SOIL SURVEY OF

Buffalo County, Nebraska

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Nebraska
Conservation and Survey Division

Issued November 1974

Major fieldwork for this soil survey was done in the period 1957–67. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the University of Nebraska, Conservation and Survey Division. It is part of the technical assistance furnished to the Lower Loup and Central Platte Natural Resources Districts.

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 and ranches; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for agriculture, industry, and recreation.

Locating Soils

All the soils of Buffalo 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 windbreak group and 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 on 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, range sites, and windbreak groups.

Ranchers and others can find, under "Management of the Soils for Range," 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 test data, estimates of soil properties, and information about soil features that affect engineering practices.

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

Newcomers in Buffalo County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

Cover Picture: Combination irrigation and dryland farm southwest of Pleasanton. Irrigated field is on Hobbs silt loam, 0 to 1 percent slopes, and the dryland terraced field is Coly silt loam, 5 to 11 percent slopes. (Courtesy of Richard Hufnagle, photographer.)

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SOIL SURVEY OF BUFFALO COUNTY, NEBRASKA

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UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE UNIVERSITY OF NEBRASKA, CONSERVATION AND SURVEY DIVISION

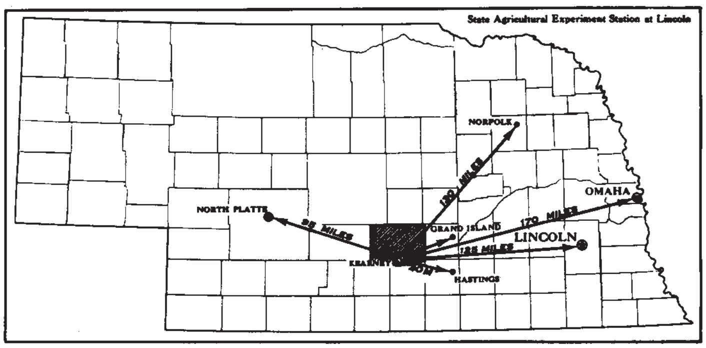

***Figure 1.*—Location of Buffalo County in Nebraska**

BUFFALO COUNTY is in south-central Nebraska (fig. 1). The Platte River is its southern boundary. Kearney, the county seat, is on U.S. Highway 30, Interstate 80, and Nebraska 10 and 40. The county has a land area of 952 square miles, or 609,280 acres. The average elevation is 2,100 feet. Physiographically, the county consists of the Platte, Wood, and South Loup River valleys. Between the rivers are loess uplands, and sandhills form an irregular band on either side of the South Loup River.

Farming is the principal enterprise. Wheat, corn, sorghum, and alfalfa are the main dryland crops. The main irrigated crops are corn, grain sorghum, and soybeans. More than one-third of the county is native grass used as range. Most of the range is used for raising beef cattle. A large part of the forage and grain crops grown in the county is fed to livestock.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Buffalo 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. Holdrege and Wood River, 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 their surface layer 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, Cozad silt loam, 0 to 1 percent slopes, is one of several phases within the Cozad series, which has a slope range of 0 to 11 percent in this county.

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 Buffalo County, soil complexes and undifferentiated soil 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; for example, Platte-Alda 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." Uly and Holdrege silt loams, 5 to 11 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so wet, 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. Marsh is a land type in Buffalo 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. Yield under defined management are predicted for all the arable soils.

But 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 woodland and 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, then adjust the groups according to the results of their studies and consultation. Thus, the capability units, range sites, windbreak groups, and other 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 Buffalo 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. The level of intensity used in preparing the general soil map of one county may differ from that used in preparing the corresponding map for another county.

A map showing soil associations is useful to people who want a general idea of the soils in a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is also useful in determining the suitability of a tract for a watershed, wildlife habitat, engineering project, recreational area, or community development. A general soil map is not suitable for planning the management of a farm or field, or designing an engineering structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management or design.

The 10 soil associations in Buffalo County are described in the following paragraphs. Unless it is stated otherwise, texture terms given in the descriptive heading for a soil association apply to the surface layer. Soils that are described as moderately deep or shallow are underlain by sand and gravel.

1. Coly-Uly-Holdrege association

Deep, gently sloping to steep, well-drained silty soils on uplands

This association consists of deep, gently sloping to steep soils on rounded ridgetops, on hillsides, and on the valley sides of entrenched drainageways (fig. 2). The soils formed in calcareous, light-gray Peoria loess. Reddish-brown loamy material of the Loveland Formation underlies this Peoria loess and is expected on some hillsides and on steep slopes along drainageways.

This association covers 293,480 acres, or 47 percent of the county. Coly soils make up 43 percent of this association, Uly soils 21 percent, Holdrege soils 19 percent, and less extensive soils the remaining 17 percent.

Coly soils have a silt loam surface layer that is less than 8 inches of darkened soil material over lighter colored calcareous loess. They are strongly sloping to steep and occur along drainageways. Where these soils have been cultivated, erosion has removed the surface layer so that the loess is at the surface.

Uly soils are sloping to strongly sloping. They border drainageways and are on rounded ridgetops. They have a silt loam surface layer 7 to 10 inches thick and lighter colored silt loam subsoil and underlying material.

Holdrege soils are on rounded ridgetops. They have a loam surface layer, a lighter colored silty clay loam subsoil, and silt loam underlying material.

Among the less extensive soils are Hobbs soils on foot slopes and in the bottoms along drainageways, and Hall soils on upland flats.

About half of this association is cultivated. The steepest and roughest areas are in native grass. Erosion by water is the most serious hazard. Some severely eroded areas have been reseeded to native grasses. The farms range from 320 to 800 acres in size. The smoother areas are suited to corn, wheat, grain sorghum, and alfalfa. The steeper areas are well suited to pasture and rangeland used for cow-calf herds. Graveled roads are on about half of the section lines, and dirt roads on about a fourth. On about a fourth of the section lines no roads have been constructed.

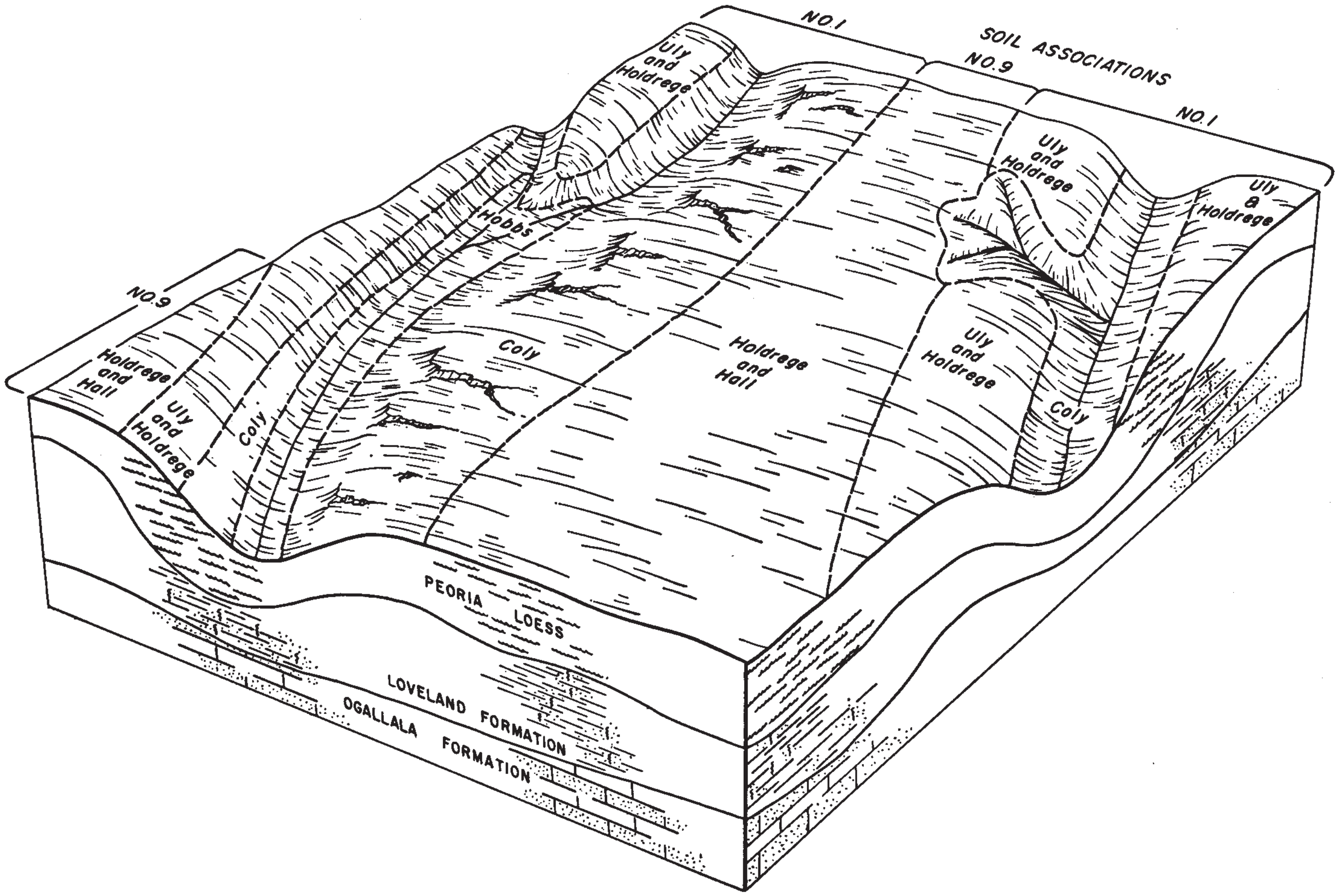

***Figure 2.*—Soils in associations 1 and 9 and their relation to underlying material.**

2. *Valentine-Ortello association*

Deep, undulating to rolling, excessively drained and well drained, mainly sandy soils on uplands

This association consists of deep, undulating to rolling soils formed in wind-deposited sand on uplands (fig. 3).

This association covers 31,800 acres, or 5 percent of the county. Valentine soils make up 69 percent of this association, Ortello soils 25 percent, and less extensive soils the remaining 6 percent.

Valentine soils are undulating to rolling. They have a thin loamy fine sand surface layer and fine sand underlying material.

Ortello soils have a thick fine sandy loam surface layer, a slightly lighter colored fine sandy loam subsoil, and a loamy substratum.

Thurman soils are the principal soils among the less extensive soils in this association. They are on elevations that are lower than those of Valentine soils, but slightly higher than those of Ortello soils.

Soil blowing is a serious hazard to cultivation of soils in this association. The Valentine soils are coarse and unstable. Many areas of the Thurman soils are cultivated, but require careful management. The Ortello soils are best suited to cultivation and are the most productive. About 65 percent of the association is in native grasses consisting of fair to good stands of prairie sandreed, big and little bluestem, sand bluestem, sand dropseed, and blue grama. The farms and ranches are larger than those in other parts of the county. Roads are adequate, but not so good as those in other parts of the county.

3. *Hord-Hall-Cozad association*

Deep, nearly level, well-drained silty soils on stream terraces

This association consists of deep, nearly level, friable soils (fig. 4) on stream terraces bordering the Platte and Wood Rivers.

This association covers 86,700 acres, or 14 percent of the county. Hord soils make up 58 percent of this association, Hall soils 19 percent, Cozad soils 19 percent, and less extensive soils the remaining 4 percent.

Hord soils have a silt loam surface layer and subsoil. Hall soils have a silt loam surface layer and a silty clay loam subsoil. Cozad soils have a moderately thick silt loam surface layer and a lighter colored silt loam subsoil. Dark buried layers are common at depths of 2 to 3 feet.

Soils in the Breaks-Alluvial land complex are the principal soils among the less extensive in this association. They are on short, steep side slopes and bottom lands.

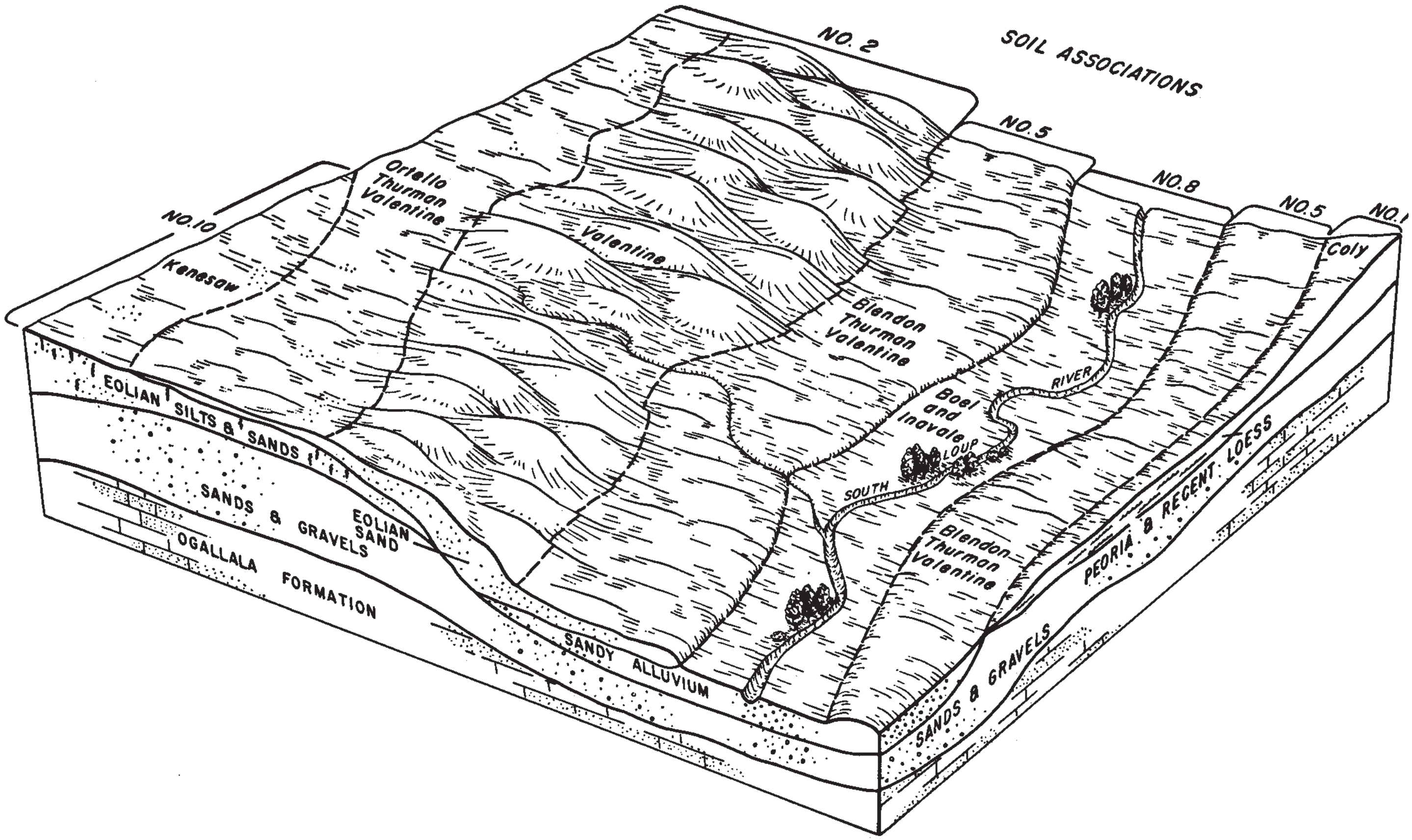

***Figure 3.*—Relationship of soil associations along the South Loup River and the adjacent uplands.**

Most of this association is irrigated. The soils are among the most productive and most intensively farmed in the county. West of Kearney, along the Platte River, the water table is about 15 feet below the surface, and some deep-rooted crops, such as alfalfa, benefit from this subirrigation. The farms average about 320 acres in size. Most of the farmers grow grain as a cash crop, but some combine this operation with cattle feeding. Good graveled roads are on most section lines.

4. *Wood River association*

Deep, nearly level, moderately well drained soils that have a claypan; on stream terraces

This association consists of deep, nearly level soils that have a claypan and are on stream terraces (fig. 4).

This association covers 24,274 acres, or about 4 percent of the county. Wood River soils make up about 98 percent of this association, and less extensive soils the remaining 2 percent.

Wood River soils have a silt loam surface layer and a compact silty clay subsoil that is slowly permeable. Hord, Hall, and Cozad soils are on slightly higher elevations than Wood River soils.

Nearly all of this association is cultivated and irrigated. Dryfarmed crops grow poorly because the claypan slows root penetration and deep percolation of water. Irrigation overcomes these difficulties, and has made this association one of the most productive areas in the county. Water is plentiful at depths of 10 to 50 feet. Grain is the cash crop on nearly all of the farms, which average about 320 acres in size. Good graveled roads are on nearly all section lines.

5. *Blendon-Thurman-Valentine association*

Deep, nearly level to gently sloping, well drained to excessively drained loamy and sandy soils on stream terraces

This association consists of deep, nearly level to gently sloping soils on stream terraces (fig. 3).

This association covers 12,100 acres, or 2 percent of the county. Blendon soils make up 38 percent of this association, Thurman soils 30 percent, Valentine soils 24 percent, and less extensive soils the remaining 8 percent.

Blendon soils have a thick loam or fine sandy loam surface layer and a fine sandy loam subsoil. Thurman soils have a loamy fine sand surface layer and loamy fine sand underlying material. Valentine soils have a thin loamy fine sand surface layer and fine sand underlying material. Among the less extensive soils are Simeon soils in low areas and along stream terrace breaks. Kenesaw, calcareous variant, is at the same general elevations as the Blendon, Thurman, and Valentine soils.

In Thurman and Valentine soils the water table is about 15 feet below the surface. Deep-rooted plants, such as alfalfa and trees, can benefit from this water table.

Most of the soils along the Platte River are irrigated. Most of the soils along the South Loup River are dryfarmed or are in native grass. Soil blowing is a hazard where these soils are cultivated.

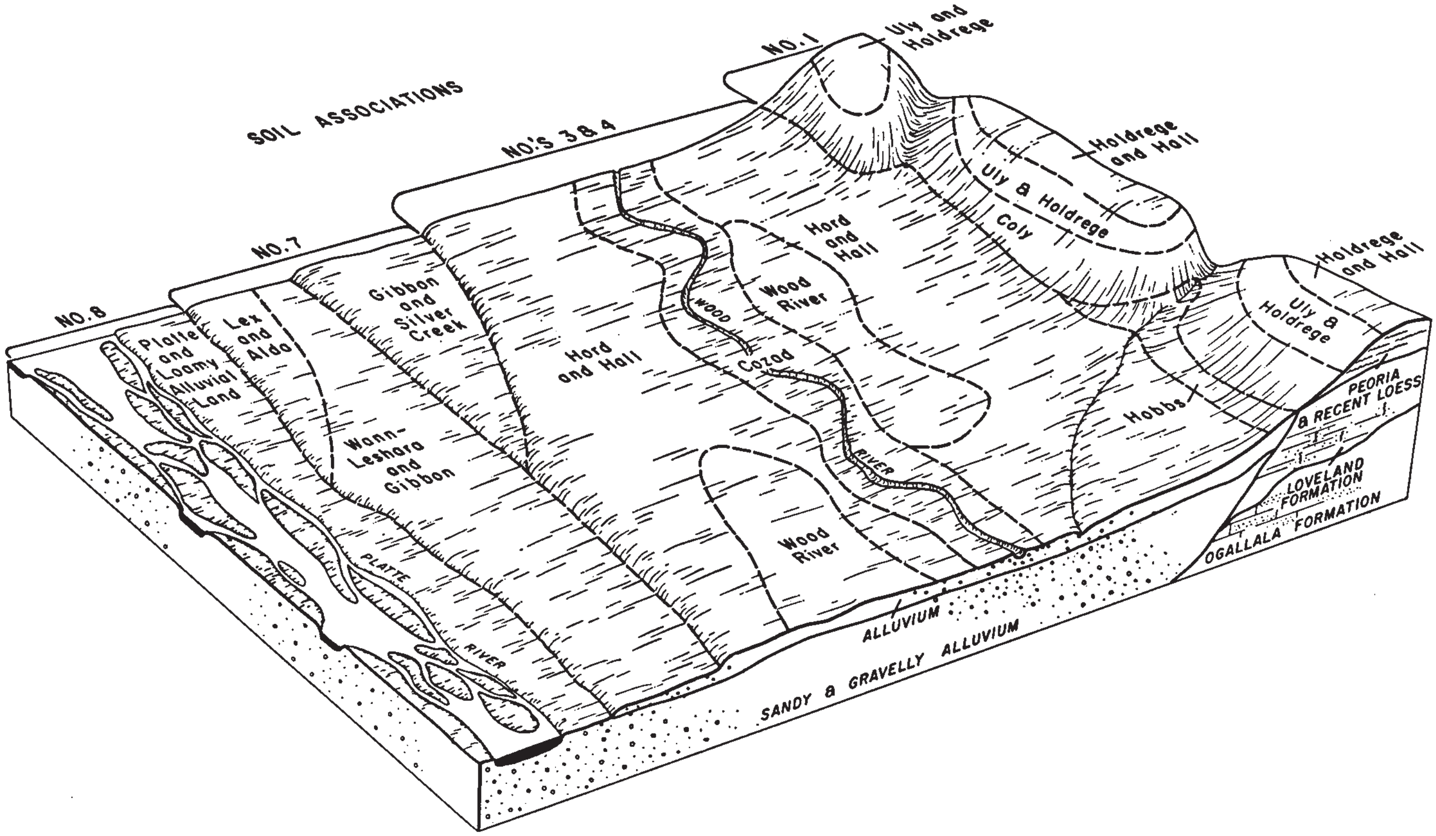

***Figure 4.*—Relationship of silty soils on stream terraces and those of adjacent bottom lands and uplands.**

Grain is the principal cash crop on irrigated farms, which average about 320 acres in size. Along the South Loup River the farms range from 480 to 800 in size, and the farmers grow corn, wheat, grain sorghum, and alfalfa, and keep cow-calf herds on pastures and rangeland. Graveled roads are on most section lines.

