa, and Valera soils formed in material weathered from dolomite, commonly known as Lueders limestone, of the Wichita Group of Lower Permian age. This dolomite generally is about 50 feet thick, but in places the beds are about 2 feet thick and are separated by beds of shale. Cobb soils are examples of soils formed in material weathered from sandstone. Abilene, Miles, and Rowena are examples of soils formed in alluvium, or plains outwash material. The alluvium deposited during Pleistocene and Recent ages overlies uneven, eroded areas of red beds. Some beds of alluvium are more than 100 feet thick.

Climate.—Jones County has a dry subhumid climate characterized by rapid changes in temperature, marked extremes, and wide daily and annual variations in temperature. It is believed to be similar to the climate that existed when the soils formed. The climate is uniform throughout the county, and differences among the soils are not the result of the effects of climate.

Plants and animals.—Plants, animals, insects, bacteria, and fungi are important in the formation of soils. They add to the supply of organic matter and nitrogen in the soils, cause gains or losses in plant nutrients, and change the structure and porosity of the soils. Plants, mainly mid and short grasses and low oak trees, have affected soil formation more than other organisms. The plants contributed to the accumulation of organic matter and thus to the darkening of the soils. In general, soils that formed under grasses have a higher content of organic matter, however, than those that formed under trees. For example, Abilene, Olton, and Rowena soils formed under grass and have a medium to high content of organic matter. On the other hand Eufaula, Nimrod, and Nobscot soils formed under oak trees, and they have a low content of organic matter.

Relief.—Relief influences soil formation through its effect on drainage, runoff, erosion, plant cover, and soil temperature. In most of Jones County the soils are nearly level or have slopes of less than 2 percent. In small areas, however, steep breaks have slopes up to 20 percent.

On the steeper slopes where runoff is rapid, the soil material is likely to be removed by erosion almost as fast as horizons can develop. Vernon soils, for example, formed on stronger slopes than Tillman soils. They therefore are thinner, and their profile is not so well developed. Abilene, Miles, and Olton soils formed on nearly level to gently sloping areas. Much of the rain that falls does not run off these soils but is absorbed. The rainfall causes leaching and affects other soil-forming processes that aid in the formation of distinct soil horizons.

Time.—Generally a long time is required for formation of soils that have distinct horizons. The length of time that parent materials have been in place is commonly reflected in the degree of development of the soil profile.

The soils of Jones County range from young to old. The young soils have had little profile development, but the older soils have well-expressed soil horizons. Yahola soils are examples of young soils; they have a weakly developed profile. Miles soils are examples of older, or mature, alluvial soils that show marked horizon differentiation. They have been in place for a long time and have approached equilibrium with their environment.

Processes of Horizon Differentiation

Several processes have been involved in the differentiation of soil horizons in Jones County. Among these are (1) accumulation of organic matter, (2) leaching of calcium carbonates and bases, (3) reduction and transfer of iron, and (4) formation and translocation of silicate clay minerals. In most soils more than one of these processes have been active in the development of horizons.

Accumulation of organic matter in the upper part of the profile has been important in the formation of an A1 horizon.

Leaching of carbonates and bases is apparent in many of the soils. The leaching of bases in soils generally precedes translocation of silicate clay minerals. Most of the soils of Jones County are moderately leached, and this leaching contributed to the development of horizons.

Reduction and transfer of iron, a process called gleying, is evident in the poorly drained soils of the county. The gray color in the subsurface horizons indicates the reduction and loss of iron. Reddish-brown mottles and concretions in some horizons indicate a segregation of iron.

In some of the soils, the translocation of clay minerals has also contributed to horizon development. The eluviated A2 horizon, above the B horizon in some of the more sandy soils, is lower in content of clay and generally is lighter in color than the B horizon. In most places the B horizon has an accumulation of clay (clay films) in pores and on the surfaces of peds. These soils were probably leached of carbonates and soluble salts before translocation of silicate clays took place. Leaching of bases and translocation of silicate clays are among the principal processes in horizon differentiation in the soils of Jones County. Abilene soils are examples of soils that have clay films in the B horizon.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their responses to manipulation. First, through classification, and then through use of soil maps, we can apply our knowledge to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. They are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*5*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. It is under continual study (*3*, *7*). Therefore, readers interested in developments of the current system should search the latest literature available. In table 5 the soil series of Jones County are placed in some categories of the current system.