6. Wood River-Slickspots-Gibbon, saline, association

Deep, nearly level, moderately well drained and somewhat poorly drained, mainly saline and alkali soils on low stream terraces

This association consists of deep, nearly level, dominantly moderately saline to strongly alkaline soils on low stream terraces.

This association covers 2,600 acres, or a little less than 1 percent of the county.

The Wood River-Slickspots complex makes up 55 percent of this association; Gibbon silt loam, saline, 40 percent; and less extensive soils the remaining 5 percent.

Wood River soils have a silt loam surface layer and a silty clay subsoil. The soil material in the Slickspots range from medium to fine in texture.

Gibbon silt loam, saline, is a somewhat poorly drained soil that has a silt loam surface layer and silty clay loam underlying material. Large amounts of free lime are visible. Slickspots are not so numerous or severe as in the Wood River-Slickspots complex. Slickspots are locally called "buffalo wallows."

The principal less extensive soils are Leshara, Gibbon, and Wann. They are on slightly higher elevations than the Wood River-Slickspots complex and Gibbon silt loam, saline.

The soils in this association are difficult to manage. They are less productive than comparable soils that are not affected by salinity or alkalinity. Slickspots are the last to dry after a rain, and then they become very cloddy and hard. Almost all of this association is irrigated. Leveling improves surface drainage and covers many of the Slickspots. Farms range from 240 to 320 acres in size. Most of the grain grown is sold as a cash crop. Some livestock is raised on nearly every farm. Graveled roads are on all section lines.

7. Gibbon-Leshara-Alda association

Deep and moderately deep, nearly level, somewhat poorly drained silty and loamy soils on bottom lands

This association consists of deep and moderately deep, nearly level soils on bottom lands bordering the Platte and South Loup Rivers.

This association covers 27,000 acres, or about 5 percent of the county. Gibbons soil makes up 29 percent of this association, Leshara soils 18 percent, Alda soils 16 percent, and a large number less extensive soils the remaining 37 percent.

Gibbon soils are deep and somewhat poorly drained. They have a moderately thick silt loam surface layer and lighter colored silt loam underlying material. Leshara soils are similar to Gibbon soils, but have a thicker surface layer. Alda soils are somewhat poorly drained, and have a loam or fine sandy loam surface layer and fine sandy loam underlying material. Mixed sand and gravel is at depths of 20 to 40 inches.

Among the less extensive soils are Cass and Grigston soils in the highest, better drained areas. Wann, Lex, and Silver Creek soils are on about the same elevations as Gibbon, Leshara, and Alda soils.

The soils along the Platte River are generally cultivated and irrigated. The principal crops are corn, grain sorghum, and alfalfa. Crops benefit from subirrigation during part of the year. Along the South Loup River about half of the soils are cultivated, and the others are used as native hayland. The farms average about 320 acres in size, and usually combine growing of grain crops with raising of cattle. Good graveled roads are on most section lines.

8. *Platte-Loamy alluvial land-Boel association*

Very shallow to deep, nearly level, mainly somewhat poorly drained loamy soils on bottom lands

This association consists of nearly level loamy soils on bottom lands of the South Loup and the Platte Rivers (figs. 3 and 4). They are very shallow to deep over sand and gravel.

This association covers 47,300 acres, or about 8 percent of the county. Platte soils make up 38 percent of this association, Loamy alluvial land 16 percent, Boel soils 6 percent, less extensive soils 14 percent, and water surfaces the remaining 26 percent.

The shallow Platte soils are along the Platte River. They are somewhat poorly drained soils 10 to 20 inches thick that are underlain by sand and gravel. The texture of the surface layer ranges from loam to fine sandy loam. Some of the Platte soils are combined with the moderately deep Alda soils in a complex pattern.

The Loamy alluvial land lies along the Platte River and consists of soil material 6 to 10 inches thick that is underlain by sand and gravel.

The Boel soils are along the South Loup River. They have a loam to fine sandy loam surface layer and fine sand underlying material. Depth to the water table ranges from 2 to 5 feet.

Among the less extensive soils and land types are Sandy alluvial land, Inavale soils, Loup soils, and Marsh. Sandy alluvial land is on the lowest elevations adjacent to the Platte River. Inavale soils are on high, well-drained areas in the valley of the South Loup River. Loup soils and Marsh are in the lowest areas of this valley. More than a fourth of the association is covered by waters of the Platte River, the South Loup River, and small lakes.

The soils in this association are principally used as range or hayland. About a third of the association is in trees. The soils have little commercial value but provide excellent cover for deer and other wildlife. Graveled roads are on some section lines.

9. *Holdrege-Hall association*

Deep, nearly level, well-drained silty soils on uplands

This association consists of deep, nearly level, silty soils on upland ridgetops (fig. 2).

This association covers 66,100 acres, or 11 percent of the county. Holdrege soils make up 60 percent of this association, Hall soils 38 percent, and less extensive soils the remaining 2 percent.

Holdrege soils have a silt loam surface layer and a silty clay loam subsoil. Hall soils are similar to Holdrege soils, but have a thicker, darker surface layer. Among the less extensive soils are soils of the Scott series in upland depressions and Coly soils on uplands.

The soils in this association are intensively cultivated, and more than half of the association is irrigated. The soils are productive and easily worked. Farms average about 320 acres in size, and usually combine growing of grain crops with raising of cattle. Graveled roads are on nearly all section lines.

10. *Kenesaw association*

Deep, nearly level to gently undulating, well-drained silty soils on uplands

This association consists of deep, nearly level to gently undulating silty soils on uplands. The tops of the hummocks are generally eroded and lighter colored than the soil in the low areas. This gives some fields a spotty appearance.

This association covers 17,100 acres, or about 3 percent of the county. Kenesaw soils make up 87 percent of this association, and less extensive soils the remaining 13 percent.

Kenesaw soils are well drained and have a silt loam surface layer and a lighter colored silty underlying material. Coly and Rusco soils are less extensive soils in this association. Coly soils have short side slopes that border drainageways. Rusco soils are in drained depressions.

Nearly all of the soils in this association are cultivated, and some are irrigated. Because of the hummocky topography, sprinkler systems are a popular and suitable method of irrigation. Although grain is the principal cash crop, most farms have some cattle and hogs. The farms range from 320 to 480 acres in size. Good graveled roads are on all section lines.

Descriptions of the Soils

This section describes the soil series and mapping units in Buffalo 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 one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which it belongs.

An important part of each series description is the representative profile. This profile is first described briefly in terms familiar to the layman, and then in detail in terms suitable for scientists, engineers, and others who need to make thorough and precise studies of soils. In both descriptions, colors are for a dry soil, unless otherwise indicated.

Mapping units are described in much less detail than soil series because the need is to emphasize mainly how each mapping unit differs from the series, not to repeat the many ways in which it is similar. As mentioned in "How This Survey Was Made," not all mapping units are members of a soil series. Wet alluvial land, for example, does not belong to a series; nevertheless, it is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses, which identifies it on the detailed soil map. Listed at the end of the description of each mapping unit is the capability unit, range site, and windbreak suitability group in which the mapping unit has been placed. The page on which each of these management groupings is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The approximate acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*3*).[1]

A given soil series in this county may be identified by a different name in a recently published soil survey of an adjacent county. Such differences in name result from changes in the concepts of soil classification that have occurred since publication. The characteristics of the soil series described in this country are considered to be within the range defined for that series. In those instances where a soil series has one or more features outside the defined range, the differences are explained.

[1] Italic numbers in parentheses refer to Literature Cited, p. 84.

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

Soil	Area	Extent
	Acres	*Percent*
Alda fine sandy loam	999	0. 2
Alda loam	3, 233	. 5
Blendon fine sandy loam, 0 to 1 percent slopes	1, 001	. 2
Blendon fine sandy loam, 1 to 3 percent slopes	733	. 1
Blendon loam, 0 to 1 percent slopes	1, 952	. 3
Blendon loam, 1 to 3 percent slopes	391	. 1
Boel fine sandy loam	2, 134	. 4
Boel loam	851	. 1
Breaks-Alluvial land complex	8, 814	1. 4
Cass fine sandy loam	584	. 1
Cass loam	443	. 1
Coly silt loam, 5 to 11 percent slopes	68, 115	11. 2
Coly silt loam, 11 to 31 percent slopes	32, 684	5. 4
Coly, Uly, and Hobbs soils, 15 to 31 percent slopes	67, 134	11. 0
Cozad silt loam, 0 to 1 percent slopes	8, 222	1. 3
Cozad silt loam, 1 to 3 percent slopes	1, 653	. 3
Cozad silt loam, 3 to 5 percent slopes, eroded	1, 155	. 2
Cozad silt loam, 5 to 11 percent slopes, eroded	1, 522	. 2
Gibbon silt loam	3, 685	. 6
Gibbon silt loam, saline	1, 190	. 2
Grigston silt loam	2, 097	. 3
Hall silt loam, terrace, 0 to 1 percent slopes	14, 775	2. 4
Hall silt loam, terrace, 1 to 3 percent slopes	1, 020	. 2
Hobbs silt loam, occasionally flooded	23, 462	3. 9
Hobbs silt loam, 0 to 1 percent slopes	8, 391	1. 4
Hobbs silt loam, 1 to 3 percent slopes	12, 075	2. 0
Hobbs silt loam, 3 to 5 percent slopes	1, 288	. 2
Holdrege silt loam, 1 to 3 percent slopes	26, 204	4. 3
Holdrege silt loam, 3 to 5 percent slopes	1, 587	. 3
Holdrege silt loam, 3 to 5 percent slopes, eroded	9, 477	1. 6
Holdrege-Hall silt loams, 0 to 1 percent slopes	28, 937	4. 7
Hord silt loam, terrace, 0 to 1 percent slopes	48, 930	8. 1
Hord silt loam, terrace, 1 to 3 percent slopes	2, 328	. 4
Inavale fine sandy loam, 0 to 3 percent slopes	1, 917	. 3
Kenesaw fine sandy loam, calcareous variant, 0 to 1 percent slopes	466	. 1
Kenesaw silt loam, 0 to 1 percent slopes	2, 596	. 4
Kenesaw silt loam, 1 to 3 percent slopes	8, 042	1. 3
Kenesaw silt loam, 3 to 5 percent slopes	769	. 1
Kenesaw-Coly silt loams, 3 to 5 percent slopes	5, 026	. 8
Leshara fine sandy loam	324	. 1
Leshara and Gibbon silt loams	8, 836	1. 5
Lex silt loam	2, 311	. 4
Loamy alluvial land	6, 782	1. 1
Loup loam	1, 737	0. 3
Marsh	740	. 1
Ortello fine sandy loam, 5 to 11 percent slopes	663	. 1
Ortello fine sandy loam, loamy substratum, 0 to 3 percent slopes	3, 822	. 6
Ortello fine sandy loam, loamy substratum, 3 to 5 percent slopes, eroded	4, 100	. 7
Pits and dumps	724	. 1
Platte soils	11, 538	1. 9
Platte-Alda complex	6, 416	1. 0
Riverwash	650	. 1
Rough broken land, loess	1, 092	. 2
Rusco silt loam	665	. 1
Sandy alluvial land	1, 266	. 2
Scott silt loam	501	. 1
Scott silt loam, drained	860	. 1
Silver Creek silt loam	989	. 2
Simeon sandy loam, 0 to 3 percent slopes	513	. 1
Thurman fine sandy loam, terrace, 0 to 3 percent slopes	268	(1)
Thurman-Valentine loamy fine sands, 0 to 3 percent slopes	665	. 1
Thurman-Valentine loamy fine sands, 3 to 5 percent slopes	3, 106	. 5
Thurman-Valentine loamy fine sands, loamy substratum, 0 to 3 percent slopes	284	(1)
Thurman-Valentine loamy fine sands, terrace, 0 to 3 percent slopes	5, 917	1. 0
Uly silt loam, 11 to 15 percent slopes	12, 796	2. 1
Uly, Holdrege and Coly soils, 5 to 11 percent slopes, eroded	39, 884	6. 6
Uly and Holdrege silt loams, 5 to 11 percent slopes	34, 002	5. 6
Valentine loamy fine sand, 3 to 17 percent slopes	21, 007	3. 4
Wann fine sandy loam	1, 559	. 3
Wann loam	2, 513	. 4
Wet alluvial land	1, 166	. 2
Wood River silt loam, 0 to 1 percent slopes	23, 380	3. 8
Wood River silt loam, 1 to 3 percent slopes	894	. 1
Wood River-Slickspots complex, 0 to 1 percent slopes	1, 428	. 2
Total land area	609, 280	100. 0
Water areas greater than 40 acres in size	11, 412	

[1] Less than 0.05 percent.

Alda Series

The Alda series consists of moderately deep, somewhat poorly drained, nearly level soils on bottom lands in the valley along the Platte River. Some areas are dissected by shallow abandoned channels of the Platte River. These soils are moderately deep over mixed sand and gravel. The sand and gravel limit effective root development. The water table fluctuates seasonally between depths of 2 and 6 feet. It is lowest in summer and highest in winter and spring.

In a representative profile the surface layer is dark-gray loam 8 inches thick. This layer is calcareous. The next layer is 18 inches thick and consists of light-gray very friable fine sandy loam that is calcareous. This layer, especially the lower part, contains brownish mottles. The underlying material is fine sandy loam to a depth of 26 inches and mixed sand and gravel from a depth of 26 inches to 50 inches.

Permeability is moderately rapid, and available water capacity is low. Capillary action brings soluble salts to the surface in winter and spring, but in summer rains leach and wash away most of these salts.

Alda soils are suited to all of the locally grown field crops.

Representative profile of Alda loam in an irrigated field 0.35 mile south and 0.3 mile west of the northeast corner of sec. 15, T. 8 N., R. 15 W.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.9; abrupt, smooth boundary.

CI—8 to 26 inches, light-gray (2.5YR 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; few, coarse, distinct, brownish mottles; massive; slightly hard when dry, very friable when moist; pH (paste) 7.8; abrupt, smooth boundary.

IIC2—26 to 50 inches, pale-brown (10YR 6/3) mixed sand and gravel; loose.

The A horizon is dark gray to very dark grayish brown and ranges from 7 to 20 inches in thickness. The combined thickness of the A and C1 horizons ranges from 20 to 40 inches, but the average thickness is 26 inches. Thin lenses of silt, clay, or sand are common.

Alda soils are similar to Lex, Platte, Leshara, and Wann soils in drainage characteristics. Alda soils have a coarser textured A horizon than Lex soils and lack the moderately fine textured AC horizon of Lex soils. They are deeper over mixed sand and gravel than Platte soils and shallower over mixed sand and gravel than Leshara or Wann soils.

Alda fine sandy loam (0 to 1 percent slopes) (Ax).—This soil occupies long, narrow, irregularly shaped areas 10 to 80 acres in size. A few areas are dissected by shallow drainage channels.

The profile of this soil is similar to that described as representative for the series, except its surface layer is coarser textured. Included with this soil in mapping were Platte soils in the channels and drains that dissect some areas. Also included were small areas of Gibbon and Wann soils.

Surface runoff is slow, and soil blowing can be a serious hazard. When dryfarmed, this soil is droughty. Irrigation improves production, but the available water capacity is low. There is danger of leaching out most of the nutrients if this soil is overirrigated.

This soil is suited to most of the commonly grown crops. About half of the acreage is cultivated, and most of the cultivated areas are irrigated. A few areas are still in native grass and are used as range or mowed for hay. (Capability units IIw-6 dryland and IIw-6 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Alda loam (0 to 1 percent slopes) (Ay).—This soil occupies long, irregularly shaped areas 10 to 100 acres in size. A few areas are dissected by drains and abandoned channels.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were small areas of Platte, Gibbon, and Wann soils. Of these three, the Platte soil is the most extensive.

Surface runoff is slow. The proximity of sand and gravel to the surface and the many channels make land leveling difficult. Irrigation water can be applied frequently in small amounts, but overirrigation leaches nutrients out of the root zone.

Some of the acreage is cultivated, but the areas that are extensively dissected by drainage channels are still in native grass. Most of the cultivated areas are irrigated. (Capability units IIw-4 dryland and IIw-4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Blendon Series

The Blendon series consists of deep, well-drained soils on stream terraces along the Platte and South Loup Rivers. These soils formed in moderately coarse textured material. They are underlain by mixed sand and gravel along the Platte River and by medium and coarse sand along the South Loup River.

In a representative profile the surface layer is dark-gray fine sandy loam 17 inches thick. The subsoil is dark grayish-brown very friable fine sandy loam 9 inches thick. The underlying material is grayish-brown fine sandy loam to a depth of 36 inches; calcareous grayish-brown loamy sand with some gravel to a depth of 42 inches; and mixed sand and gravel to a depth of 52 inches.

Permeability is moderately rapid, and available water capacity is moderate.

Blendon soils are suited to all of the locally grown crops. Most areas are irrigated.

Representative profile of Blendon fine sandy loam, 0 to 1 percent slopes, in an irrigated field 150 feet south and 0.49 mile west of the northwest corner of sec. 7, T. 8 N., R. 15 W.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.8; abrupt, smooth boundary.

A12—7 to 17 inches. dark-gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 7.3; clear, smooth boundary.

B—17 to 26 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 7.7; clear, smooth boundary.

C1—26 to 36 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard when dry, very friable when moist; pH (paste) 7.4; abrupt, smooth boundary.

IIC2—36 to 42 inches, grayish-brown (10YR 5/2) loamy sand with some gravel, dark grayish brown (10YR 4/2) moist; single grained; loose; calcareous; pH (paste) 8.4; abrupt, smooth boundary.

IIC3—42 to 52 inches, light brownish-gray (10YR 6/2) mixed sand and gravel; grayish brown (10 YR 5/2) moist; single grained; loose; calcareous; pH (paste) 8.6.

The A horizon ranges from 15 to 23 inches in thickness. The C horizon is stratified in some places with moderately coarse soil material. The C horizon is calcareous along the Platte River and noncalcareous along the South Loup River.

Blendon soils are similar to Hord, Hall, and Ortello soils in location on the landscape. Blendon soils have a coarser textured B horizon than Hord or Hall soils. They have a thicker A horizon than Ortello soils and lack the loamy IIC horizon that is part of most Ortello soils in Buffalo County. Blendon soils are finer textured throughout the solum and have a thicker A horizon than Thurman or Valentine soils.

Blendon fine sandy loam, 0 to 1 percent slopes (Bdn).—This soil occupies tracts 10 to 400 acres in size. The largest tracts are along the Platte River.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were areas of Hord silt loam and Blendon loam. Blendon loam makes up nearly 30 percent of some areas.

Surface runoff is slow, and soil blowing is a serious problem in winter and spring. Care can be taken to avoid leaving this soil bare for extended periods of time. When dryfarmed, it is somewhat droughty.

Most of the acreage is cultivated, and about half of it is irrigated. Only small, odd-shaped areas are still in native grass. (Capability units IIe-3 dryland and IIe-3 irrigated; Sandy range site; Sandy windbreak suitability group)

Blendon fine sandy loam, 1 to 3 percent slopes (BdnA).—This soil occupies irregularly shaped areas 10 to 80 acres in size, on narrow ridges and low hummocks.

The profile of this soil is similar to that described as representative for the series. On some ridges and tops of hummocks, however, this soil has been eroded and the upper part of the profile is lighter colored. Included with this soil in mapping were Thurman soils and Blendon soils that have a loam surface layer.

Surface runoff is slow. Soil blowing is the greatest hazard, particularly in winter and spring. Droughtiness also is a problem.

Some of the acreage is irrigated, but most of it is dryfarmed. A few small, odd-shaped areas are still in native grass. (Capability units IIIe-3 dryland and IIe-31 irrigated; Sandy range site; Sandy windbreak suitability group)

Blendon loam, 0 to 1 percent slopes (Bed).—This soil occupies irregularly shaped areas 10 to 100 acres in size. The largest, most uniform areas are along the Platte River.

The profile of this soil is similar to that described as representative for the series, except its surface layer is loam and the underlying material is stratified silt and sand. This soil is more stratified along the South Loup River than it is along the Platte River. Included with it in mapping were Hord silt loam and Blendon fine sandy loam.

Surface runoff is slow, and droughtiness is a concern if the soil is dryfarmed.

Nearly all of the acreage is cultivated. Only small, odd-shaped areas are still in native grass. About 70 percent of the acreage is along the Platte River and is irrigated. The remaining 30 percent is along the South Loup River and is dryfarmed. (Capability units IIc-1 dryland and I-2 irrigated; Sandy range site; Silty to Clayey windbreak suitability group)

Blendon loam, 1 to 3 percent slopes (BedA).—This soil occupies irregularly shaped areas 5 to 50 acres in size.

The profile of this soil is similar to that described as representative for the series, except its surface layer is finer textured and in some areas is lighter colored and thinner. The subsoil, especially in areas along the South Loup River, is stratified with silt and sand. Included with this soil in mapping were areas of Blendon fine sandy loam and Hord silt loam.

Surface runoff is slow, and droughtiness is a concern if the soil is dryfarmed.

This soil is irrigated along the Platte River and is dryfarmed along the South Loup River. (Capability units IIe-1 dryland and IIe-1 irrigated; Sandy range site; Silty to Clayey windbreak suitability group)

Boel Series

The Boel series consists of deep, somewhat poorly drained, nearly level soils that formed in stratified loamy and sandy alluvium on bottom lands of the South Loup River. Most areas are dissected by channels or are low and hummocky. The water table is at a depth of 2 to 5 feet. It is highest in winter and spring.

In a representative profile the surface layer is dark-gray fine sandy loam 6 inches thick. The transition layer is 8 inches thick and consists of loose gray loamy fine sand. The underlying material is light brownish-gray fine sand that reaches to a depth of 60 inches. It is mottled between depths of 20 and 40 inches.

Permeability is rapid. Available water capacity is low, but rainfall is readily absorbed. Natural fertility is low.

Most areas of Boel soils are used as range or hayland.

Representative profile of Boel fine sandy loam in native grass 0.3 mile north and 0.1 mile west of the southeast corner of sec. 26, T. 12 N., R. 17 W.:

A—0 to 6 inches, dark-gray (10YR 4/1) fine sandy loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.6; abrupt, smooth boundary.

AC—6 to 14 inches, gray (10YR 5/1) loamy fine sand, very dark grayish brown (10YR 3/2) moist; single grained; loose; pH (paste) 7.1; abrupt, smooth boundary.

IIC1—14 to 20 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; calcareous; pH (paste) 7.5; clear, smooth boundary.

IIC2—20 to 40 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; common, medium, distinct mottles; single grained; loose; calcareous; pH (paste) 7.7; clear, smooth boundary.

IIC3—40 to 60 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; pH (paste) 7.8.

The A horizon ranges from 6 to 14 inches in thickness. It is thickest in areas of low elevation and thinnest in ridgetops. In some areas the C horizon is stratified with thin lenses of silt or coarse sand and gravel. Free lime is lower in the profile than in the defined range for the series, but this does not alter usefulness or management of these soils.

Boel soils are similar to Inavale, Wann, Loup, and Leshara soils in location in the landscape. Boel soils have a darker A horizon than Inavale soils, and the water table is higher than in Inavale soils but not so high as in Loup soils. Boel soils have a thinner A horizon and a coarser textured C horizon than Wann or Leshara soils.

Boel fine sandy loam (0 to 3 percent slopes) (Bob).—This soil occupies irregularly shaped areas 5 to 100 acres in size. Many areas are dissected by channels or have wind-deposited low hummocks.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were small areas of Inavale soils that are at higher elevations and have a lower water table. Also included were small areas of Wann and Gibbon soils.

Surface runoff is slow, and soil blowing and drought are the greatest hazards. The water table is lowest in midsummer, generally at the time crops most need water. Natural fertility is low.

Most of the acreage is used as range or hayland. (Capability units IIIw–6 dryland and IIw–61 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Boel loam (0 to 3 percent slopes) (Boc).—This soil occupies irregularly shaped areas 5 to 50 acres in size. Most of the areas are smooth, but some are dissected by channels or have wind-deposited hummocks.

The profile of this soil is similar to that described as representative for the series, except its surface layer is finer textured. Included with this soil in mapping were areas of Boel fine sandy loam and Inavale, Wann, and Gibbon soils. These soils make up as much as 25 percent of some areas.

Surface runoff is slow, and drought is the greatest hazard. Natural fertility is low.

A few areas are cultivated, but most of the acreage is used as range or hayland. (Capability units IIw–4 dryland and IIw–4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Breaks-Alluvial Land Complex

Breaks-Alluvial land complex (0 to 30 percent slopes) (By) is made up of two land types. The breaks consist of short, steep side slopes. The nearly level Alluvial land is on bottoms of the Wood River and other small streams in Buffalo County. Silty Breaks make up as much as 60 percent of areas in which streams are deeply entrenched. Short side slopes make up less than 25 percent of some areas, and Alluvial land makes up 40 to 75 percent of some areas.

The side slopes range from 11 to 30 percent. The surface layer is loam or silt loam 8 to 12 inches thick. Depth to calcium carbonate is variable, but usually greater than 18 inches. The bottom lands consist of deposits of alluvium that are added each time the streams flood. The material is silty and highly stratified with layers of light and dark-colored material.

Surface runoff is very rapid on the Breaks and slow to medium on the Alluvial land.

The acreage is used as range, but the quantity of grass produced is low. Trees grow well, but their shade reduces the quantity of grass that is produced. (Dryland capability unit VIe–1; Breaks part in the Silty range site, and the Alluvial land part in Silty Overflow range site; Silty to Clayey windbreak suitability group)

Cass Series

This series consists of deep, well-drained, moderately coarse textured soils that formed in loamy and sandy stream deposits on bottom lands of Mud Creek and the South Loup and Platte Rivers. They are underlain by coarse and medium sand along the South Loup River and its tributaries and by coarse sand and gravel along the Platte River. The water table is at depths of 12 to 20 feet.

In a representative profile the surface layer is gray fine sandy loam 11 inches thick. Transitional from the surface layer to the underlying material is 6 inches of grayish-brown very friable fine sandy loam. The underlying material is light brownish-gray loamy fine sand to a depth of 23 inches; grayish-brown fine sandy loam to a depth of 27 inches; light brownish-gray fine sandy loam to a depth of 33 inches; and light brownish-gray fine sand to a depth of 60 inches.

Permeability is moderately rapid, and available water capacity is moderate.

Cass soils are suited to all of the locally grown grain crops. Many areas are irrigated. Alfalfa and trees benefit in some areas because their roots extend down to the water table.

Representative profile of Cass fine sandy loam in an irrigated field 0.25 mile south and 0.1 mile west of the northwest corner of sec. 12, T. 12 N., R. 15.:

Ap—0 to 8 inches, gray (10YR 5/1) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

A12—8 to 11 inches, gray (10YR 5/1) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.3; clear, smooth boundary.

AC—11 to 17 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, fine, subangular blocky structure; slightly hard when dry, very friable when moist; pH (paste) 6.6; abrupt, smooth boundary.

C1—17 to 23 inches, light brownish-gray (10YR 6/2) loamy fine sand, dark grayish brown (14YR 4/2) moist; single grained; slightly hard when dry, very friable when moist; pH (paste) 6.4; abrupt, smooth boundary.

C2—23 to 27 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; single grained; slightly hard when dry, very friable; pH (paste) 6.2; abrupt, smooth boundary.

C3—27 to 33 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; single grained; slightly hard when dry, very friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

IIC4—33 to 60 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; soft when dry, loose when moist; pH (paste) 7.6.

The A horizon ranges from 7 to 16 inches in thickness and is lighter colored in cultivated areas than in those never cultivated. The C horizon is generally stratified with thin lenses of silty material or with sand and gravel. Class soils are noncalcareous, but calcium carbonate is present in some areas.

Cass soils are associated with Wann, Leshara, Gibbon, and Grigston soils. They are similar to Wann soils in thickness and texture of horizons but have a lower water table. Cass soils have a coarser textured C horizon and a lower water table than Leshara or Gibbon soils. They are similar to Grigston soils in depth to water table and location in the landscape but have a coarser textured C horizon.

Cass fine sandy loam (0 to 3 percent slopes) (Cs).—This soil occupies irregularly shaped areas 5 to 80 acres in size.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were areas of Cass loam and Grigston silt loam.

Surface runoff is slow, and soil blowing can be a serious hazard.

This soil is suited to all of the crops commonly grown in the county. Most of the acreage is cultivated, and much of it is irrigated. (Capability units IIe–3 dryland and IIe–3 irrigated; Sandy Lowland range site; Sandy windbreak suitability group)

Cass loam (0 to 1 percent slopes) (Cm).—This soil occupies irregularly shaped areas 5 to 60 acres in size.

The profile of this soil is similar to that described as representative of the series, except its surface layer is finer textured. Included with this soil in mapping were a few areas of Cass loam that have slopes of more than 1 percent and small areas of Grigston silt loam and Cass fine sandy loam.

Surface runoff is slow.

This soil is suited to all of the crops commonly grown in the county. Most of the acreage is cultivated, and much of it is irrigated. (Capability units I–1 dryland and I–1 irrigated; Sandy Lowland range site; Silty to Clayey windbreak suitability group)

Coly Series

The Coly series consists of deep, medium-textured, well-drained soils that formed in calcareous loess on uplands. These soils are sloping to steep.

In a representative profile the surface layer is grayish-brown silt loam 5 inches thick. Transitional from the surface layer to the underlying material is 3 inches of light brownish-gray friable silt loam that is calcareous. The underlying material is light-gray silt loam that is calcareous to a depth of 60 inches.

Permeability is moderate, and available water capacity is high. Natural fertility and organic-matter content are low. Coly soils have medium internal drainage.

Most areas of the steep Coly soils are in native grasses. Most areas of the sloping Coly soils have been cultivated, and some areas have been reseeded to native grasses.

Representative profile of Coly silt loam in an area of Coly, Uly, and Hobbs soils, 15 to 31 percent slopes, in native range 100 feet west and 0.2 mile north of the southeast corner of sec. 30, T. 11 N., R. 17 W.:

A—0 to 5 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 7.4; abrupt, smooth boundary.

AC—5 to 8 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium and fine, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.8; abrupt, smooth boundary.

C—8 to 60 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; soft when dry, very friable when moist; calcareous; pH (paste) 7.6.

The A horizon ranges from 4 to 7 inches in thickness. It is generally grayish brown in soils that have not been cultivated and light brownish gray in soils that have been cultivated. Carbonates are at a depth of 0 to 10 inches.

Coly soils are associated with Uly, Kenesaw, and Holdrege soils. They differ from Uly and Holdrege soils in having a thinner and lighter colored A horizon and calcium carbonate at a shallower depth, and they lack the B horizon of Holdrege and Uly soils. Coly soils generally have steeper slopes and a thinner A horizon than Kenesaw soils and are not so deeply leached of calcium carbonate.

Coly silt loam, 5 to 11 percent slopes (CbC).—This soil occupies irregularly shaped tracts 30 to 600 acres in size. Slopes are 100 to 600 feet long.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner and lighter colored. Included with this soil in mapping were areas of Uly and Holdrege soils that make up as much as 25 percent of a given area but not more than 10 percent of the total acreage. Also included were small areas of Coly silt loam that have slopes of 11 to 15 percent. Brownish and reddish loess is exposed in some areas west of Pleasanton.

Surface runoff is rapid, and water erosion is the greatest hazard in cultivated areas (fig. 5). Natural fertility is low.

Most of the acreage is cultivated, but some areas have been seeded to native grasses. (Capability units IVe–8 dryland and IVe–11 irrigated; Limy Upland range site; Silty to Clayey windbreak suitability group)

Coly silt loam, 11 to 31 percent slopes (CbE).—This soil occupies irregularly shaped tracts 20 to 600 acres in size.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner and lighter colored. Included with this soil in mapping was Hobbs silt loam, occasionally flooded. It is on the bottoms of the drainageways and in many places has been covered by silty material that has eroded from Coly soils on the adjacent slopes.

Surface runoff is very rapid, and the erosion hazard is severe if this soil is cultivated. The slopes are short, and parts of them are steep and rough.

This soil is poorly suited to cultivated crops. It is best suited to native grasses used for grazing. (Capability unit VIe–8 dryland; Limy Upland range site; Silty to Clayey windbreak suitability group)

Coly, Uly, and Hobbs soils, 15 to 31 percent slopes (CYE).—These soils occupy irregularly shaped tracts 20 to 500 acres in size. They occupy the bottoms and borders of upland drainageways. About 60 percent of any given area is Coly silt loam, 20 percent is Uly silt loam, and 20 percent is Hobbs silt loam.

The Coly soil is steep and has short side slopes that border drains. It has the profile described as representative for the Coly series. The Uly soil is moderately steep and border drains. The Hobbs soil is on the alluvial bottoms of drains. The Uly and Hobbs soils have profiles similar to those described as representative for their respective series.

Included with these soils in mapping was Rough broken land, loess, which has the steepest slopes. It is locally referred to as catsteps. In some areas along the South Loup River, as much as 25 percent of this mapping unit consists of sandy soils.

Surface runoff is very rapid, and water erosion is the principal hazard in cultivated areas.

These soils are used for range. They are poorly suited to cultivated crops, even though some areas of Hobbs soil

Figure 5.—**Farming up and down the slope, without management of crop residue or use of terraces, has greatly increased water erosion on Coly silt loam, 5 to 11 percent slopes.**

on the bottoms of drains are cultivated. (All soils in capability unit VIe–9 dryland; Coly part in Limy Upland range site, Uly part in Silty range site, and Hobbs part in Silty Overflow range site; all soils in Silty to Clayey windbreak suitability group)

Cozad Series

The Cozad series consists of deep, well-drained, medium-textured, nearly level soils on stream terraces and gently sloping soils that border small drains dissecting stream terraces of the Platte River valley. These soils are also along Elm Creek and the Wood and South Loup Rivers. They formed in silty and loamy alluvium on natural levees.

In a representative profile the surface layer is gray silt loam 12 inches thick. The subsoil is grayish-brown friable silt loam 6 inches thick. The underlying material is light brownish-gray loam that extends to a depth of 60 inches. It is calcareous at a depth of 48 inches.

Permeability is moderate, and available water capacity is high.

Cozad soils are suited to all of the locally grown crops. Most areas are cultivated and irrigated.

Representative profile of Cozad silt loam, 0 to 1 percent slopes, in an irrigated field 100 feet west and 200 feet north of the southeast corner of sec. 29, T. 9 N., R. 17 W.:

Ap—0 to 8 inches, gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.7; abrupt, smooth boundary.

A12—8 to 12 inches, gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.4; abrupt, smooth boundary.

B—12 to 18 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate, fine to medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 6.2; clear, smooth boundary.

C1—18 to 48 inches, light brownish-gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; pH (paste) 6.2; gradual, smooth boundary.

C2—48 to 60 inches, light brownish-gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.1.

The A horizon ranges from 7 to 16 inches in thickness. Buried soils are common at depths of 2 to 6 feet. Depth to calcium carbonate ranges from 15 to 50 inches or more. Thin lenses of sandy material are common in the C horizon.

Cozad soils are associated with Hord, Hall, and Wood River soils. They have a slightly thinner A horizon and a much thinner B horizon than Hord soils. Cozad soils have a thinner A horizon and a less clayey B horizon than Hall soils and a less clayey B horizon than Wood River soils.

Cozad silt loam, 0 to 1 percent slopes (Coz).—This soil occuppies tracts 10 to more than 300 acres in size. It is in bands that range from 100 to 2,000 feet in width.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were small areas of Hord silt loam and Hall silt loam. Also included were areas of Cozad silt loam that have slopes of more than 1 percent.

Surface runoff is slow.

This soil is suited to all of the crops commonly grown in the county. Nearly all of the acreage is cultivated and irrigated. Only small or odd-shaped areas are in native grass or are dryfarmed. (Capability units IIc–1 dryland and I–2 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Cozad silt loam, 1 to 3 percent slopes (CozA).—This soil occupies long, narrow areas, 10 to 80 acres in size, away from drains and streams. The areas range from 100 to 300 feet in width.

Included with this soil in mapping were small areas of Cozad silt loam that have slopes of less than 1 percent and a few areas that have slopes of more than 3 percent. Also included were small areas of Hord silt loam and Hall silt loam.

Surface runoff is slow, and water erosion is a minor hazard.

This soil is suited to all of the locally grown crops. The acreage is cultivated and irrigated, except for a few odd-shaped areas still in native grass or dryfarmed. (Capability units IIe–1 dryland and IIe–1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Cozad silt loam, 3 to 5 percent slopes, eroded (CozB2).—This soil occupies long, irregularly shaped areas 5 to 40 acres in size. They border drains and are also on long, narrow ridges.

The profile of this soil is similar to that described as representative for the series, except its surface layer is lighter colored and thinner as a result of erosion. In some areas the lighter colored subsoil is now at the surface or has been mixed with the surface layer during cultivation.

Included with this soil in mapping were a few areas that have not been cultivated, and these are not eroded. Also included were small areas of Hobbs silt loam, occasionally flooded, in the bottoms of some drains.

Surface runoff is medium, and erosion is a serious hazard.

Much of the acreage is cultivated, and some of it is irrigated. The irrigated areas are generally parts of larger fields. (Capability units IIIe–1 dryland and IIIe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Cozad silt loam, 5 to 11 percent slopes, eroded (CozC2).—This soil occupies small, narrow areas 4 to 30 acres in size. It borders drains and is also at levels between stream terraces.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner as a result of erosion. Included with this soil in mapping were a few areas that have not been cultivated, and these are not eroded.

Surface runoff is rapid, and erosion is a serious hazard. The shape and size of the tillable areas make terracing difficult.

Most of the acreage is cultivated, and some of it is irrigated. (Capability units IVe–1 dryland and IVe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Gibbon Series

The Gibbon series consists of deep, somewhat poorly drained, nearly level soils that formed in silty alluvium on bottom lands and low stream terraces along the Platte and South Loup Rivers. These soils are underlain by mixed sand and gravel along the Platte River and by course sand along the South Loup River. The water table is 2 to 6 feet from the surface. It is highest in winter and spring and lowest in summer and fall.

In a representative profile the surface layer is dark-gray silt loam 18 inches thick. It is calcareous at a depth of 10 inches. Transitional from the surface layer to the underlying material is 3 inches of gray friable silt loam. The underlying material is light-gray, mottled, calcareous silt loam to a depth of 33 inches; dark grayish-brown mottled loam to a depth of 38 inches; and light brownish-gray, distinctly mottled loamy sand and gravel to a depth of 40 inches. Below this is light brownish-gray mixed sand and gravel.

Permeability is moderate, and available water capacity is moderate.

Gibbon soils are easily tilled. They are suited to native grasses that can be used as range or mowed for hay. Alfalfa and trees benefit in some areas because their roots extend down to the water table.

Representative profile of Gibbon silt loam (fig. 6) in an irrigated field 0.54 mile south and 150 feet west of the northeast corner of sec. 4, T. 8 N., R. 13 W.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.7; abrupt, smooth boundary.

A12—7 to 10 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 7.4; abrupt, smooth boundary.

A13—10 to 18 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; calcareous; pH 7.8; abrupt, smooth boundary.

AC—18 to 21 inches, gray (10YR 5/1) silt loam, dark gray (10YR 4/1) moist and rubbed; weak, fine, subangular blocky structure parting to massive; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.9; clear, wavy boundary.

C—21 to 33 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; few, fine, faint mottles; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 8.1; abrupt, wavy boundary.

Figure 6.—**Profile of Gibbon silt loam, a deep, somewhat poorly drained soil on bottom lands. Soil is medium textured to a depth of the second marker; the dark, uneven layer just above that marker indicates an old buried soil.**

IIC1—38 to 40 inches, light brownish-gray (10YR 6/2) loamy sand and gravel, dark grayish brown (10YR 4/2) moist; common, medium, distinct, yellowish mottles; single grained; loose; pH (paste) 8.0; clear, wavy boundary.

IIC2—40 to 60 inches, light brownish-gray (10YR 6/2) mixed sand and gravel, very dark grayish brown (10YR 3/2) moist; medium, distinct mottles; single grained; loose; pH (paste) 8.1:

The A horizon ranges from 10 to 20 inches in thickness and is calcareous in some areas. Calcium carbonate streaks and concretions are common in the upper part of the C horizon. Buried profiles are common on bottom lands and on some low stream terraces.

Gibbon soils are associated with Leshara, Lex, Alda, and Silver Creek soils. They generally have a thinner A horizon than Leshara soils and are deeper over sand and gravel than Lex or Alda soils. Gibbon soils lack the clayey B horizon of Silver Creek soils.

Gibbon silt loam (0 to 1 percent slopes) (Gg).—This soil occupies tracts 10 to 400 acres in size. The largest tract is on high bottom land. In the area south of Gibbon the water table is at a depth of 6 to 8 feet during the drier part of the year.

The profile of this soil is the one described as representative of the series. Included with this soil in mapping were a few small areas of Silver Creek silt loam and Leshara silt loam. Also included were areas of Gibbon silt loam, saline.

Surface runoff is slow. This soil is moderately corrosive, and buried iron pipe lasts only a few years.

Most of the acreage is used as irrigated cropland. (Capability units IIw-4 dryland and IIw-4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Gibbon silt loam, saline (0 to 1 percent slopes) (2Gg).—This soil occupies tracts, 20 to 200 acres in size, on high bottom lands.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner and the underlying material is silty clay loam. Included with this soil in mapping were a few areas that have slopes of 2 percent.

Surface runoff is very slow. About 20 percent of this soil is moderately affected by soluble salts. It is in depressions that range from less than 1 acre to 10 acres in size. The soil in areas between depressions is not affected or is only slightly affected by soluble salts.