TABLE 5.—*Classification of soil series* [1]

Series	Family	Subgroup	Order
Abilene	Fine, mixed, thermic	Pachic Argiustolls	Mollisols.
Acme	Loamy, mixed, thermic, shallow	Torriorthentic Haplustolls	Mollisols.
Cobb	Fine-loamy, mixed, thermic	Udic Haplustalfs	Alfisols.
Cosh	Loamy, mixed, thermic, shallow	Typic Rhodustalfs	Alfisols.
Cottonwood	Loamy, carbonatic, thermic, shallow	Ustic Torriorthents	Entisols.
Eufaula	Sandy, siliceous, thermic	Psammentic Paleustalfs	Alfisols.
Gomez [2]	Coarse-loamy, mixed, thermic	Typic Ustochrepts	Inceptisols.
Meno	Loamy, mixed, thermic	Aquic Arenic Haplustalfs	Alfisols.
Miles	Fine-loamy, mixed, thermic	Udic Paleustalfs	Alfisols.
Nimrod	Loamy, siliceous, thermic	Aquic Arenic Paleustalfs	Alfisols.
Nobscot	Loamy, mixed, thermic	Arenic Haplustalfs	Alfisols.
Olton [3]	Fine, mixed, thermic	Aridic Paleustolls	Mollisols.
Owens	Clayey, mixed, thermic, shallow	Typic Ustochrepts	Inceptisols.
Randall	Fine, montmorillonitic, thermic	Udic Pellusterts	Vertisols.
Roscoe	Fine, montmorillonitic, thermic	Typic Pellusterts	Vertisols.
Rowena	Fine, mixed, thermic	Vertic Calciustolls	Mollisols.
Selden	Fine-loamy, siliceous, thermic	Aquic Paleustalfs	Alfisols.
Spur	Fine-loamy, mixed, thermic	Fluventic Haplustolls	Mollisols.
Stamford	Fine, montmorillonitic, thermic	Typic Chromusterts	Vertisols.
Tarrant	Clayey-skeletal, montmorillonitic, thermic	Lithic Haplustolls	Mollisols.
Tillman [4]	Fine, mixed, thermic	Typic Paleustolls	Mollisols.
Tobosa	Fine, montmorillonitic, thermic	Typic Chromusterts	Vertisols.
Valera	Fine, montmorillonitic, thermic	Petrocalcic Calciustolls	Mollisols.
Vernon [5]	Fine, mixed, thermic	Typic Ustochrepts	Inceptisols.
Weymouth	Fine-loamy, mixed, thermic	Typic Ustochrepts	Inceptisols.
Winters	Fine, mixed, thermic	Udic Paleustalfs	Alfisols.
Yahola	Coarse-loamy, mixed, (calcareous), thermic	Typic Ustifluvents	Entisols.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more information becomes available.

[2] The soils of Jones County named for this series are outside the range of the series in that they have a fine-loamy control section, but this difference does not alter their usefulness and behavior.

[3] The soils of Jones County named for this series are outside the range of the series in that they are of a more humid environment. They are of an aridic subgroup. This difference does not affect the usefulness and behavior of these soils.

[4] The soils of Jones County named for this series are outside the range for the series in that they have a solum thinner than 60 inches, but this difference does not alter their usefulness and behavior.

[5] The soils of Jones County named for this series are outside the range for the series in that the soil thickness is less than 20 inches, but this difference does not alter their usefulness and behavior.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar origin are grouped together. The classes of the current system are briefly defined in the following paragraphs.

ORDERS: Ten soil orders are recognized. They are Envisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, the Entisols and Histosols, occur in many different kinds of climate. The five soil orders in Jones County are Alfisols, Entisols, Inceptisols, Mollisols, and Vertisols.

Alfisols are soils that have a clay-enriched B horizon that is high in base saturation.

Entisols are recent soils that do not have genetic horizons or that have only the beginning of such horizons.

Inceptisols generally form on young, but not recent, land surfaces; hence, their name is derived from the Latin *inceptum*, for beginning. These soils have weakly developed or incipient horizons.

Mollisols are soils that have high base supply, a dark A horizon that is friable or soft, and a high content of organic matter.

Vertisols are soils in which natural churning or inversion of soil material takes place, mainly through the swelling and shrinking of clays.

SUBORDERS: Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest similarity from the standpoint of their genesis. Suborders narrow the broad climatic range of soils that are in the orders. Soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences produced through the effects of climate or vegetation.