Good surface drainage is important because low areas that hold water, even for a short time, increase salinity. Crops are generally disappointing the first year after leveling, but irrigation water leaches out the soluble salts and makes the soil better suited to crops. In areas that are used for range and are overgrazed, inland saltgrass is a serious problem. This soil is corrosive, and buried iron pipe lasts only a few years.

About half of the acreage is still in native grass, and the rest is used as irrigated cropland. Salt-tolerant crops, such as beets, grain sorghum, corn, and alfalfa, grow fairly well. Potatoes are less tolerant of salts and grow poorly. (Capability units IVs-1 dryland and IIIs-1 irrigated; Subirrigated range site; Moderately Saline or Alkali windbreak suitability group)

Grigston Series

The Grigston series consists of deep, well-drained medium-textured soils that are nearly level. They formed in silty to loamy alluvium on bottom lands along Mud Creek. The water table ranges from a depth of 12 to 20 feet.

In a representative profile the surface layer is gray silt loam 10 inches thick. The transitional layer below the surface layer is 2 inches of grayish-brown friable silt loam. The underlying material is light brownish-gray to grayish-brown silt loam and loam to a depth of 21 inches; light-gray loam to a depth of 33 inches; and light-gray fine sandy loam to a depth of 42 inches. Below this is light-gray fine sand.

Permeability is moderate, and available water capacity is moderate. Natural fertility is high, and organic-matter content is moderate. Grigston soils commonly receive runoff water from adjoining areas.

Grigston soils are easily tilled and are suited to the commonly grown dryfarmed and irrigated crops.

Representative profile of Grigston silt loam in a cultivated field 300 feet north and 300 feet west of the southeast corner of sec. 8, T. 12 N., R. 14 W.:

Ap—0 to 10 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 7.2; abrupt smooth boundary.

AC—10 to 12 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 7.5; clear, smooth boundary.

C1—12 to 17 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist: massive; slightly hard when dry, friable when moist; pH (paste) 7.6; abrupt, smooth boundary.

C2—17 to 21 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard when dry, friable when moist; calcareous; pH (paste) 8.0; abrupt, smooth boundary.

C3—21 to 33 inches, light-gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, friable when moist; calcareous; pH (paste) 8.0; abrupt, smooth boundary.

C4—33 to 42 inches, light-gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; single grained; slightly hard when dry, very friable when moist; calcareous; pH (paste) 8.2; abrupt, smooth boundary.

IIC5—42 to 50 inches, light-gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose, calcareous; pH (paste) 7.4; abrupt, smooth boundary.

IIC6—50 to 60 inches, light-gray (10YR 7/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; pH (paste) 7.2.

The A horizon ranges from 10 to 20 inches in thickness. The C horizon is calcareous in the upper part, but the lower part generally lacks free calcium carbonate. Faint mottlings are present at depths below 40 inches in some profiles. Stratification with moderately fine textured to coarse-textured soil material is common between depths of 12 and 42 inches.

Grigston soils are associated with Cass, Leshara, Gibbon, and Hobbs soils. They are similar to Cass soils in depth to water table and location in the landscape, but the upper part of their C horizon is finer textured and generally has more calcium carbonate. Grigston soils have better drainage than Leshara or Gibbon soils and have a thinner A horizon and a lighter colored C horizon than Hobbs soils.

Grigston silt loam (0 to 1 percent slopes) (Gk).—This soil occupies irregularly shaped areas 5 to 100 acres in size.

Included with this soil in mapping were small areas of Cass Loam and Cass fine sandy loam. Also included were a few areas of moderately well drained soils that have a water table within 6 feet of the surface.

Surface runoff is slow. This soil does not have a high water table, so there is no benefit from this source to shallow-rooted crops.

This soil is suited to all of the crops commonly grown in the county. Most of the acreage is cultivated, and some of it is irrigated. (Capability units I-1 dryland and I-1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hall Series

The Hall series consists of deep, well-drained soils on loess-capped alluvial stream terraces of the Platte River valley and on flats on the loess uplands. On the uplands, these soils formed in loess that is 10 or more feet thick. Near the break from the stream terraces to the bottom lands, mixed sand and gravel is commonly within 6 feet of the surface.

In a representative profile the surface layer is dark-gray silt loam 17 inches thick. The subsoil is grayish-brown firm light silty clay loam to a depth of 21 inches; grayish-brown firm silty clay loam to a depth of 29 inches; and pale-brown friable silt loam to a depth of 33 inches. The subsoil is not so friable as the surface layer. The underlying material is light brownish-gray silt loam to a depth of 46 inches; below this it is light-gray silt loam that is calcareous.

Permeability is moderately slow, and available water capacity is high.

Hall soils are among the best soils in the county for cultivated crops. Most areas are irrigated, particularly the stream terraces in the Platte River valley.

Representative profile of Hall silt Loam, terrace, 0 to 1 percent slopes, in an irrigated field 0.37 mile west and 300 feet south of the northeast corner of sec. 31, T. 9 N., R. 15 W.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.5; abrupt, smooth boundary.

A12—8 to 17 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.5; abrupt, smooth boundary.

B21—17 to 21 inches, grayish-brown (10YR 5/2) light silty clay loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, fine, subangular blocky structure; hard when dry, firm when moist; pH (paste) 7.3; abrupt, smooth boundary.

B22t—21 to 29 inches, grayish-brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist and rubbed; weak medium, prismatic structure parting to moderate, medium, subangular blocky structure; hard when dry, firm when moist; pH (paste) 7.3; clear, smooth boundary.

B3—29 to 33 inches, pale-brown (10YR 6/3) silt loam, brown (10 YR 5/3) moist and rubbed; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 7.1; abrupt, smooth boundary.

C1—33 to 46 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; pH (paste) 7.1; abrupt, smooth boundary.

C2—46 to 60 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.5.

The A horizon ranges from 15 to 22 inches in thickness. and the upper 4 to 6 inches of the B horizon is the same color as the A horizon. The clay content of the B22t horizon ranges from 27 to 35 percent. The solum ranges from 26 to 40 inches in thickness, and depth to free calcium carbonate ranges from 30 to 60 inches.

Hall soils are associated with Holdrege, Hord, and Wood River soils. They are darker colored in the upper part of the B horizon than Holdrege soils but are similar to Holdrege soils in drainage characteristics. Hall soils have a thicker A horizon and a less clayey B horizon than Wood River soils. They have a more clayey B2 horizon than Hord soils.

Hall silt loam, terrace, 0 to 1 percent slopes (Ha).—This soil occupies tracts, 20 to more than 500 acres in size, on alluvial stream terraces in the Platte and Wood River valleys.

The profile of this soil is the one described as representative of the series. During land leveling, part or all of the surface layer has been removed from some areas of cultivated fields and deposited elsewhere in the fields. Included with this soil in mapping were small areas of Wood River silt loam and Hord silt loam.

Surface runoff is slow, and soil blowing and water erosion can be hazards. A good supply of underground water is beneath this soil.

Most of the acreage is cultivated and irrigated. (Capability units IIc–1 dryland and I–2 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hall silt loam, terrace, 1 to 3 percent slopes (HaA).—This soil occupies areas 5 to 30 acres in size. It borders shallow drains and is also on narrow ridges and between stream terraces.

The profile of this soil is similar to that described as representative for the series, except its surface layer is slightly thinner. A few areas are moderately eroded. Erosion and land leveling have uncovered the subsoil in some areas. Included with this soil in mapping were small areas of Wood River silt loam and Hord silt loam.

Surface runoff is slow, and water erosion is a hazard.

Most of the acreage is cultivated and irrigated. (Capability units IIe–1 dryland and IIe–1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hobbs Series

The Hobbs series consists of deep, medium-textured, well-drained, nearly level to gently sloping soils at the base of slopes, on alluvial fans, on occasionally flooded bottoms of upland drains, and on creek bottoms that are seldom flooded but receive runoff from adjacent hills. These soils formed in water-deposited silts.

In a representative profile the surface layer is dark-gray silt loam 28 inches thick. Below it is a transitional layer, 10 inches thick, that consists of grayish-brown friable silt loam. The underlying material is grayish-brown silt loam.

Permeability is moderate, and available water capacity is high.

Hobbs soils are suited to all of the locally grown crops.

Representative profile of Hobbs silt loam, 0 to 1 percent slopes, 150 feet east and 0.18 mile north of the southwest corner of sec. 14, T. 9 N., R. 16 W.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

A12—7 to 28 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.3; clear, smooth boundary.

AC—28 to 38 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 6.6; clear, smooth boundary.

C—38 to 60 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; massive; slightly hard when dry, very friable when moist; pH (paste) 6.7.

The combined thickness of A and AC horizons ranges from 20 to nearly 60 inches. It is thinnest in gently sloping soils on foot slopes. In flooded areas the A horizon is highly stratified with light and dark-colored soil material.

Hobbs soils are associated with Uly, Holdrege, Hord, and Hall soils. They have a thicker A horizon than Uly, Holdrege, Hord, and Hall soils. Hobbs soils are more friable in the B horizon than Hall and Holdrege soils.

Hobbs silt loam, occasionally flooded (0 to 3 percent slopes) (2Hb).—This soil occupies long, narrow areas, 5 to 100 acres in size, along upland drains and on the bottom lands of some major streams.

The profile of this soil is similar to the one described as representative of the series except that the surface layer and the underlying material are more highly stratified. Strata range from less than 1 inch to 4 inches in thickness. Some of the strata are calcareous, even though this soil is generally free of calcium carbonate. Included with this soil in mapping were areas of Hobbs silt loam, 0 to 1 percent slopes, and Breaks-Alluvial land complex.

Surface runoff is slow, and flooding can be a hazard in spring and summer. The floodwater usually drains away within a few hours, or a day at the most, but it deposits heavy loads of silt and debris. Flooding can be beneficial, but it drastically reduces the choice of crops that can be grown. Some of the upland drains are shallow and can be cultivated, but others are 5 to 6 feet wide and up to 10 feet deep. Cultivating this soil can be a problem because it is slow to dry out and cultivation is commonly delayed. Small grains lodge when flooded and are commonly lost.

This soil is suited to row crops, especially corn and grain sorghum, because these withstand more flooding than small grains and alfalfa and can benefit from the added moisture. (Capability unit IIw–31 dryland and IIw–3 irrigated; Silty Overflow range site; Moderately Wet windbreak suitability group)

Hobbs silt loam, 0 to 1 percent slopes (Hb).—This soil occupies tracts, 5 to 200 acres in size, on creek bottoms that are seldom flooded but receive runoff from adjacent hills.

The profile of this soil is the one described as representative of the series. Most areas have been developed for irrigation, and flooding has been eliminated by diversion and drainage ditches. Included with this soil in mapping were areas of Hord silt loam and Cozad silt loam. Also included were areas of Hobbs soils, occasionally flooded.

Surface runoff is slow.

This soil is one of the best cultivated soils in the county and is well suited to irrigation. It is less droughty than nearly level soils on uplands. About half of the acreage is irrigated, and the rest is dryfarmed. (Capability units I–1 dryland and I–1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hobbs silt loam, 1 to 3 percent slopes (HbA).—This soil occupies long, narrow areas, 5 to 80 acres in size, at the base of slopes, in uplands drains, and between uplands and alluvial stream terraces.

The profile of this soil is similar to that described as representative for the series. On the surface in some areas is 4 to 10 inches of soil material that has eroded from adjacent hills. Included with this soil in mapping were some areas that have a well-defined subsoil. Also included were small areas of Hobbs silt loam, occasionally flooded, and Holdrege silt loam.

Surface runoff is slow.

This soil can be irrigated, but because it is generally in narrow bands at the base of slopes, it is seldom cultivated except as part of a larger crop unit. (Capability units IIe–1 dryland and IIe–1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hobbs silt loam, 3 to 5 percent slopes (HbB).—This soil occupies areas, 5 to 50 acres in size, at the base of slopes and at the heads of upland drains.

The profile of this soil is similar to that described as representative for the series, except its surface layer is slightly thinner. Included with this soil in mapping were areas of Holdrege silt loam and of Hobbs silt loam at the base of slopes.

Surface runoff is medium, and erosion is the most serious hazard.

This soil is suited to all of the crops commonly grown in the county. It is generally cultivated. It can be irrigated, but generally it is not because it is in small, narrow areas. (Capability units IIIe–1 dryland and IIIe–1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Holdrege Series

The Holdrege series consists of deep, well-drained, nearly level to gently sloping soils on uplands. These soils formed in loess that is generally 10 or more feet thick.

In a representative profile the surface layer is gray to dark-gray silt loam 13 inches thick. The upper part of the subsoil is grayish-brown, firm light silty clay loam that is 9 inches thick. This layer is not so friable as the surface layer. The lower part of the subsoil is light brownish-gray friable silt loam 6 inches thick. The underlying material is light-gray silt loam that is calcareous at a depth of 34 inches.

Permeability is moderate, and available water capacity is high.

Holdrege soils are suited to all of the locally grown crops. Most areas are cultivated, and many areas are irrigated.

Representative profile of Holdrege silt loam described from an area of Holdrege-Hall silt loams, 0 to 1 percent slopes, 0.82 mile west and 100 feet south of the northeast corner of sec. 6, T. 10 N., R. 16 W.:

Ap—0 to 5 inches, gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.6; abrupt, smooth boundary.

A12—5 to 13 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.6; clear, smooth boundary.

B2t—13 to 22 inches, grayish-brown (10YR 5/2) light silty clay, loam, dark grayish brown (10YR 4/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; hard when dry, firm when moist; pH (paste) 6.8; clear, smooth boundary.

B3—22 to 28 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate, coarse, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 7.0; abrupt, smooth boundary.

C1—28 to 34 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; pH (paste) 7.1; abrupt, smooth boundary.

C2—34 to 60 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.4.

The A horizon ranges from 7 to 18 inches in thickness. The solum ranges from 24 to 36 inches in thickness, and the clay content in the B2t horizon ranges from 27 to 35 percent. Free calcium carbonate is at depths of 32 to 48 inches.

Holdrege soils are associated with Scott, Kenesaw, Hall, and Uly soils. They have a more friable, less clayey B horizon and are better drained than Scott soils. They have a thicker A horizon and a more clayey B horizon than Uly soils and a slightly thinner A horizon than Hall soils. They have a B horizon that is lacking in the Kenesaw soils.

Holdrege silt loam, 1 to 3 percent slopes (HoA).—This soil occupies irregular tracts, 5 to 200 acres in size, on narrow ridgetops in loess uplands and on some broad upland flats. The slopes are smooth and are 50 to 400 feet long.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner in some areas because land leveling has removed much of it. In other areas soil blowing and erosion have removed part of the surface layer. The subsoil has been uncovered in only a few areas. Included with this soil in mapping were small areas of Hobbs silt loam; Holdrege silt loam, 3 to 5 percent slopes; and Holdrege-Hall silt loams, 0 to 1 percent slopes.

Surface runoff is slow, and erosion is a hazard.

This soil is suited to all of the crops commonly grown in the county. It can be dryfarmed or irrigated. (Capability units IIe–1 dryland and IIe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Holdrege silt loam, 3 to 5 percent slopes (HoB).—This soil occupies areas, 5 to 40 acres in size, on ridges between drains.

The profile of this soil is similar to that described as representative for the series. Included with this soil in the mapping were small areas of Hobbs silt loam and Holdrege silt loam, 1 to 3 percent slopes.

Surface runoff is medium.

This soil is suited to cultivated crops, but because of location, size, or shape, most areas are not cultivated. The acreage is principally used as range. (Capability units IIIe–1 dryland and IIIe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Holdrege silt loam, 3 to 5 percent slopes, eroded (HoB2).—This soil occupies areas, 5 to 50 acres in size, on ridgetops and at the base of some slopes.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner and lighter colored. Erosion has not been uniform. Included with this soil in mapping were areas that have little or no surface layer and areas that have a surface layer more than 10 inches thick. Also included were small areas of Hobbs silt loam.

Surface runoff is medium, and erosion is the greatest hazard.

The acreage is or has been cultivated and can be irrigated. (Capability units IIIe-1 dryland and IIIe-1, irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Holdrege-Hall silt loams, 0 to 1 percent slopes (HQ).—The soils of this mapping unit occupy tracts, 10 to 200 acres in size, on broad, smooth flats in loess uplands. About 50 percent of any given area in Holdrege silt loam that has a surface layer less than 20 inches thick; the remaining 50 percent is Hall silt loam that has a surface layer more than 20 inches thick.

The Holdrege soil has the profile described as representative for the Holdrege series, and the profile of the Hall soil is similar to that described as representative for the Hall series. Included with these soils in mapping were small areas of Scott silt loam.

Surface runoff is slow, and drought is frequently a concern if these soils are dryfarmed.

These soils are suited to all of the crops commonly grown in the county. They are easily tilled and can be dryfarmed or irrigated. (Capability units IIc-1 dryland and I-2 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Hord Series

The Hord series consists of deep, well-drained, medium-textured, nearly level to very gently sloping soils in the South Loup River valley and on loess-capped alluvial stream terraces of the Platte and Wood River valleys These soils formed in silty alluvium or in loess.

In a representative profile the surface layer is 14 inches of silt loam that is dark grayish-brown in the upper part and dark gray in the lower part. The upper part of the subsoil is grayish-brown friable silt loam 14 inches thick, and the lower part is light brownish-gray friable silt loam 20 inches thick. The underlying material is light brownish-gray silt loam that is calcareous.

Permeability is moderate, and available water capacity is high.

Hord soils are among the best cultivated soils in the county and are suited to all of the locally grown crops. Most areas are irrigated.

Representative profile of Hord silt loam, terrace, 0 to 1 percent slopes, in an irrigated field 100 feet north and 0.25 mile west of the southeast corner of sec. 5, T. 9 N., R. 16 W.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure, slightly hard when dry, friable when moist; pH (paste) 7.2; abrupt, smooth boundary.

A2—8 to 14 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.2; clear, smooth boundary.

B2—14 to 28 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 6.8; clear, smooth boundary.

B3—28 to 48 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; very weak, coarse, subangular blocky structure parting to massive; slightly hard when dry, friable when moist; pH (paste) 7.0; abrupt, smooth boundary.

C—48 to 60 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.7.

The A horizon is dark grayish brown to dark gray and is 10 to 16 inches thick. The B horizon is generally only slightly lighter colored than the A horizon. Free calcium carbonate is at depths of 36 to 60 inches. The C horizon is silty and many feet thick in soils along with Wood River and at the base of uplands. In the Platte River valley, particularly on the break between stream terraces and bottom lands, the C horizon grades to mixed sand and gravel at depths of 40 to 48 inches.

Hord soils are associated with Wood River, Hall, Blendon, and Cozad soils. They have a thicker, more friable, and less clayey B horizon than Wood River soils and a more friable and less clayey B2 horizon than Hall soils. Hord soils have a finer textured B horizon than Blendon soils and a darker B horizon than Cozad soils.

Hord silt loam, terrace, 0 to 1 percent slopes (Hd).—This soil occupies uniform tracts, 10 to 1,000 acres in size, on alluvial stream terraces of the Platte and Wood River valleys.

This soil has the profile described as representative for the series. Included with this soil in mapping were small areas of Wood River silt loam and Hall silt loam.

Surface runoff is slow. Irrigation water is available, and more than 90 percent of this soil has been developed for irrigation.

This soil is suited to all of the commonly grown crops. It can be dryfarmed or irrigated. (Capability units IIc-1 dryland and I-2 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Hord silt loam, terrace, 1 to 3 percent slopes (HdA).—This soil occupies areas 5 to 50 acres in size. It borders drains and is also on ridges and between uplands and stream terraces.

The profile of this soil is similar to that described as representative for the series, except its surface layer is thinner and lighter colored in some areas because erosion or land leveling has removed much of it. Included with this soil in mapping were areas that have slopes of less than 1 percent. Also included were areas of Hobbs silt loam and Hall silt loam.

Surface runoff is slow, and erosion is a hazard, particularly if the soil is irrigated.

The acreage is cultivated, and most of it is irrigated. A few areas are still in native grass. (Capability units IIe-1 dryland and IIe-1 irrigated; Silty Lowland range site; Silty to Clayey windbreak suitability group)

Inavale Series

The Inavale series consists of deep, excessively drained, nearly level soils on bottom lands of the Platte and South Loup Rivers. These soils formed in deep alluvial deposits of loamy and sandy material. The water table fluctuates seasonally between depths of 5 and 10 feet. It is lowest in summer and early in fall.

In a representative profile the surface layer is grayish-brown fine sandy loam 10 inches thick. The underlying material is stratified, loose, light-gray fine sand that reaches to a depth of 60 inches.

Permeability is rapid, and available water capacity is low. Natural fertility is low. Most of the rainfall is readily absorbed.

Most areas of Inavale soils are in native grass. Alfalfa and trees benefit in some areas because their roots extend down to the water table.

Representative profile of Inavale fine sandy loam, 0 to 3 percent slopes, in a native grass meadow 0.06 mile west and 0.52 mile south of the northeast corner of sec. 17, T. 12 N., R. 17 W.:

A11—0 to 3 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; soft when dry, very friable when moist; pH (paste) 6.8; abrupt, smooth boundary.

A12—3 to 10 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure; soft when dry, very friable when moist; pH (paste) 6.8; clear, smooth boundary.

C—10 to 60 inches, light-gray (10YR 7/1) fine sand, light brownish gray (10YR 6/2) moist; single grained; loose; pH (paste) 7.9; stratified with lenses of darkened sand and silt less than 2 inches thick.

The A horizon ranges from grayish brown to dark grayish brown, and ranges from 6 to 12 inches in thickness. It is generally low in organic matter. A thin AC horizon is present in some profiles. The C horizon is commonly stratified with thin lenses of loam, fine sandy loam, or gravel. Some of the lenses are calcareous.

Inavale soils are similar to Boel, Cass, Grigston, and Wann soils in location on the landscape. They have a thicker A horizon than Boel soils, and depth to water table is greater. Inavale soils have a thinner A horizon and are coarser textured in the upper part of the C horizon than Cass or Grigston soils. They are better drained and have a coarser textured C horizon than Wann soils.

Inavale fine sandy loam, 0 to 3 percent slopes (In).—This soil occupies areas, 5 to 100 acres in size, that are dissected by channels and have low hummocks. Many of the areas are in oxbows of the South Loup River.

Included with this soil in mapping were areas of Boel sandy loam, Boel loam, and Wann loam that make up as much as 30 percent of some areas. In some areas the surface layer is loamy fine sand.

Surface runoff is slow, and soil blowing, drought, and low natural fertility are concerns in management.

A few areas of this soil are cultivated, but most of the acreage has native grass and trees and is used as range or hayland. (Capability units IIIe-31 dryland and IIIe-3 irrigated; Sandy Lowland range site; Sandy windbreak suitability group)

Kenesaw Series

The Kenesaw series consists of deep, well-drained, medium-textured, nearly level to gently sloping soils on uplands. They formed in loamy material that in many places has been worked by wind into low hummocks.

In a representative profile the surface layer is grayish-brown silt loam 8 inches thick. The transition layer is 14 inches thick and consists of light brownish-gray friable loam. The underlying material is light-gray calcareous silt loam to a depth of 60 inches.

Permeability is moderate, and available water capacity is high. Kenesaw soils are suited to all of the locally grown crops. Most areas are cultivated, and some areas are irrigated.

Representative profile of Kenesaw silt loam, 0 to 1 percent slopes (fig. 7), in a cultivated field 150 feet north and 150 feet east of the southwest corner of sec. 25, T. 12 N., R. 13 W.:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam; very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, granular structure; slightly

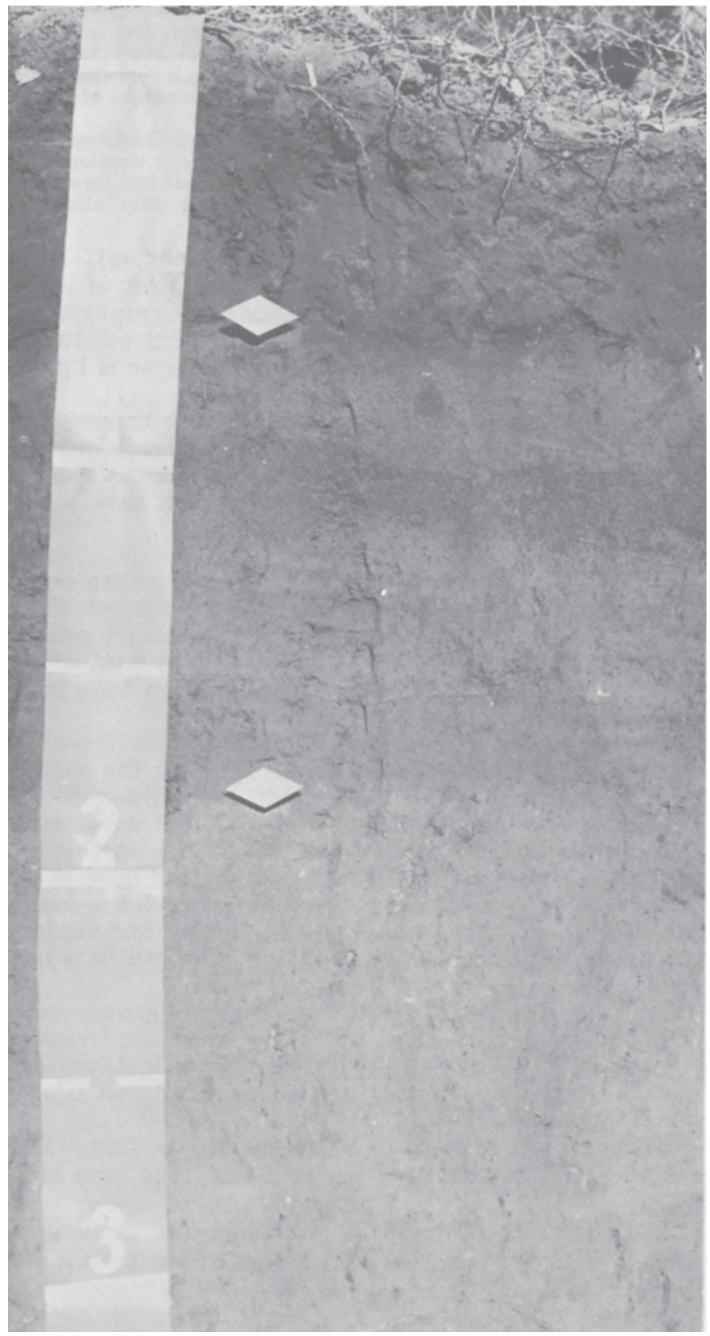

Figure 7.—Profile of Kenesaw silt loam, 0 to 1 percent slopes, a young soil formed in loamy material reworked by wind.

hard when dry, friable when moist; pH (paste) 6.8; abrupt, smooth boundary.

AC—8 to 22 inches, light brownish-gray (10YR 6/2) loam; dark grayish brown (10YR 4/2) moist and rubbed; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; pH (paste) 6.7; clear, smooth boundary.

C—22 to 60 inches, light-gray (2.5Y 7/2) silt loam; light brownish gray (2.5Y 6/2) moist; massive, slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.5.

In most places the Kenesaw landscape has small hummocks and low ridges. Surface drainage is not well established, and small depressions are common. The A horizon is medium in texture and ranges from 7 to 12 inches in thickness. It is thinnest on the top and side of hummocks and ridges and is thickest and darkest at the lowest elevations. The combined thickness of the A and AC horizons ranges from 21 to 25 inches. The soil in depressions commonly has a well-developed silty clay loam AC horizon. Free calcium carbonate is at depths of 15 to 40 inches or more.

Kenesaw soils are associated with Uly and Holdrege soils. They lack the B horizon and are not so well developed as these soils. Kenesaw soils resemble Cozad soil but formed in loamy wind-deposited material rather than silty alluvium. They lack the B horizon of Cozad soils.

Kenesaw silt loam, 0 to 1 percent slopes (Ks).—This soil occupies areas 20 to 200 acres in size. Most of it has been leveled for irrigation. The original topography was slightly hummocky. The hummocks were cut off during land leveling, and as a result the surface layer is lighter colored in some areas than in others.

This soil has the profile described as representative for the Kenesaw series. Included with this soil in mapping were areas of Kenesaw soils that have slopes of more than 1 percent and small areas that have a fine sandy loam surface layer.

Surface runoff is slow.

This soil is suited to all of the commonly grown crops. (Capability units IIc–1 dryland and I–2 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Kenesaw silt loam, 1 to 3 percent slopes (KsA).—This soil occupies areas 10 to 300 acres in size that have hummocks and low ridges.,

The profile of this soil is similar to that described as representative for the series, except that the surface layer is generally somewhat thinner and lighter colored on the tops of hummocks and ridges. A few small areas have a sandy loam surface layer. Included with this soil in mapping were areas of Kenesaw soils that have slopes of more than 3 percent; Ortello fine sandy loam, loamy substratum; and Thurman-Valentine loamy fine sands.

Surface runoff is slow, and soil blowing can be a hazard.

This soil is suited to all of the commonly grown crops. It is generally dryfarmed, but a few areas are irrigated by sprinkler systems. (Capability units IIe–1 dryland and IIe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Kenesaw silt loam, 3 to 5 percent slopes (KsB).—This soil occupies areas, 5 to 50 acres in size, that have hummocks.

Included with this soil in mapping were small areas of Kenesaw silt loam that have slopes of less than 3 percent; Ortello fine sandy loam, loamy substratum; and Thurman-Valentine loamy fine sands.

Surface runoff is medium. Soil blowing and water erosion are the main hazards when the soil is cultivated.

This soil is suited to cultivated crops, but because of location, size, or shape, only a few small areas are cultivated. The acreage is generally used as range. (Capability units IIIe–1 dryland and IIIe–1 irrigated; Silty range site; Silty to Clayey windbreak suitability group)

Kenesaw-Coly silt loams, 3 to 5 percent slopes (KCB).—The soils of this mapping unit occupy tracts, 5 to more than 200 acres in size, on ridges and hummocks. In a few areas they have short side slopes that border intermittent drains. The calcareous Coly soil is on the crest of ridges and hummocks and makes up 30 percent of the total acreage. The Kenesaw soil is in swales and on the lower part of ridges and hummocks and makes up about 65 percent. Included soils of other series make up the remaining 5 percent.

Much of the surface layer on the ridges and hummocks has been removed by erosion and deposited in the swales, and as a result a few small areas of the Kenesaw soil have a surface layer thicker than that described as representative for the series. Included with these soils in mapping were areas of Kenesaw silt loam that have slopes of less than 3 percent; Ortello fine sandy loam, loamy substratum; and Thurman-Valentine loamy fine sands.

Surface runoff is medium, and soil blowing and water erosion are serious hazards. The short slopes and hummocks make terracing difficult.

These soils are suited to all of the locally grown crops. (Capability units IIIe–1 dryland and IIIe–1 irrigated; the Kenesaw part is in the Silty range site, and Coly part in Limy Upland range site; Silty to Clayey windbreak suitability group).

Kenesaw, Calcareous Variant

Kenesaw, calcareous variant, consists of deep, well-drained soils on stream terraces of the South Loup River valley. They formed in calcareous reworked alluvium that is moderately coarse textured in the upper part and medium textured in the lower part.

In a representative profile the surface layer is noncalcareous gray fine sandy loam 9 inches thick. The transition layer is 3 inches thick and consists of calcareous grayish-brown fine sandy loam. The underlying material is very friable calcareous light-gray loam to a depth of 30 inches, calcareous light brownish-gray loam to a depth of 58 inches, and calcareous light-gray fine sandy loam to a depth of 60 inches.

Permeability is moderate, and available water capacity is high. Soils in this variant are suited to cultivated crops, grass, and windbreak plantings.

Representative profile of Kenesaw fine sandy loam, calcareous variant, 0 to 1 percent slopes, 0.92 mile east and 0.45 mile north of the southwest corner of sec. 11, T. 12 N., R. 18 W.:

Ap—0 to 9 inches, gray (10YR 5/1.5) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.9; abrupt, smooth boundary.

AC—9 to 12 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.4; clear, smooth boundary.

IIC1—12 to 30 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.7; clear, smooth boundary.
IIC2—30 to 36 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4.5/2) moist; massive, slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.7; abrupt, smooth boundary.
IIC3—36 to 40 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (2.5Y 4.5/2) moist; massive, slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.7; abrupt, smooth boundary.
IIC4—40 to 58 inches, light brownish-gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.7; abrupt, smooth boundary.
IIIC5—58 to 60 inches, light-gray (10YR 7/2) fine sandy loam, brown (10YR 5/2) moist; massive; soft when dry, very friable when moist; calcareous; pH (paste) 7.8.

The A horizon ranges from 7 to 20 inches in thickness. Dark buried soils are common. In areas disturbed by rodents, calcium carbonate concretions are common on the surface and in the upper horizons.

Kenesaw, calcareous variant, is associated with Thurman and Valentine soils. It is not so coarse textured as Thurman or Valentine soils, and calcium carbonate is at shallower depths.

Kenesaw fine sandy loam, calcareous variant, 0 to 1 percent slopes (2Kt).—This soil occupies areas 20 to 165 acres in size.

Included with this soil in mapping were areas of Ortello fine sandy loam, loamy substratum, and Thurman-Valentine loamy fine sands.

Surface runoff is slow, and soil blowing is a hazard. This soil is suited to most of the commonly grown crops and can be dryfarmed or irrigated. The surface layer readily absorbs moisture, and the loamy underlying material holds it for use by plants. (Capability units IIe-3 dryland and IIe-3 irrigated; Silty Lowland range site; Sandy windbreak suitability group)

Leshara Series

The Leshara series consists of deep, somewhat poorly drained, nearly level soils on bottom lands bordering the Platte and South Loup Rivers. A few areas are dissected by abandoned river channels. These soils formed in silty and loamy alluvium. Mixed sand and gravel is at depths of 40 to 60 inches along the Platte River. Along the South Loup River the underlying material is sandy. The water table is at depths of 2 to 6 feet. It is highest in winter and spring and lowest in summer and fall.

In a representative profile the surface layer is grayish-brown silt loam to a depth of 9 inches and dark grayish-brown loam to a depth of 36 inches. Below this is a buried soil that consists of friable gray loam to a depth of 42 inches and very friable light-gray very fine sandy loam to a depth of 51 inches. The underlying material is calcareous light-gray loamy fine sand that reaches to a depth of 60 inches.

Permeability is moderate, and available water capacity is high.

Leshara soils are suited to cultivated crops, grasses, and trees for windbreaks.

Representative profile of Leshara silt loam described from an area of Leshara and Gibbon silt loams 0.42 mile east and 0.15 mile south of the northwest corner of sec. 4, T. 12 N., R. 18 W.:

Ap—0 to 9 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 7.4; abrupt, smooth boundary.
A12—9 to 31 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; some stratification with lighter colors; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 7.6; abrupt, smooth boundary.
A13—31 to 36 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; common. medium, distinct mottles; weak, medium, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.6; abrupt, smooth boundary.
Ab—36 to 42 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; common, medium, distinct mottles; weak, medium, platy structure, thinly stratified; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.7; abrupt, smooth boundary.
ACb—42 to 51 inches, light-gray (10YR 6/1) very fine sandy loam, dark grayish brown; (10YR 4/2) moist; weak, medium, granular structure; common, coarse, prominent mottles; soft when dry, very friable when moist; calcareous; pH (paste) 7.8; abrupt, smooth boundary.
IIC—51 to 60 inches, light-gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; single grained; loose; calcareous; pH (paste) 7.9.

The A horizon is fine sandy loam, silt loam, or loam and ranges from 12 to 38 inches in thickness. Buried soils are common. Depth to lime ranges from 12 to 20 inches, and mottles range from few to common and from faint to prominent.

Leshara soils are similar to Platte, Lex, Alda, and Silver Creek soils in location in the landscape. They are deeper over sand or sand and gravel than Platte, Lex, or Alda soils. Leshara soils have a thicker A horizon but lack the clayey B horizon of Silver Creek soils.

Leshara fine sandy loam (0 to 1 percent slopes) (Lf).—This soil occupies irregularly shaped areas, 5 to 80 acres in size, along the South Loup River.

The profile of this soil is similar to that described as representative for the series, except its surface layer and the lower part of the underlying material are coarser textured. Included with this soil in mapping were small areas of Wann loam and Boel fine sandy loam.

Surface runoff is slow, and soil blowing is a hazard, especially in sandy areas. Available water capacity is relatively low, and establishment of uniform crop stands is difficult.

This soil is suited to native grasses and all of the commonly grown crops. It is generally dryfarmed. (Capability units IIw-6 dryland and IIw-6 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Leshara and Gibbon silt loams (0 to 1 percent slopes) (LG).—These soils are in areas 5 to 200 acres in size. Some areas are dissected by shallow abandoned river channels. Some areas of this mapping unit consist entirely of Leshara soils; other areas are composed entirely of Gibbon soils; and many areas contain both soils.

The profile of the Leshara soil is the one described as representative for the Leshara series. Calcium carbonate is at a greater depth in the Leshara soil than in the Gibbon soil. Included with these soils in mapping were small areas of Wann loam, Lex silt loam, and Platte soils.

Surface runoff is slow. Small amounts of soluble salts and alkali are present in some areas, and severely affected areas are shown by a special symbol for alkali.

These soils are suited to corn, grain sorghum, and alfalfa (fig. 8). About 75 percent of the acreage is along the Platte River and is used as irrigated cropland. A few small areas are still in native grass or are dryfarmed. The remaining 25 percent of the acreage is along the South Loup River and its tributaries. It is still in native grass or is dryfarmed. The areas still in native grass are generally mowed for hay. (Capability units IIw–4 dryland and IIw–4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Lex Series

The Lex series consists of somewhat poorly drained, nearly level soils on bottom lands of the Platte River. These soils are moderately deep over mixed sand and gravel. They formed in loamy and silty alluvium. The water table is at its highest level, 2 to 3 feet from the surface, in spring and winter. In some years it drops to a depth of 6 feet in summer.

In a representative profile the surface layer is gray silt loam 9 inches thick. Below this is 9 inches of calcareous, firm, gray silty clay loam that is transitional to the underlying material. This underlying material is mottled light-gray fine sandy loam to a depth of 24 inches, and mottled light brownish-gray mixed sand and gravel to a depth of 48 inches.

Permeability is moderately slow, and available water capacity is low.

Most areas of Lex soils are used as irrigated cropland. A few small areas are used for hay.

Representative profile of Lex silt loam in an irrigated field located 150 feet east and 0.38 mile south of the northwest corner of sec. 1, T. 8 N., R. 15 W.:

Ap—0 to 7 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak, medium, granular structure; hard when dry, friable when moist; calcareous; pH (paste) 7.7; abrupt, smooth boundary.

A12—7 to 9 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate, medium, granular structure; hard when dry, friable when moist; calcareous; pH (paste) 7.7; clear, smooth boundary.

AC—9 to 18 inches, gray (2.5Y 5/0) silty clay loam, very dark gray (2.5Y 3/0) moist; moderate, fine and medium, subangular blocky structure; hard when dry, firm when moist; calcareous; pH (paste) 7.8; gradual, smooth boundary.

C1—18 to 24 inches, light-gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; few, small, distinct, yellowish-brown mottles; massive; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.8; abrupt, smooth boundary.

IIC2—24 to 48 inches, light brownish-gray (10YR 6/2) mixed sand and gravel; few distinct mottles; single grained; loose.

The A horizon ranges from 7 to 14 inches in thickness.

Lex soils are associated with Wann, Leshara, and Platte soils. They are shallower over mixed sand and gravel than Wann or Leshara soils. Lex soils are deeper over mixed sand and gravel than Platte soils.

Lex silt loam (0 to 1 percent slopes) (Lex).—This soil occupies areas 20 to more than 1,000 acres in size.

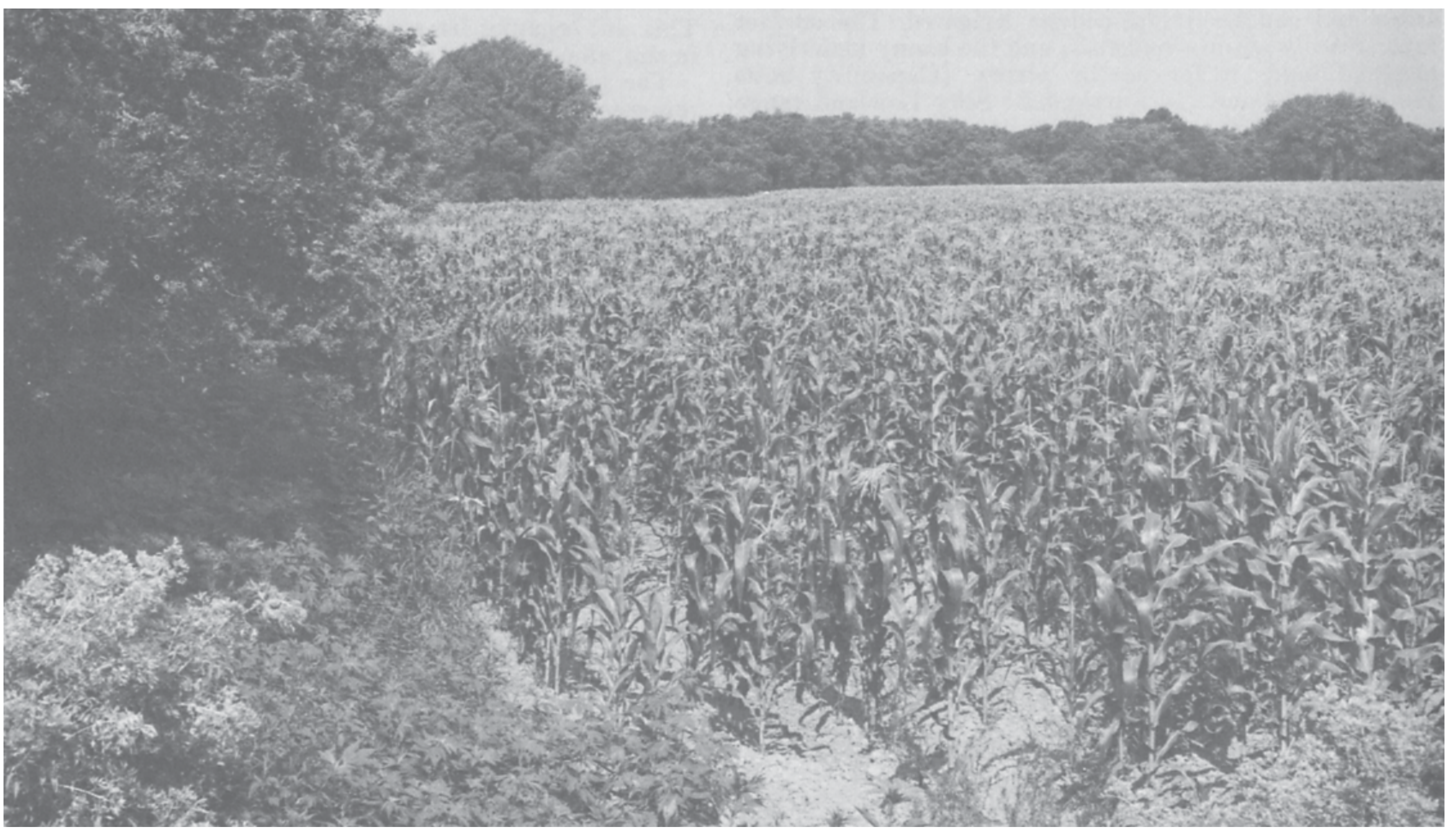

***Figure 8.*—Excellent field of corn on Leshara and Gibbon silt loams. Crop is subirrigated by a water table at a depth of about 4 feet.**

Included with this soil in mapping were areas of Leshara and Gibbon silt loams, Wann loam, and Platte soils.