GREAT GROUPS: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and other features. The horizons used as a basis for distinguishing between great groups are those in which (1) clay, iron, or humus have accumulated; (2) a pan has formed that interferes with growth of roots, movement of water, or both; or (3) a thick, dark-colored surface horizon has formed. The other features commonly used are the self-mulching properties of clay, temperature of the soil, major differences in chemical composition (mainly the bases calcium, magnesium, sodium, and potassium), or the dark-red or dark-brown colors associated with soils formed in material weathered from basic rocks.

SUBGROUPS: Great soil groups are subdivided into subgroups. One of these represents the central, or typic, segment of the group. Other subgroups have properties of the group but have one or more properties of another great group, subgroup, or order, and these are called intergrades. Subgroups may also be made for soils that have properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Pachic Argiustolls.

FAMILIES: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. An example is the fine, mixed, thermic family of Pachic Argiustolls.

Climate [5]

Jones County has a dry subhumid continental climate characterized by hot summers and mild winters. Table 6 gives the average monthly and yearly temperatures and precipitation typical for the county, as well as other climatic data representative of the county.

The rainfall pattern is typical of the Great Plains. The average annual rainfall is about 24 inches. About three-fourths of this amount falls during the period from April through October. The amount of rainfall varies considerably from year to year. For example, Stamford received 43.23 inches of rain in 1941 and only 7.62 inches in 1956. In exceptionally wet years, much of the rain comes within short periods and causes excessive runoff.

The average annual snowfall is 4.3 inches. In some years, however, snows are infrequent but are very heavy. High winds and frequent rises in temperature make the snow cover uneven. Little effective moisture is gained from the snow that falls.

The wide range in temperatures characteristic of the Great Plains applies to Jones County. Temperature changes are rapid, especially in winter and early in spring when cold, dry polar air replaces the warm, moist tropical air. The temperature is likely to fall as much as 20 to 30 degrees within an hour.

January is the coldest month. Periods of cold weather are short. Fair, mild weather is frequent in January and in February. Hot daytime temperatures prevail for long periods in summer, but these temperatures are broken by thunderstorm activity on an average of about five times a month. The hottest weather comes in August. Occasionally, from May through September, the daily temperature reaches 100° F. Summer days are hot, but good wind motion and low humidity lessen discomfort. Rapid cooling takes place after nightfall, and most nights are pleasant. Minimum night temperatures range from the upper 60's to the lower 70's throughout the summer.

Winds are strongest during intense thunderstorms, or squalls, but these storms do not last long. The strongest continuous winds occur during March and April, and the prevailing direction of the winds is from the south to southeast.

Severe winds or hailstorms sometimes accompany heavy thunderstorms, especially late in spring and early in summer. The wind, hail, and heavy rains that accompany these storms often damage crops. Tornadoes have accompanied severe thunderstorms, but they are infrequent.

[5] By ROBERT B ORTON, State climatologist, National Weather Service, U.S. Department of Commerce.

416-630—72——4

TABLE 6.—*Temperature*

[Temperature data based on records kept at Anson, 1957–64.

Month	Temperature									Heating degree days
	Average daily maximum	Average daily minimum	Monthly average	Record high	Record low	Average number of days with—				
						Maximum temperature of—		Minimum temperature of—		
						90° F. or above	32° F. or below	32° F. or below	0° F. or below	
	°F.	°F.	°F.	°F.	°F.					
January	58.0	29.9	44.0	80	5	0	1	19	0	645
February	62.2	34.5	48.4	89	9	0	1	11	0	472
March	70.0	41.6	55.8	96	13	1	[2]	7	0	312
April	82.6	53.9	68.3	100	28	7	0	[2]	0	74
May	89.0	62.9	76.0	106	38	18	0	0	0	9
June	92.8	68.1	80.5	107	50	22	0	0	0	[2]
July	95.9	72.4	84.2	107	61	27	0	0	0	0
August	96.6	72.2	84.4	108	54	29	0	0	0	0
September	89.3	65.3	77.3	105	45	16	0	0	0	4
October	80.8	55.0	67.9	96	27	4	0	[2]	0	55
November	67.2	42.5	54.9	88	18	0	0	4	0	253
December	58.4	34.8	46.6	84	15	0	1	14	0	562
Year	78.6	52.8	65.7	107	5	124	3	55	0	2,386

[1] Trace.
[2] Less than one-half day.

Table 6 also gives temperature data in terms of degree days. The number of degree days is the difference between the average temperature for a given day and 65° F. It is a measure of the amount of heat needed to keep the temperature that day at 65°. For example, a day that has an average temperature of 50° would be counted as 15 degree days. A knowledge of accumulated degree days for a stated time is helpful in calculating the amount of fuel needed for heating buildings and for determining the rate of growth and the maturity date of crops.

On the basis of weather data recorded in Anson during 1957–64, the average date of the last reading of 32° F. or below in spring is March 31, and the first date in fall is November 9. The average number of days between the last occurrence of 32° or below in spring and the first occurrence of 32° or below in fall is 223 days. The average annual relative humidity, at various hours, Central Standard Time, is 75 to 80 percent at 6:00 a.m., 45 to 50 percent at noon, 40 to 45 percent at 6:00 p.m., and 65 to 70 percent at midnight. The sun shines on an average of 70 to 75 percent of the possible hours annually.

The average annual amount of moisture that evaporates from a class A pan, 4 feet in diameter, is about 95 to 100 inches. The average annual lake evaporation is 66 to 70 inches.

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Glossary

ABC soil. A soil that has a complete profile, including an A, B, and C horizon.

AC soil. A soil that has an A and a C horizon but no B horizon. Commonly such soils are immature, as those developing from alluvium or those on steep, rocky slopes.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more

and precipitation data

Precipitation data based on records kept at Stamford, 1935–64]

Precipitation										
Average total	Greatest daily	Total in—		1 year in 10 will have—		Average number of days with precipitation of—			Snow, sleet	
		Driest year (1956)	Wettest year (1941)	Less than	More than	0.10 inch or more	0.50 inch or more	1.00 inch or more	Average monthly	Maximum monthly
In.	*In.*	*In.*	*In.*	*In.*	*In.*				*In.*	*In.*
0. 91	1. 25	0. 51	0. 27	(1)	1. 76	2	1	(2)	1. 2	8. 5
1. 16	2. 11	. 65	2. 70	0	2. 70	3	1	(2)	1. 2	7. 0
1. 02	2. 45	(1)	1. 79	(1)	2. 28	2	1	(2)	. 6	7. 5
1. 91	2. 93	1. 07	4. 14	. 17	4. 14	3	1	(2)	. 1	2. 0
4. 08	3. 50	1. 68	8. 04	1. 36	7. 72	6	3	1	0	0
3. 50	3. 02	. 20	5. 40	. 20	5. 40	5	3	1	0	0
1. 96	5. 13	. 06	1. 84	(1)	4. 19	3	1	1	0	0
1. 45	3. 57	. 29	4. 13	0	4. 13	2	1	(2)	0	0
2. 76	4. 08	(1)	1. 90	(1)	6. 46	4	2	1	0	0
2. 51	5. 95	1. 32	10. 57	. 05	5. 32	3	2	1	0	0
1. 35	1. 89	. 29	. 58	0	3. 32	3	1	1	. 3	5. 5
1. 14	2. 55	1. 55	1. 87	. 02	2. 89	2	1	(2)	. 9	7. 0
23. 75	5. 95	7. 62	43. 23	14. 47	31. 84	38	18	6	4. 3	8. 5

of the total exchangeable bases), or both, that the growth of most crop plants is low from this cause.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Badlands. Areas of rough, irregular land where most of the surface is occupied by ridges, gullies, and deep channels. Land hard to traverse.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperature areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: Clay coat, clay skin.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fallow. Cropland left idle in order to restore productivity, mainly through accumulation of water, nutrients, or both. Summer fallow is a common stage before cereal grain in regions of limited rainfall. The soil is tilled for at least one growing season to control weeds, to aid decomposition of plant residues, and to encourage the storage of moisture for the succeeding grain crop.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline soil. A soil that contains soluble salt in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Slick spots. Small areas in a field that are slick when wet because they contain excess exchangeable sodium, or alkali.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are— *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Ter-

races intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine" or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity, and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit or a range site, read the introduction it is in for general information about its management. For facts about wildlife turn to the section beginning on p. 29. Absence of data in the column on range sites indicates the soil was not placed in a range site. Other information is given in tables as follows:

Acreage and extent, table 1, p. 5.
Predicted yields, table 2, p. 25.

Engineering uses of the soils, tables 3 and 4, pp. 32 through 43.