Surface runoff is slow. Soluble salts and alkali are present in some areas, and severely affected areas are shown by a special symbol for alkali.

This soil is suited to all of the commonly grown crops. The acreage is used as irrigated cropland, range, and hayland. (Capability units IIw-4 dryland and IIw-4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Loamy Alluvial Land

Loamy alluvial land (0 to 3 percent slopes) (Lx) is a very shallow land type that consists of less than 10 inches of soil material over mixed sand and gravel. It is along the Platte River in abandoned river channels and other low areas. The water table is at or above the surface in winter and spring, and water flows in some of the deepest channels during these times. In summer the water table is 1 to 3 feet below the surface.

The thin surface layer ranges in texture from loam to fine sand. Included with this land type in mapping were a few areas where gravel is exposed at the surface. Also included were small areas of Platte and Alda soils and Marsh.

Surface runoff is slow. Alkali or salinity is not a problem, although white crusts of salt are common in winter and spring. The thin surface layer and limited depth of the water table restrict kinds of plants and the amount of growth.

This land type is not suited to cultivation. It can be used as range or wildlife habitat or for recreation. The acreage has trees and native grasses, but the grasses are sparse in very sandy or gravelly areas. (Dryland capability unit VIIs-3; Subirrigated range site; Undesirable windbreak suitability group)

Loup Series

The Loup series consists of deep, poorly drained soils in low areas and depressions on bottom lands of the South Loup River. They formed in water-deposited loamy and sandy material. The water table is at or near the surface in spring. It is at depths of as much as 3 feet late in summer and in fall.

In a representative profile the surface layer is 10 inches of loam. The upper part is gray and the lower part is dark gray. This layer contains small amounts of calcium carbonate. The underlying material is light-gray loamy fine sand to a depth of 24 inches and white fine sand to a depth of 50 inches.

Permeability is rapid, and available water capacity is low.

Loup soils are too wet for cultivation. They are suited to grazing and are principally used as range or hayland.

Representative profile of Loup loam 0.3 mile north and 0.5 mile west of the southeast corner of sec. 17, T. 12 N., R. 14 W.:

A11—0 to 3 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak, fine, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.5; abrupt, smooth boundary.

A12—3 to 10 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) moist; weak, fine, granular, structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.5; abrupt, smooth boundary.

IIC1—10 to 24 inches, light-gray (10YR 7/1) loamy fine sand, grayish brown (10YR 5/2) moist; single grained; nonsticky wet; pH (paste) 7.8; abrupt, smooth boundary.

IIC2—24 to 50 inches, white (10YR 8/2) fine sand, light brownish gray (10YR 6/2) moist; single grained; pH (paste) 8.1.

The A horizon ranges from 7 to 12 inches in thickness. The top few inches contains much partially decayed organic matter. A mottled C horizon is present in some areas but lacking in others.

Loup soils are associated with Platte, Wann, Leshara, and Gibbon soils. They have a higher water table than Platte soils and have fine sand at a depth below 20 inches, rather than mixed sand and gravel. Loup soils have a higher water table and are coarser textured in the upper part of the C horizon than Wann, Leshara, or Gibbon soils.

Loup loam (0 to 1 percent slopes) (Lm).—This soil occupies irregularly shaped areas, 5 to 100 acres in size, in depressions on bottom lands away from the South Loup River.

Included with this soil in mapping were small areas of Wet alluvial land, Wann loam, Leshara and Gibbon silt loams, and Marsh.

Surface runoff is very slow. In places this soil is ponded. In wet years the soil generally cannot be used for hay, but in dry years the seasonal drop in the water table makes it possible to mow.

The acreage is used as range or hayland. (Capability unit Vw-1 dryland; Wet Land and Subirrigated range sites; Very Wet windbreak suitability group)

Marsh

Marsh (M) is a land type that is in nearly level oxbows, abandoned channels, and low areas along the South Loup River. It is under 1 to 2 feet of water most of the year. Some areas become dry in very dry years, but all of them contain water in wet years.

Included with this land type in mapping were small areas of Loup soils and Wet alluvial land.

Surface water is ponded. This land type is an excellent breeding area for mosquitoes, and for this reason it can adversely affect the usefulness of adjoining rangeland.

This land is not suited to cultivation or use as range or woodland, but it can be used as wildlife habitat. (Dryland capability unit VIIIw-1; Undesirable windbreak suitability group)

Ortello Series

The Ortello series consists of deep, well-drained soils that formed in wind-reworked loamy and sandy material.

In a representative profile the surface layer is dark grayish-brown fine sandy loam 7 inches thick. The subsoil is grayish-brown very friable fine sandy loam 10 inches thick. The underlying material is light brownish-gray loamy fine sand stratified with moderately coarse and coarse textured soil material to a depth of 46 inches. Below this is light brownish-gray fine sandy loam that reaches to a depth of 53 inches, and pale-brown silt loam extending from 53 inches to a depth of 60 inches.

Permeability is moderately rapid to moderate, and available water capacity is moderate.

Ortello soils are suited to most of the locally grown crops. Most areas are cultivated, and a few areas are irrigated.

Representative profile of Ortello fine sandy loam, loamy substratum, 3 to 5 percent slopes, eroded, 300 feet north and 180 feet east of the southwest corner of sec. 19, T. 12 N., R. 13 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 5.8; abrupt, smooth boundary.

B—7 to 17 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

C1—17 to 46 inches, light brownish-gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grained; stratified; soft when dry, very friable when moist; pH (paste) 6.9; clear, smooth boundary.

C2—46 to 53 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; single grained; slightly hard when dry, very friable when moist; pH (paste) 7.0; abrupt, smooth boundary.

IIC—53 to 60 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard when dry, very friable when moist; pH (paste) 7.4.

The A horizon ranges from 6 to 13 inches in thickness. The B horizon is commonly stratified with wavy lenses of soil material. Depth to the loamy substratum ranges from 2 to 5 feet. In cultivated areas soil blowing has removed part of the surface layer from the tops and sides of hummocks and deposited it in the lowest areas.

Ortello soils are associated with Valentine, Thurman, and Kenesaw soils. They have a thicker A horizon and are not so coarse textured in the C horizon as Valentine soils. Ortello soils have a coarser textured solum than Kenesaw soils and have a B horizon that is lacking in Thurman soils.

Ortello fine sandy loam, 5 to 11 percent slopes (OrC).—This soil occupies irregularly shaped tracts 5 to 20 acres in size. The slopes are 40 to 200 feet long.

The profile of this soil is similar to that described as representative for the series, except its surface layer is somewhat thinner and is lighter colored when cultivated. Much of the surface layer has been removed or reworked. Some areas have a loamy subsoil that is lacking in other areas. Included with this soil in mapping were small areas of Ortello soils having slopes of less than 5 percent, Valentine loamy fine sand, and Thurman loamy fine sand.

Surface runoff is medium to rapid, and soil blowing and water erosion are serious hazards. Overgrazing can result in soil blowing.

About half of the acreage is still in native grass, and the rest has been cultivated. (Capability units IVe–3 dryland and IVe–3 irrigated; Sandy range site; Sandy windbreak suitability group)

Ortello fine sandy loam, loamy substratum, 0 to 3 percent slopes (2Or).—This soil occupies tracts 10 to 200 acres in size. The landscape is low hummocky, and there are many depressions between the hummocks.

The profile of this soil is similar to that described as representative for the series. Depth to the loamy substratum ranges from 2 to 5 feet. The loamy substratum is closest to the surface in depressions and is at the surface in a few areas. Included with this soil in mapping were small areas of Kenesaw silt loam, Thurman-Valentine loamy fine sand, Ortello soils that have slopes of more than 3 percent, and areas in which the loamy substratum is at a depth below 5 feet.

Surface runoff is slow, and soil blowing is a serious hazard in winter and spring. The irregularity of the topography makes leveling expensive. This soil can be irrigated without leveling, but the depressions collect water that can drown crops.

Most of the acreage is dryfarmed, but a few areas have been leveled and are irrigated. (Capability units IIIe–3 dryland and IIe–31 irrigated; Sandy range site; Sandy windbreak suitability group)

Ortello fine sandy loam, loamy substratum, 3 to 5 percent slopes, eroded (2OrB2).—This soil occupies tracts 5 to 150 acres in size. Many of the tracts have hummocks, and there are a few depressions between the hummocks.

This soil has the profile described as representative for the series. Included with this soil in mapping were small areas of Ortello fine sandy loam that have slopes of less than 3 percent, Thurman-Valentine loamy fine sands, and areas in which the loamy substratum is at a depth below 5 feet.

Surface runoff is medium, and soil blowing is a serious hazard in winter and spring. The depressions collect rain and irrigation water that can drown crops.

This soil is suited to all of the commonly grown crops and can be dryfarmed, but because of location, size, or shape, most areas are not cultivated. About one-fourth of the acreage is still in native grass. (Capability units IIIe–31 dryland and IIIe–3 irrigated; Sandy range site; Sandy windbreak suitability group)

Pits and Dumps

Pits and dumps (GP) occupy areas, 2 to 80 acres in size, along the Platte River and include piles and ridges of waste sand and gravel that border pits. The South Loup River valley does not have gravel of sufficient quality or quantity to make commercial exploitation feasible.

Pits and dumps are not suited to cultivation and have little value as range. The acreage can be used for recreation, especially fishing, and provides limited cover for wildlife. The extracted sand and gravel is used for roads and building material. (Dryland capability unit VIIIs–1; Undesirable windbreak suitability group)

Platte Series

The Platte series consists of somewhat poorly drained nearly level soils on bottom lands of the Platte River. Some areas are dissected by drains and abandoned river channels. These soils formed in silty to sandy alluvium that is 10 to 20 inches thick over mixed sand and gravel. The water table, at a depth of 2 to 5 feet, is highest late in winter and in spring. During these periods water stands in some of the channels and drains. The sand and gravel limit root development.

In a representative profile the surface layer is dark-gray to grayish-brown loam 8 inches thick. The underlying material is light brownish-gray, very friable, mottled fine sandy loam to a depth of 12 inches; light brownish-gray very friable, mottled loamy fine sand to a depth of 17 inches; light-gray sand and gravel to a depth of 34 inches; light brownish-gray loamy fine sand to a depth of 39 inches; and light brownish-gray coarse sand and gravel to a depth of 54 inches.

Permeability is moderately rapid in the upper part of the underlying material and very rapid in the sand and gravel that is farther down. Available water capacity is very low.

Most areas of Platte soils are still in native grass. These soils are suited to cultivated crops when irrigated, but they are too shallow and droughty to be successfully dryfarmed.

Representative profile of Platte loam in an area of Platte soils on bottom land 0.53 mile south and 0.25 mile east of the northwest corner of sec. 8, T. 8 N., R. 14 W.:

A11—0 to 5 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) moist; weak, medium, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.8; abrupt, smooth boundary.

A12—5 to 8 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; common, fine, faint mottles; weak, medium, granular structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.8; abrupt, smooth boundary.

C1—8 to 12 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; few, medium, distinct mottles; single grained; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.6; abrupt, smooth boundary.

C2—12 to 17 inches, light brownish-gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; common, coarse, distinct mottles; single grained; slightly hard when dry, very friable when moist; pH (paste) 7.6; abrupt, smooth boundary.

IIC3—17 to 34 inches, light-gray (10YR 7/2) sand and gravel, grayish brown (10YR 5/2) moist; common, coarse, distinct mottles; single grained; loose; pH (paste) 8.0; abrupt, smooth boundary.

IIIC4—34 to 39 inches, light brownish-gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; common, coarse, distinct mottles; single grained; soft when dry, very friable when moist; pH (paste) 7.8; abrupt, smooth boundary.

IVC5—39 to 54 inches, light brownish-gray (10YR 6/2) coarse sand and gravel; single grained; loose.

The A horizon ranges from 4 to 12 inches in thickness and from very dark gray to grayish brown in color. It is mildly to moderately alkaline. White salt crusts are common late in winter and in spring.

Platte soils are associated with Alda, Leshara, Gibbon, and Lex soils. They are shallower over mixed sand and gravel than those soils.

Platte soils (0 to 3 percent slopes) (Pt).—These soils occupy tracts 5 to 500 acres in size. Some of the tracts are dissected by drains 1 to 2 feet deep and 5 to 15 feet wide.

The profile of these soils is similar to that described as representative for the series, except their surface layer is medium textured to moderately coarse textured. Included with these soils in mapping were small areas of Wann loam, Leshara and Gibbon silt loams, Lex silt loam, and Loamy alluvial land.

Surface runoff is very slow to slow, and available water capacity is low. These soils are too shallow and droughty to be dryfarmed. Some areas have been developed for irrigation, but management of these is fairly difficult. Although these soils are suited to most of the commonly grown crops, production costs are high. Native grasses benefit from the high water table only part of the year because in summer it drops to a depth below 4 feet.

The acreage is principally used as range or hayland. (Capability units VIw-4 dryland and IVw-4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Platte-Alda complex (0 to 3 percent slopes) (PL).—This soil occupies tracts, 5 to 500 acres in size, that commonly are dissected by channels 1 to 2 feet deep and 10 to 20 feet wide. About 55 percent of the total acreage is Platte soils, and 35 percent is Alda fine sandy loam. Other included soils and land types make up the remaining 10 percent.

The Platte soils are on the bottoms of channels and in the lower part of the landscape, and Alda fine sandy loam is on ridges and in the higher part of the landscape. Included with these soils in mapping were areas of Loamy alluvial land, Inavale fine sandy loam, and Lex silt loam.

Surface runoff is slow. Native grasses benefit from the water table only part of the year because it drops in summer. This soil is poorly suited to dryfarming. It can be irrigated, but development and production costs are high.

About 70 percent of the acreage is in native grass. (Capability units VIw-4 dryland and IVw-4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Riverwash

Riverwash (Rw) consists of nearly level to very gently sloping sandbars, sand flats, and beds of intermittent streams in the sandhills, and of islands in the South Loup River. This land type is principally stratified sand and gravel, but silty strata are common. It is 6 inches to 3 feet above the level of normal stream flow. The water table fluctuates from ground level to a depth of 3 feet.

Flooding, reworking, and shifting of this land type is common each spring during periods of high water. Trees and other plants grow along the South Loup River, but little or no vegetation is along Sweet Creek and Sand Creek. Trees help to stabilize the areas in which they grow.

Riverwash has little or no agricultural value and is used for whatever grazing it affords. The areas that have trees are good wildlife habitat. (Dryland capability unit VIIIw-1; Undesirable windbreak suitability group)

Rough Broken Land, Loess

Rough broken land, loess (25 to 60 percent slopes) (RB) occupies tracts, 15 to 700 acres in size, on V-shaped upland drainageways. It formed in silty wind-deposited material. On the slopes there commonly is a succession of short, vertical exposures known as catsteps (fig. 9).

The surface layer is slightly darkened silt loam, 2 to 4 inches thick, that is abruptly underlain by calcareous material. Included with this land type in mapping were Coly soils that make up 15 to 35 percent of the total acreage.

Figure 9.—**Rough broken land, loess, is best suited to range.**

Surface runoff is very rapid, and geological erosion is active. Sparse vegetation and steep slopes limit grazing.

The acreage is principally used as range. (Dryland capability unit VIIe–1; Thin Loess range site; Undesirable windbreak suitability group)

Rusco Series

The Rusco series consists of deep, well-drained, nearly level soils. They formed in depressions that have been drained either naturally or artificially. They are in only a few areas of Buffalo County, and the largest area is about 500 acres in size.

In a representative profile, the surface layer is dark-gray silt loam to a depth of 10 inches. The subsoil is gray firm silty clay loam to a depth of 18 inches, and gray friable loam to a depth of 24 inches. The underlying material is gray loam to a depth of 40 inches, and to a depth of 60 inches is gray fine sandy loam stratified with lenses of loam and loamy fine sand.

Permeability is moderately slow, and available water capacity is high.

Rusco soils are suited to all of the locally grown crops. Most areas are cultivated and irrigated.

Representative profile of Rusco silt loam in an irrigated field 0.17 mile south and 100 feet west of the northeast corner of sec. 9, T. 11 N., R. 15 W.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; moderate, medium, granular structure; hard when dry, friable when moist; pH (paste) 6.4; abrupt, smooth boundary.

A12—8 to 10 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, granular structure; hard when dry, friable when moist; pH (paste) 6.3; clear, smooth boundary.

B2t—10 to 18 inches, gray (10YR 5/1) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; hard when dry, firm when moist; pH (paste) 5.8; clear, smooth boundary.

B3—18 to 24 inches, gray (10YR 5/1) loam, dark grayish brown (10YR 4/2) moist; moderate, medium, prismatic structure parting to weak, medium, subangular blocky structure; hard when dry, friable when moist; few, medium, reddish-brown stains; pH (paste) 6.2; abrupt, smooth boundary.

C1—24 to 40 inches, gray (10YR 5/1) loam, dark grayish brown (10YR 4/2) moist; massive; thin fine sandy loam and loamy fine sand strata are present; slightly hard when dry, very friable when moist; few to common, medium, reddish-brown stains; pH (paste) 6.1; abrupt, smooth boundary.

C2—40 to 60 inches, gray (10YR 5/1) fine sandy loam, dark grayish brown (10YR 4/2) moist; single grained; stratified with loam and loamy fine sand; slightly hard when dry, very friable when moist; pH (paste) 6.1.

The A horizon ranges from 8 to 15 inches in thickness. It is generally friable but commonly puddled and has poor aggregation in some areas. The clay content in the B2t horizon ranges from 28 to 35 percent. The solum is 20 to 40 inches thick. The C horizon is generally loam but commonly contains lenses of silt loam and fine sandy loam. It is calcareous in some areas, but calcium carbonate is generally below a depth of 60 inches.

Rusco soils are associated with Kenesaw, Hall, Holdrege, and Ortello soils. They have a B horizon that is lacking in Kenesaw soils and are not so coarse as Ortello soils. Rusco soils have a thinner A horizon and a more clayey B2t horizon than Holdrege soils. They are lower in the landscape than Kenesaw, Hall, Holdrege, or Ortello soils.

Rusco silt loam (0 to 1 percent slopes) (Ru).—This soil occupies areas, 30 to 500 acres in size, in upland depressions.

Included with this soil in mapping were small areas of Kenesaw silt loam.

Surface runoff is slow, and droughtiness is a hazard. Floodwater is a concern in management for short periods after rains and can damage crops in the lowest areas.

This soil is suited to both dryfarmed and irrigated crops. (Capability units IIw-3 dryland and I-3 irrigated; Silty Lowland range site; Moderately Wet windbreak suitability group)

Sandy Alluvial Land

Sandy alluvial land (0 to 3 percent slopes) (Sx) is in areas along the South Loup River and in abandoned channels of that river. It is about 1 to 6 feet above the normal stream flow. Some areas are subject to flooding, depending upon the level to which water rises in the river. There are a few, small, shallow, ponded areas. About 30 to 60 percent of the acreage has a water table within 5 feet of the surface.

Most areas of this land type contain mixed materials that are principally fine and medium sand. Sandbars and mounds of stratified flood deposits are common. Silt bars are present in some places.

Included with this land type in mapping were areas of Loup and Boel soils and Wet alluvial land.

Surface runoff is slow, and trees limit the amount of grass that is produced.

This land type is used for range where it is conveniently situated near larger, more productive areas of rangeland. It provides excellent cover for wildlife. (Dryland capability unit VIw-5; Subirrigated range site; Moderately Wet windbreak suitability group)

Scott Series

The Scott series consists of deep, poorly drained, soils that have a claypan and are in upland depressions. Roots cannot penetrate the subsoil when it is dry.

In a representative profile the surface layer is silt loam 9 inches thick. The upper part is gray and the lower part is light gray. The subsoil is grayish-brown very firm silty clay to a depth of 42 inches, and brown firm silty clay loam to a depth of 52 inches. The underlying material is a light yellowish-brown silt loam that reaches to a depth of 60 inches.

Permeability is very slow, and available water capacity is high. Moisture is released slowly to plants.

Most areas of Scott soils are used as range, although a few of the depressions are drained and cultivated.

Representative profile of Scott silt loam 2,560 feet north and 150 feet west of the southeast corner of sec. 9, T. 10 N., R. 16 W.:

Ap—0 to 6 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate, medium, granular structure; slightly hard when dry, friable when moist; abrupt, smooth boundary.

A2—6 to 9 inches, light-gray (10YR 7/1) silt loam, dark gray (10YR 4/1) moist; moderate, fine, platy structure; slightly hard when dry, friable when moist; abrupt, smooth boundary.

B2t—9 to 42 inches, grayish-brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong, coarse, prismatic structure parting to strong, medium, angular blocky structure; very hard when dry, very firm when moist; clear, smooth boundary.

B3—42 to 52 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist; clear, smooth boundary.

C—52 to 60 inches, light yellowish-brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; few distinct, yellowish-brown stains.

The A horizon is 3 to 10 inches thick and is medium textured to moderately fine textured. The A2 horizon is commonly destroyed when the soil is cultivated. The clay content of the B2t horizon ranges from 40 to 55 percent. Ferromanganese pellets are common in the lower part of the B horizon.

Scott soils are associated with Holdrege, Hall, and Uly soils in loess uplands. They have a thinner surface layer and a thicker, darker, more clayey subsoil than Holdrege, Hall, or Uly soils.

Scott silt loam (0 to 1 percent slopes) (Sc).—This soil is in depressions and basins that range from 3 to 100 acres in size.

The profile of this soil is similar to the one described as representative of the series. Included with this soil in mapping were small areas of Holdrege-Hall silt loams.

Surface runoff is ponded or very slow, and flooding is a hazard. Because of the frequency and duration of floods, this soil is a poor producer of forage. Some areas of the depressions are barren. Smartweed grows in many areas.

The acreage is used as range or for wildlife, or is left as wasteland. It can be cultivated, but crop yields are usually low. (Capability unit IVw-2 dryland; Undesirable windbreak suitability group)

Scott silt loam, drained (0 to 1 percent slopes) (2Sc).—This soil is in shallow basins and depressions that range from 10 to 200 acres.

The profile of this soil is similar to that described as representative for the series, except its surface layer varies in thickness. Some areas have been leveled and the subsoil is exposed at the surface. In other areas the surface layer is very thick. Some areas have been plowed deeply and part of the clayey subsoil has been incorporated into the surface layer. Included with this soil in mapping were small areas of undrained Scott silt loam and Holdrege-Hall silt loams.

Surface runoff is slow. The basins and depressions have been drained, but because the drainage systems are not equally efficient, some areas drain more slowly than others. This soil remains wet longer than most soils because the subsoil is a claypan. In wet years cultivation and planting are difficult. When this soil is wet, row crops remain more erect than small grains or alfalfa.

This soil is suited to corn and grain sorghum if moisture is adequate. Nearly all of the acreage is cultivated, and more than half of it is irrigated. (Capability units IIIw-2 dryland and IIIw-2 irrigated; Clayey Overflow range site; Moderately Wet windbreak suitability group)

Silver Creek Series

The Silver Creek series consists of deep, somewhat poorly drained, nearly level soils on bottom lands of the Platte River. They formed in silty and clayey alluvium. Sand or mixed sand and gravel is at depths of 40 to 60 or more inches. The water table is at a depth of 5 to 8 feet.

In a representative profile the surface layer is very dark gray silt loam 10 inches thick. The subsoil is very dark gray, firm silty clay loam to a depth of 14 inches, dark-gray firm silty clay to a depth of 21 inches, and gray firm silty clay to a depth of 27 inches. The lower part of the subsoil has many streaks and soft masses of calcium carbonate. The underlying material is gray silt loam to a depth of 38 inches, light olive-gray fine sandy loam and loamy fine sand to a depth of 50 inches, and light brownish-gray fine sand to a depth of 60 inches. It is mottled between depths of 42 and 60 inches. The upper part of the underlying material has many soft masses of calcium carbonate.

Permeability is slow, and available water capacity is moderate. Capillary action brings water into the lower part of the subsoil and keeps it moist throughout the year.

Most areas of Silver Creek soils are irrigated, but a few areas are still in native grass.

Representative profile of Silver Creek silt loam in an irrigated field 0.21 mile south and 150 feet east of the northwest corner of sec. 29, T. 9 N., R. 13 W.:

Ap—0 to 7 inches, very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 7.0; abrupt, smooth boundary.

A12—7 to 10 inches, very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; moderate, medium, granular structure; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.6; clear, smooth boundary.

B1—10 to 14 inches, very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist; calcareous; pH (paste) 7.9; clear, wavy boundary.

B2—14 to 21 inches, dark-gray (2.5Y 4/1) silty clay, black (2.5Y 2/1) moist; moderate, medium, prismatic structure parting to moderate, medium, blocky structure; hard when dry, firm when moist; calcareous; contains streaks and soft white masses of lime; pH (paste) 8.2; clear, wavy boundary.

B3ca—21 to 27 inches, gray (2.5Y 5/1) silty clay, dark gray (2.5Y 4/1) moist; moderate, medium, prismatic structure parting to weak, medium, subangular blocky structure; hard when dry, firm when moist; calcareous; contains streaks and soft white masses of lime; pH (paste) 8.2; clear, wavy boundary.

C1ca—27 to 38 inches, gray (2.5Y 6/1) silt loam, grayish brown (2.5Y 5/1) moist; weak, coarse, subangular blocky structure; slightly hard when dry, very friable when moist; calcareous; contains streaks and soft white concretions of lime; pH (paste) 8.5; abrupt, wavy boundary.

IIC2g—38 to 42 inches, light olive-gray (5Y 6/2) fine sandy loam, olive gray (5Y 5/2) moist; common, medium, distinct mottles; single grained; slightly hard when dry, very friable when moist; pH (paste) 8.0; abrupt, smooth boundary.

IIC3g—42 to 50 inches, light olive-gray (5Y 6/2) loamy fine sand, olive gray (5Y 5/2) moist; common, coarse, distinct mottles; single grained; soft when dry, loose when moist; pH (paste) 7.9; abrupt, smooth boundary.

IIC4—50 to 60 inches. light brownish-gray (2.5Y 6/2) fine sand, grayish brown (2.5Y 5/2) moist; many, coarse, distinct mottles; single grained; loose; pH (paste) 7.2.

The A horizon ranges from 7 to 12 inches in thickness and from slightly acid to neutral in reaction. The B horizon, especially the lower part, is moderately alkaline to strongly alkaline. Soluble salts are present in some areas, but the amount and location within the profile are highly variable.

Silver Creek soils are associated with Gibbon, Leshara, and Lex soils. They have a thinner A horizon and a more clayey B horizon than Gibbon or Leshara soils. They are deeper than Lex soils.

Silver Creek silt loam (0 to 1 percent slopes) (Slc).—This soil occupies tracts 10 to 200 acres in size.

Included with this soil in mapping were small areas of Gibbon silt loam and a few Slickspots that make up less than 5 percent of the total acreage.

Surface runoff is very slow. Because of the small amounts of soluble salts and alkali that are commonly present in this soil, potatoes grow poorly.

The soil is suited to all of the commonly grown crops. Most of the acreage is used as irrigated cropland. A few areas have never been cultivated and are still in native grass. (Capability units IIIw-2 dryland and IIIw-2 irrigated; Subirrigated range site; Moderately Wet windbreak suitabliity group)

Simeon Series

The Simeon series consists of shallow, excessively drained, nearly level to very gently sloping soils on stream terraces along the South Loup River. These soils formed in wind-reworked loamy and sandy alluvium. They are shallow over sand and gravel.

In a representative profile the surface layer is dark grayish-brown sandy loam 9 inches thick. Transitional from the surface layer to the underlying material is 5 inches of grayish-brown loose loamy sand and gravel. The underlying material is pale-brown sand and gravel to a depth of 29 inches, light-gray medium and fine sand to a depth of 57 inches, and light-gray medium sand to a depth of 60 inches.

Permeability is rapid, and available water capacity is very low. Organic-matter content is low, and natural fertility is low. All areas of Simeon soils are in native grass.

Representative profile of Simeon sandy loam, 0 to 3 percent slopes, in native grass 0.76 mile north and 70 feet west of the southeast corner of sec. 35, T. 12 N., R. 15 W.:

A—0 to 9 inches, dark grayish-brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

AC—9 to 14 inches, grayish-brown (10YR 5/2) loamy sand and gravel, dark grayish brown (10YR 4/2) moist; single grained; soft when dry, loose when moist; pH (paste) 6.1; abrupt, smooth boundary.

IIC1—14 to 29 inches, pale-brown (10YR 6/3) sand and gravel, brown (10YR 5/3) moist; single grained; loose; pH (paste) 6.2; abrupt, smooth boundary.

IIIC2—29 to 57 inches, light-gray (10YR 7/2) medium and fine sand, grayish brown (10YR 5/2) moist; single grained; loose; pH (paste) 6.7; abrupt, smooth boundary.

IIIC3—57 to 60 inches, light-gray (10YR 7/2) medium sand, grayish brown (10YR 5/2) moist; single grained; loose; pH (paste) 6.9.

The A horizon is grayish brown to very dark grayish brown when moist. The C horizon is stratified with moderately coarse textured to coarse textured soil material in some areas. The coarser sands and gravel are just below the A horizon or are at depths of 10 to 20 inches.

Simeon soils are associated with Thurman and Valentine soils. They have a thinner A horizon and a coarser textured C horizon than Thurman soils. Simeon soils have a slightly thicker A horizon and more gravel in the C horizon than Valentine soils.

Simeon sandy loam, 0 to 3 percent slopes (SdA).—This soil occupies areas 10 to 40 acres in size. Most of the areas are smooth, but a few are low and hummocky.

Included with this soil in mapping were areas of Thurman-Valentine loamy fine sands and a few areas that have been eroded by soil blowing during cultivation.

Surface runoff is slow, and soil blowing is a serious hazard. This soil is too droughty to be cultivated unless it is irrigated.

All of the acreage is in native grass. (Capability units VIs-4 dryland and IVs-4 irrigated; Shallow to Gravel range site; Shallow windbreak suitability group)

Slickspots

Slickspots (no map symbol) are deep, somewhat poorly drained, nearly level, areas of silty and clayey alluvium on low stream terraces and bottom lands. These spots are mapped only with Wood River soils. Uncultivated Slickspots are in small, shallow, irregularly shaped depressions. Depth to the water table ranges from 3 to 8 feet, depending on the topography and the season.

The surface layer is principally silt loam. At depths of 2 to 6 inches is silty clay that has prismatic structure. At depths of 15 to 24 inches is moderately fine textured, medium textured, or moderately coarse textured soil material. Stratification of textures and colors is common.

Permeability is very slow, and available water capacity is moderate. Natural fertility and organic-matter content are low. This land type is slightly to strongly alkaline in the plowed layer and strongly to very strongly alkaline in the underlying layers. Water commonly stands until it evaporates, and some of the water held by the alkaline material is not readily available to plants. Some areas in which alkalinity is extremely high are barren.

In some areas the upper horizons have been slightly darkened by organic matter. Depth to calcium carbonate ranges from 0 to 12 inches in cultivated areas and from 10 to 20 inches in range areas.

Slickspots lack the well-defined horizons of Gibbon and Wood River soils and is more strongly affected by alkalinity and salinity.

This land type is best suited to range, but because it is in small areas within larger areas of better soils, most of it is cultivated and irrigated. A few odd-shaped areas are still in native grass.

Thurman Series

The Thurman series consists of deep, somewhat excessively drained, nearly level to gently sloping, coarse-textured soils that formed in wind-reworked loamy and sandy material.

In a representative profile the surface layer is grayish-brown loamy sand 11 inches thick. Transitional from the surface layer to the underlying material is 4 inches of grayish-brown very friable loamy fine sand. The underlying material is light brownish-gray loamy fine sand to a depth of 25 inches, and light brownish-gray fine sand to a depth of 60 inches. Moisture is readily absorbed.

Permeability is rapid, and available water capacity is low. Organic-matter content is moderately low.

Thurman soils are suited to all of the locally grown crops. Alfalfa and trees benefit in some areas because their roots extend down to the water table.

Representative profile of Thurman loamy fine sand in an area of Thurman-Valentine loamy fine sands, 3 to 5 percent slopes, in a dryfarmed field 0.1 mile east and 50 feet south of the northwest corner of sec. 17, T. 12 N., R. 13 W.:

Ap—0 to 11 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.2; abrupt, smooth boundary.

AC—11 to 15 inches, grayish-brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.1; abrupt, smooth boundary.

C1—15 to 25 inches, light brownish-gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grained; soft when dry, loose when moist; pH (paste) 6.5; clear, smooth boundary.

C2—25 to 60 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; soft when dry, loose when moist; pH (paste) 6.5.

The A horizon ranges from 10 to 18 inches in thickness and is lighter colored and slightly coarser in cultivated areas than it is in areas that are still in native grass. The C horizon contains fine sand between depths of 20 and 48 inches. Some areas have a buried A horizon.

Thurman soils are associated with Valentine and Ortello soils. They have a thicker A horizon and are not so coarse in the upper C horizon as soils in the Valentine series. They lack the B horizon of the Ortello soils and are coarser textured below the A horizon.

Thurman fine sandy loam, terrace, 0 to 3 percent slopes (TsA).—This soil occupies areas 5 to 30 acres in size. The slopes are smooth.

The profile of this soil is similar to that described as representative for the series, except its surface layer is not so coarse and is slightly darker in some areas.

Included were a few areas where the surface layer is loam and a few areas where it is loamy fine sand. Included with this soil in mapping were small areas that have loamy substratum.

Surface runoff is slow, and drought is a hazard. Available water capacity is low. Row crops are difficult to grow on this soil because they most need water during the driest part of summer.

This soil is suited to all of the locally grown crops. (Capability units IIIe-3 dryland and IIe-31 irrigated; Sandy range site; Sandy windbreak suitability group)

Thurman-Valentine loamy fine sands, 0 to 3 percent slopes (TXA).—These soils occupy tracts 10 to 200 acres in size that are about 50 percent Thurman loamy fine sand and 50 percent Valentine loamy fine sand. The Thurman soil is at the base of slopes and in low areas, and the Valentine soil is on ridges and hummocks.

The Thurman soil has a surface layer 10 or more inches thick, and the Valentine soil has a surface layer less than 10 inches thick. Most cultivated areas have been severely eroded by soil blowing. The original topsoil has been removed, and areas are now lighter colored. Included with these soils in mapping were small areas of Ortello fine sandy loam, loamy substratum.

Surface runoff is slow, and soil blowing is a hazard. These soils are droughty when cultivated. In unprotected areas, sand piles up along fence rows and at the edges of cultivated fields. It fills furrows and buries newly planted crops in spring. Irrigation is feasible but is not extensively practiced.

These soils are suited to all the locally grown crops. Some of the acreage is cultivated, and some is used as range. (Capability units IIIe-5 dryland and IVe-5, irrigated; Sandy range site; Sandy windbreak suitability group)

Thurman-Valentine loamy fine sands, 3 to 5 percent slopes (TXB).—These soils occupy tracts,10 to 200 acres in size, on irregularly shaped ridges and hummocks and in swales. The Thurman soil is at the base of slopes and in swales and makes up about 50 percent of the total acreage. The Valentine soil is on ridgetops and hummocks and makes up the remaining 50 percent.

The Thurman soil has a profile similar to that described as representative for the Thurman series. The Valentine soil has a profile similar to that described as representative for the Valentine series, except in some areas the surface layer is lighter colored because it has been removed and reworked. In some areas the surface layer is fine sand. Included with these soils in mapping were small areas of Ortello fine sandy loam, loamy substratum.

Surface runoff is slow, and soil blowing and drought are serious hazards. The hummocky topography makes irrigation difficult, and overgrazing can result in soil blowing.

These soils are suited to all of the commonly grown crops. About one-third of the acreage is still in native grass. (Capability units IVe-5 dryland and IVe-51 irrigated; Sandy range site; Sandy windbreak suitability group)

Thurman-Valentine loamy fine sands, loamy substratum, 0 to 3 percent slopes (2TXA).—These soils occupy areas, 10 to 50 acres in size, along the South Loup River. The Thurman soil is in the lower part of the landscape and makes up about 50 percent of the total acreage. The Valentine soil is in the higher part of the landscape and makes up the remaining 50 percent.

The profiles of these two soils are similar to those described as representative for their respective series, except a loamy substratum is at a depth of 2 to 5 feet. The Valentine soil has a thinner, lighter colored surface layer than the Thurman soil.

Surface runoff is slow, and soil blowing and drought are serious hazards.

These soils are suited to all of the locally grown crops. Small grains grow well. Deep-rooted plants, such as alfalfa or trees, grow well because they can reach moisture stored in the loamy substratum. (Capability units IIIe-5 dryland and IVe-5 irrigated; Sandy range site; Sandy windbreak suitability group)

Thurman-Valentine loamy fine sands, terrace, 0 to 3 percent slopes (TYA).—These soils occupy wind-reworked tracts, 10 to 300 or more acres in size, on stream terraces of the South Loup River valley. The Thurman soil is in the lower part of the landscape and makes up about 50 percent of the total acreage. The Valentine soil is in the higher part of the landscape and makes up the remaining 50 percent.

The Thurman soil has a profile similar to that described as representative for the Thurman series, except its surface layer is thicker and finer textured in some areas because it contains wind-deposited soil material. The Valentine soil has a profile similar to the one described as representative for the Valentine series, except its surface layer is thinner, lighter colored, and coarser textured in some areas as a result of soil blowing. Included with these soils in mapping were areas of Simeon sandy loam and areas in which the surface layer is fine sandy loam.

Surface runoff is slow, and soil blowing and drought are serious hazards if these soils are cultivated.

These soils are suited to all of the locally grown crops. They can be irrigated, but few areas are. East of Ravenna, some areas of this soil have a water table at a depth of 10 feet. This can benefit trees, alfalfa, and other deep-rooted plants. (Capability units IIIe-5 dryland and IVe-5 irrigated; Sandy range site; Sandy windbreak suitability group)

Uly Series

The Uly series consists of deep, well-drained, medium-textured, moderately sloping to strongly sloping soils that formed in calcareous light brownish-gray loess 5 or more feet thick.

In a representative profile the surface layer is a dark-gray silt loam 8 inches thick. The subsoil is grayish-brown friable silt loam 6 inches thick. The underlying material is light brownish-gray silt loam to a depth of 19 inches, and light-gray silt loam to a depth of 60 inches.

Permeability is moderate, and available water capacity is high.

Uly soils can be cultivated, but more than half of the total acreage is still in native grass.

Representative profile of Uly silt loam, 11 to 15 percent slopes, in native grass 0.83 mile south and 0.17 mile west of the northeast corner of sec. 17, T. 11 N., R. 18 W.:

A11—0 to 4 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.5; clear, smooth boundary.

A12—4 to 8 inches, dark-gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) moist; moderate, fine and medium, granular structure; hard when dry, friable when moist; pH (paste) 6.7; clear, smooth boundary.

B—8 to 14 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium, prismatic structure parting to weak, fine, subangular blocky structure; hard when dry, friable when moist; pH (paste) 7.0; abrupt, smooth boundary.

C1ca—14 to 19 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; weak, medium, prismatic structure; slightly hard when dry, friable when moist; calcareous; pH (paste) 7.4; clear, smooth boundary.

C2—19 to 60 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; common yellowish-brown stains; massive; slightly hard when dry, very friable when moist; calcareous; few, small, white concretions; pH (paste) 7.4.

The A horizon ranges from 7 to 12 inches in thickness. It is thickest in areas that are still in native grass. Depth to free calcium carbonate ranges from 12 to 24 inches.

Uly soils are associated with Coly, Kenesaw, and Holdrege soils. They have a thicker solum than Coly soils and have calcium carbonate leached to greater depths. Uly soils have a B horizon that is lacking in Kenesaw and Coly soils. They have a thinner solum, a less clayey subsoil, and calcium carbonate at a shallower depth than Holdrege soils.

Uly silt loam, 11 to 15 percent slopes (UsD).—This soil occupies tracts, 10 to 500 acres in size, that border drains or are at the base of stronger slopes. The slopes are 50 to 500 feet long, and narrow downhill drains are common.

This soil has the profile described as representative for the series. Included with it in mapping were small areas of Coly silt loam and Holdrege silt loam.

Surface runoff is rapid, and water erosion is a serious hazard.

The acreage is principally used as range. Less than 5 percent of it is cultivated. (Capability unit VIe-1 dryland; Silty range site; Silty to Clayey windbreak suitability group)

Uly, Holdrege and Coly soils, 5 to 11 percent slopes, eroded (UHC2).—These soils occupy tracts, 30 to 500 acres in size, that are dissected by intermittent drains and shallow gulleys. The slopes are relatively smooth and are 100 to 600 feet long. In most areas the Uly soil makes up about 50 percent of the total acreage, the Holdrege soil 30 percent, and the Coly soil the remaining 20 percent. In some areas, however, the Holdrege or Coly soil is not present.

The Uly soil is between the lower and higher parts of the landscape and has the darkest surface layer. The Holdrege soil is at the base of slopes and at the heads of drains and has the thickest surface layer. The Coly soil is on the crest of ridges and on knobs where erosion has been most active. It has a thinner, lighter colored surface layer and is calcareous.