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
AbA	Abilene clay loam, 0 to 1 percent slopes	6	IIc-1	22	Deep Hardland	27
AbB	Abilene clay loam, 1 to 3 percent slopes	6	IIe-1	21	Deep Hardland	27
Ac	Acme-Cottonwood complex	7	IVs-1	24	Deep Hardland	27
Bv	Badland-Vernon complex	7	VIe-1	24	Shallow Redland	28
CbA	Cobb fine sandy loam, 0 to 1 percent slopes	8	IIe-4	22	Sandy Loam	27
CbB	Cobb fine sandy loam, 1 to 3 percent slopes	8	IIIe-4	23	Sandy Loam	27
CoB	Cosh fine sandy loam, 1 to 3 percent slopes	8	IVe-9	24	Sandy Loam	27
EsB2	Eufaula and Selden soils, 1 to 3 percent slopes, eroded	9	VIe-5	24	Sandyland Savannah	28
Eu	Eufaula fine sand	9	VIe-5	24	Sandyland Savannah	28
Gf	Gomez fine sandy loam	9	IVe-5	24	Deep Sand	28
Gn	Gravelly land	9	VIs-1	25	Gravelly	29
Gp	Gravel pit	9	VIIIs-1	25	----------	--
Me	Meno loamy fine sand	10	IIIe-6	23	Sandyland	27
MmB	Miles loamy fine sand, 0 to 3 percent slopes	10	IIIe-6	23	Sandyland	27
MnA	Miles fine sandy loam, 0 to 1 percent slopes	10	IIe-4	22	Sandy Loam	27
MnB	Miles fine sandy loam, 1 to 3 percent slopes	10	IIe-5	22	Sandy Loam	27
MnC	Miles fine sandy loam, 3 to 5 percent slopes	10	IIIe-4	23	Sandy Loam	27
Mp	Miles complex	11	IVe-9	24	Sandy Loam	27
Ne	Nimrod-Eufaula fine sands	11	VIe-5	24	Sandyland Savannah	28
Nf3	Nimrod-Eufaula complex, severely eroded	11	VIe-5	24	Sandyland Savannah	28
No	Nobscot fine sand	12	VIe-5	24	Deep Sand	28
Ns	Nobscot soils and Blown-out land	12	VIe-5	24	Deep Sand	28
Os	Oil-waste land	12	VIIIs-1	25	----------	--
OtA	Olton clay loam, 0 to 1 percent slopes	13	IIc-1	22	Deep Hardland	27
OtB	Olton clay loam, 1 to 3 percent slopes	13	IIe-1	21	Deep Hardland	27
Ov	Owens-Vernon stony complex	13	VIe-1	24	Shallow Redland	28
Qu	Quarry	13	VIIIs-1	25	----------	--
Rd	Randall soils	14	IVw-1	24	----------	--
Ro	Roscoe clay	15	IIIw-1	23	Deep Hardland	27
RwA	Rowena clay loam, 0 to 1 percent slopes	15	IIc-1	22	Deep Hardland	27
RwB	Rowena clay loam, 1 to 3 percent slopes	15	IIe-1	21	Deep Hardland	27
Sp	Spur loam	16	I-1	21	Loamy Bottomland	26
Sr	Spur soils, broken	16	Vw-1	24	Loamy Bottomland	26
StA	Stamford clay, 0 to 2 percent slopes	16	IIIs-1	23	Clay Flat	28
Ta	Tarrant complex	17	VIs-3	25	Very Shallow	29
TcA	Tillman clay loam, 0 to 1 percent slopes	17	IIs-1	22	Deep Hardland	27
TcB	Tillman clay loam, 1 to 3 percent slopes	18	IIIe-1	22	Deep Hardland	27
ToA	Tobosa clay, 0 to 1 percent slopes	18	IIIs-1	23	Clay Flat	28
ToB	Tobosa clay, 1 to 3 percent slopes	18	IVe-1	23	Clay Flat	28
VaB	Valera silty clay, 1 to 3 percent slopes	19	IIe-1	21	Deep Hardland	27
VeC	Vernon clay, 2 to 8 percent slopes	19	VIe-1	24	Shallow Redland	28
WeB	Weymouth clay loam, 1 to 3 percent slopes	19	IIIe-7	23	Deep Hardland	27
WeC	Weymouth clay loam, 3 to 5 percent slopes	20	IVe-6	24	Deep Hardland	27
WnA	Winters fine sandy loam, 0 to 1 percent slopes	20	IIe-4	22	Sandy Loam	27
WnB	Winters fine sandy loam, 1 to 3 percent slopes	20	IIIe-4	23	Sandy Loam	27
Ya	Yahola fine sandy loam	20	IIe-6	22	Loamy Bottomland	26

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