These soils have profiles similar to the ones described as representative for their respective series, except the surface layers are slightly thinner.

Surface runoff is medium to rapid, and erosion is a serious hazard.

Most of the acreage is cultivated. It can be irrigated, but few areas are. (Capability units IVe-1 dryland and IVe-1 irrigated; Uly and Holdrege parts in Silty range site and Coly part in Limy Upland range site; Silty to Clayey windbreak suitability group)

Uly and Holdrege silt loams, 5 to 11 percent slopes (UHC).—These soils occupy irregularly shaped tracts 30 to 600 acres in size. The slopes are 100 to 600 feet long. In most areas about 75 percent of the total acreage is Uly silt loam, and the remaining 25 percent is Holdrege silt loam. In some instances, however, all of an area consists of only one of these soils.

The Uly soil is generally in the upper part of the landscape, and the Holdrege soil is at the base of slopes. Included with these soils in mapping were small areas of Uly silt loam, 11 to 15 percent slopes, and a few cultivated areas of Uly, Holdrege, and Coly soils, 5 to 11 percent slopes, eroded.

Surface runoff is medium to rapid, and water erosion is a serious hazard if these soils are cultivated, although it causes little damage in areas that are still in native grass. Many areas have been overgrazed.

Most of the acreage is still in native grass. Less than 5 percent of it has been cultivated. (Capability units IVe-1 dryland and IVe-1 irrigated; Silty range site; Silty to Clayey windbreak suitabiilty group)

Valentine Series

The Valentine series consists of deep, excessively drained, coarse-textured soils on uplands and on wind-reworked stream terraces of the South Loup River valley. These soils formed in wind-deposited sand.

In a representative profile the surface layer is dark grayish-brown loamy fine sand 5 inches thick. The underlying material is loose grayish-brown fine sand to a depth of 30 inches, and pale-brown fine sand to a depth of 60 inches.

Permeability is rapid, and available water capacity is low. Organic-matter content is low. Rainfall is readily absorbed.

Most areas of Valentine soils are still in native grass and are used as range. A few areas are cultivated.

Representative profile of Valentine loamy fine sand, 3 to 17 percent slopes, in native grass 75 feet west and 0.44 mile north of the southeast corner of sec. 8, T. 12 N., R. 13 W.:

A—0 to 5 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak, medium, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.5; abrupt, smooth boundary.

C1—5 to 30 inches, grayish-brown (10YR 5/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; pH (paste) 7.0; clear, smooth boundary.

C2—30 to 60 inches, pale-brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grained; loose; pH (paste) 6.9.

The A horizon ranges from 2 to 9 inches in thickness. Many areas have an AC horizon in the profile. Areas that have been cultivated commonly have a surface layer of fine sand.

Valentine soils are associated with Thurman, Orthello, and Blendon soils. They have a thinner A horizon than Thurman, Orthello, or Blendon soils, and the layer beneath the A horizon is coarser textured.

Valentine loamy fine sand, 3 to 17 percent slopes (VbC).—This soil occupies tracts, 30 to 1,000 acres in size, on uplands and stream terraces.

This soil has the profile described as representative for the series. As much as 25 percent of some upland areas have silty substrata. Included with this soil in mapping were small blowouts on the tops of hummocks, small areas of Thurman and Ortello soils, and areas in which the surface layer is fine sand.

Surface runoff is slow to medium, and soil blowing is a serious hazard if the grass cover is destroyed. This soil is generally too sandy and unstable to be cultivated.

Nearly all of the acreage is used as range. (Capability unit VIe–5 dryland; Sands range site; Very Sandy windbreak suitability group)

Wann Series

The Wann series consists of deep, somewhat poorly drained soils on the bottom lands of the Platte and South Loup Rivers. These soils formed in loamy alluvium. Coarse sand and gravel many feet thick is present at depths of 40 to 60 inches along the Platte River. Fine and medium sand is present at depths of 40 to 72 inches along the South Loup River. The water table is at 3 to 6 feet. It is lowest in summer and fall and highest late in winter and in spring.

In a representative profile the surface layer is dark-gray fine sandy loam 13 inches thick. Transitional from the surface layer to the underlying material is 4 inches of gray very friable fine sandy loam. The underlying material is light brownish-gray, mottled fine sandy loam to a depth of 34 inches; and light-gray, mottled fine sandy loam to a depth of 60 inches.

Permeability is moderately rapid, and available water capacity is moderate.

Wann soils are suited to native grass and all of the locally grown crops. Most areas are cultivated, and many of these are irrigated. Trees and alfalfa benefit because their roots extend down to the water table.

Representative profile of Wann fine sandy loam in a cultivated field 0.6 mile north and 0.2 mile east of the southwest corner of sec. 10, T. 12 N., R. 14 W.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) fine sandy loam, very dark brown (10YR 2/2) moist; weak, fine, granular structure; slightly hard when dry, very friable when moist; pH (paste) 6.6; abrupt, smooth boundary.

A12—8 to 13 inches, dark-gray (10YR 4/1) fine sandy loam, very dark brown (10YR 2/2) moist; weak, fine, granular structure; slightly hard when dry, very friable when moist; pH (paste) 7.2; clear, smooth boundary.

AC—13 to 17 inches, gray (10YR 5/1) fine sandy loam, dark gray (10YR 4/1) moist; single grained; slightly hard when dry, very friable when moist; calcareous; pH (paste) 7.8; clear, smooth boundary.

C1—17 to 34 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; few, fine, distinct, mottles; single grained; slightly hard when dry, very friable when moist; calcareous; pH (paste) 8.0; clear, smooth boundary.

C2—34 to 48 inches, light-gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; many, medium, distinct mottles; single grained; slightly hard when dry, very friable when moist; calcareous; pH (paste) 8.1; clear, smooth boundary.

C3—48 to 60 inches, light-gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; few, medium, distinct mottles; single grained; slightly hard when dry, very friable when moist; pH (paste) 7.8.

The A horizon ranges from 10 to 20 inches in thickness. Wann soils are commonly highly stratified with thin lenses of silt, clay, and sand or gravel, and buried A horizons are common. In many areas capillary action brings soluble salts to the surface in winter and spring. These salts appear as a white crust, but spring and summer rains wash away most of them.

Wann soils are associated with Leshara, Gibbon, Alda, and Lex soils. They are coarser textured in the upper part of the C horizon than Leshara or Gibbon soils and are deeper over mixed sand and gravel than Alda or Lex soils.

Wann fine sandy loam (0 to 1 percent slopes) (Wb).—This soil occupies areas 10 to 100 acres in size. About 75 percent of the total acreage is along the South Loup River, and the remaining 25 percent is along the Platte River.

This soil has the profile described as representative for the series. Some areas have a loamy fine sand surface layer. Included with this soil in mapping were small areas of Wann loam, Alda soils, Platte soils, and Boel soils.

Surface runoff is slow, and soil blowing is a hazard if this soil is left bare.

Most of the acreage is in native grass or is dryfarmed. Areas along the Platte River are generally irrigated, but only a few areas along the South Loup River are irrigated. (Capability units IIw–6 dryland and IIw–6 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Wann loam (0 to 1 percent slopes) (Wm).—This soil occupies tracts, 10 to 200 acres in size, a few of which are dissected by channels.

The profile of this soil is similar to that described as representative for the series, except the surface layer is loam. Included with this soil in mapping were small areas of Alda and Platte soils, Wann fine sandy loam, and Leshara and Gibbon silt loams. These soils make up only a small percentage of the total acreage.

Surface runoff is slow, and salinity is a problem, especially along the Platte River. Salinity generally need not be considered in management of areas along the South Loup River. The most severely affected areas are shown by a special symbol for salts. Because of the soluble salts, potatoes grow poorly.

Most of the areas along the Platte River are irrigated. Corn, alfalfa, and grain sorghum grow well. The areas along the South Loup River are dryfarmed or are still in native grass that is generally mowed for hay. (Capability units IIw–4 dryland and IIw–4 irrigated; Subirrigated range site; Moderately Wet windbreak suitability group)

Wet Alluvial Land

Wet alluvial land (0 to 1 percent slopes) (Wx) is a very poorly drained land type in depressions, abandoned channels, and oxbows of the Platte and South Loup Rivers. It formed in silty and clayey alluvium. The water table is at or above the surface in spring, but it commonly falls to a depth of 2 feet late in summer and in fall. In wet years it is near the surface throughout the growing season.

The surface layer is commonly an organic mulch 1 to 3 inches thick. The underlying material is sand or sand and gravel.

Included with this land type in mapping were areas of Marsh, Gibbon silt loam, Loup loam, and Wann loam. Loup loam makes up as much as 25 percent of some areas.

This land type is not suited to cultivation and is used as range or hayland. It generally produces good forage, but in wet years it is too wet to be mowed for hay. (Capability unit Vw–1 dryland; Wet Land range site; Very Wet windbreak suitability group)

Wood River Series

The Wood River series consists of deep, moderately well drained soils that have a claypan and are on stream terraces along the Platte and Wood Rivers. They formed in loess and silty alluvium that is 6 or more feet thick over mixed sand and gravel.

In a representative profile the surface layer is dark-gray silt loam 11 inches thick. The subsoil is dark-gray firm silty clay loam to a depth of 16 inches, grayish-brown very firm silty clay to a depth of 23 inches, and grayish-brown firm silty clay loam to a depth of 36 inches. Streaks of calcium carbonate and concretions are common. The underlying material is light-gray silt loam that reaches to a depth of 60 inches.

Permeability is slow, and available water capacity is high. Wood River soils are cultivated and irrigated.

Representative profile of Wood River silt loam, 0 to 1 percent slopes, in an irrigated field 0.48 mile east and 1,350 feet south of the northwest corner of sec. 6, T. 9 N., R. 13 W.:

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.5; abrupt, smooth boundary.

A12—8 to 11 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist and rubbed; weak, medium, granular structure; slightly hard when dry, friable when moist; pH (paste) 6.5; abrupt, smooth boundary.

B21—11 to 16 inches, dark-gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist and rubbed; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky structure; hard when dry, firm when moist; pH (paste) 6.9; clear, smooth boundary.

B22t—16 to 23 inches, grayish-brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist and rubbed; moderately coarse prismatic structure parting to moderate, medium, subangular blocky structure; very hard when dry, very firm when moist; pH (paste) 7.5; abrupt, wavy boundary.

B3ca—23 to 36 inches, grayish-brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist and rubbed; weak, coarse, subangular blocky structure; hard when dry, firm when moist; calcareous; free calcium carbonate is disseminated but is also present in streaks and small concretions; pH (paste) 7.6; abrupt, wavy boundary.

C1ca—36 to 50 inches, light-gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard when dry; very friable when moist; calcareous; small, white concretions; pH (paste) 8.0; abrupt, wavy boundary.

C2—50 to 60 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard when dry; very friable when moist; calcareous; pH (paste) 7.9.

The A horizon ranges from 8 to 16 inches in thickness. Some surfaces of peds in the lower part of the A horizon have faint gray coatings. The upper part of the B horizon is commonly as dark as the A horizon. In some areas the B3ca and C1ca horizons contain small amounts of soluble salts.

Wood River soils are associated with Hall, Hord, and Cozad soils. They have a more clayey B horizon than Hall, Hord, or Cozad soils.

Wood River silt loam, 0 to 1 percent slopes (Wr).—This soil occupies tracts 10 to more than 500 acres in size. The slopes are smooth.

The profile of this soil is the one described as representative of the series. Land leveling results in surface layers that are both thicker and thinner than that described as representative for the series. In places there is a slightly saline layer beneath the subsoil. Included with this soil in mapping were small areas of Hall silt loam, Hord silt loam, and Cozad silt loam.

Surface runoff is slow, and soil blowing can be a hazard. A good supply of underground water is present beneath this soil.

Most of the acreage is used as irrigated cropland. It can be dryfarmed, but few areas are. (Capability units IIs–2 dryland and IIs–2 irrigated; Clayey range site; Silty to Clayey windbreak suitability group)

Wood River silt loam, 1 to 3 percent slopes (WrA).—This soil occupies narrow areas, 5 to 40 acres in size, that border drains or are on low ridges.

Erosion and land leveling operations have thinned the surface layer in some areas and thickened it in others. Included with this soil in mapping were small areas of Hall silt loam and Hord silt loam.

Surface runoff is medium, and water erosion is a hazard. The clayey subsoil absorbs water slowly.

The acreage is generally cultivated, and most areas have been developed for irrigation. (Capability units IIe–2 dryland and IIIe–2 irrigated; Clayey range site; Silty to Clayey windbreak suitability group)

Wood River-Slickspots complex, 0 to 1 percent slopes (WS).—This complex occupies areas, 10 to 100 acres in size, on low alluvial stream terraces of the Platte River valley. About 70 percent of the total acreage is Wood River silt loam, 0 to 1 percent slopes, and the remaining 30 percent is Slickspots.

The profile of the Wood River soil is similar to that described as representative for the Wood River series. Slickspot areas are as described for that land type. Included with this complex in mapping were small areas of Hord silt loam, terrace, and Hall silt loam, terrace.

Surface runoff is very slow, and surface drainage is needed in most areas. Tilth is poor in the Slickspot areas, as these are very hard when dry and very sticky when wet. Tractors commonly become stuck in the Slickspot areas. The saline-alkali areas are low in available nitrogen and phosphorus. Crops are spotty, especially in the Slickspot areas. Corn grows poorly.

About half of the acreage is cultivated, and most of the cultivated area is irrigated. The rest of the acreage is in native grass. This complex is best suited to alfalfa and grain sorghum. It is also suited to grass and trees, and it can be used for other less intensive purposes. (Capability unit IVs–1 dryland and IIIs–1 irrigated; the Wood River part in Clayey range site, and Slickspots part in Saline Lowland range site; Moderately Saline or Alkali windbreak suitability group)

Use and Management of the Soils

This section explains how the soils in Buffalo County can be used. It begins with a general discussion of management practices on dryland and irrigated soils. This is followed by an explanation of the capability classification used by the Soil Conservation Service and a grouping of the soils into units according to that classification. Information on the yields of the principal dryfarmed and irrigated crops under prevailing conditions and under improved management is given for each arable soil. Management of rangeland is discussed next, and soils are grouped into range sites, each of which is a distinctive type of rangeland. There follows a discussion of the suitability of soils for growing trees, particularly capacity of the soil associations to produce food and cover for wildlife. The section concludes with a discussion of the engineering properties of soils, a description of the systems used in classifying soils for engineering purposes, and interpretations of engineering test data for each of the soil series.

Management of the Soils for Crops [2]

General management practices that apply to most soils in Buffalo County are described in this section. Two types of management, dryland and irrigated, are discussed. Management practices for each type are given separately.

Managing dry farmed cropland

Soils that are cultivated without benefit of irrigation need management that conserves moisture, controls water erosion and soil blowing, and preserves tilth and fertility.

Terracing, contour farming, and grading in gullies for grassed waterways are methods of conserving moisture and controlling water erosion. It is necessary that they be used in conjunction with various types of vegetation management. Soils in the Holdrege, Ulysses, and Kenesaw series can benefit from these practices. Keeping crop residues on the surface or growing a protective cover of plants helps to prevent the soil from sealing or crusting after heavy rains. Crop residues left on the surface form a mulch that slows evaporation. Tall stubble left in fields over the winter catches drifting snow. Erosion hazard can be reduced by using soils that are nearly level or gently sloping for row crops and by using the more steeply sloping soils for hay and pasture.

Soil blowing is reduced by the same practices that conserve soil moisture. Stubble-mulch tillage, management of crop residues, wind stripcropping, and the use of narrow field windbreaks help to reduce wind velocity at the soil surface and thus reduce movement of soil particles. Destroying crop residues by burning is not a desirable practice.

Managing tillage operations for seedbed preparation so that all but the essential steps are eliminated and using management practices that leave maximum crop residues on the surface help to improve the physical condition of the soil and reduce soil losses. Fewer operations mean less tractor and machinery travel, less soil compaction, and a higher intake of water into the soil.

[2] By E. O. PETERSON, conservation agronomist, Soil Conservation Service.

Most soils used for dryland crops require nitrogen fertilizer. Barnyard manure or commercial fertilizer can be used. The type and amount of commercial fertilizer to be applied should be determined by soil tests. The available supply of moisture should also be considered. Soils in the Uly, Kenesaw, and Coly series can benefit from the use of fertilizer in most years.

Managing irrigated cropland

Many of the management practices applicable to dryfarmed areas are equally suited to irrigated areas. Soil blowing can be reduced by proper management of crop residues and wind stripcropping. Problems that generally need careful attention are related to soil slope, depth, and texture and the possible need for erosion control. Wet and alkali-affected areas have limitations that need special treatment.

Irrigated soils require more fertilizer because increased crop production removes plant nutrients.

Land leveling or reshaping may be needed to ensure efficient water use, uniform distribution of irrigation water, and better control of runoff. Some areas can be irrigated best by a sprinkler system, others by gravity systems.

Water can be distributed to crops in various ways. Furrows, borders, corrugations, controlled flooding, and sprinkler systems are suitable methods.[3]

Irrigation methods should be selected only after careful consideration of maximum crop production, possible soil hazards, and costs. Not all soils are suited to irrigation.

Capability Groups of Soils

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops (*5*). 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 landforming 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 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 trees, or for engineering.

In the capability system, all kinds of soils 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.

[3] Additional information on irrigation methods is contained in the IRRIGATION GUIDE FOR NEBRASKA, U.S. Dept. Agri., Soil Conservation Service, 100 pp., 1971.

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 or 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.

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–2 dryland. 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.

Management by capability units

In this section the soils of Buffalo County are placed in capability units. A capability unit is a group of soils about alike in those characteristics that affect management for tilled crops and tame pasture, and approximately alike in their response to the management. A capability unit ordinarily contains more than one mapping unit, and for this reason emphasis is on those characteristics that the mapping units have in common, and the relation of these characteristics to management.

The mapping unit of this county have been placed in both dryland and irrigated capability units. To save space, however, the characteristics of a given group of mapping units are described once; and then, separately, the management under dryfarming and under irrigation. For example, Wood River silt loam, 1 to 3 percent slopes has characteristics that make it appropriate to place this soil in capability unit IIe–2 dryland and in capability unit IIIe–2 irrigated. The soil characteristics affecting management, however, are described only once in the opening paragraphs, then the management practices for dryland and for irrigated land are treated separately.

CAPABILITY UNITS I–1 DRYLAND AND I–1 IRRIGATED

These capability units consist of those soils in the Cass, Grigston, and Hobbs series that are deep and have a medium-textured surface layer. They are on bottom lands. The underlying material is medium textured, except in Cass soils, where it is moderately coarse.

These are some of the best cultivated soils in the county. Natural fertility is medium to high. These soils absorb water well and release it readily to plants. They are easily worked. Surface runoff is slow, and permeability is moderate, except in Cass soils, where it is moderately rapid.

Overflow can be a hazard on the Hobbs soils. Water erosion is not a serious hazard, but soil blowing can be a hazard if these soils are left bare.

Dryland Management.—Corn, grain sorghum, alfalfa, and wheat are the principal dryfarmed crops. These soils are also suited to oats and tame grasses and can be used as range.

Fertility can be maintained by returning crop residues to the soil during tillage. Maintaining crop residues on the surface helps to increase water intake and reduces evaporation of soil moisture. An intensive cropping system that has a high percentage of row crops can be used. The use of legumes and grasses in the cropping system improves tilth of the soil and helps to break up disease and insect cycles. Field borders seeded to native grasses can be used as turnrows, roadways, hayland, winter pasture, or cover for wildlife.

Irrigation Management.—The principal irrigated crops are corn, grain sorghum, alfalfa, soybeans, and tame grasses.

Maintenance of soil fertility and proper distribution of irrigation water are the principal management concerns. Fertility can be maintained by adding commercial fertilizer or barnyard manure. Land leveling is needed in most areas to permit more uniform distribution of irrigation water. Furrows, borders, and sprinkler systems can be used for irrigation. The amount of irrigation water and the time and duration of its application need to be carefully managed to prevent waste.

CAPABILITY UNITS IIc–1 DRYLAND AND I–2 IRRIGATED

These capability units consist of the deep, well-drained, nearly level soils in the Blendon, Cozad, Hall, Holdrege, Hord, and Kenesaw series that have a medium-textured surface layer. They are on uplands and stream terraces. The subsoil ranges from moderately fine to moderately coarse in texture.

These are some of the best soils for cultivation in Buffalo County. They can be cultivated more intensively than most other soils in the county. These soils absorb water well and release it readily to plants, and they are easily worked. Available water capacity is moderate to high. Surface runoff is slow, and permeability is moderately slow to moderate.

These soils are apt to be somewhat droughty if they are dryfarmed, particularly in years of low rainfall. Soil blowing is a hazard if these soils are left bare.

DRYLAND MANAGEMENT.—These soils are suited to tame grasses and all of the commonly grown crops. Corn, grain sorghum, wheat, and alfalfa are the principal dryfarmed crops.

Fertility can be maintained by returning crop residues to the soil during tillage and by adding commercial fertilizer. Maintaining crop residues on the surface helps to increase water intake and reduces evaporation of soil moisture. The use of small grains or legumes in the cropping system helps to break up disease and insect cycles. Field borders seeded to native grasses can be used as turnrows, hayland, winter pasture, or cover for wildlife.

IRRIGATION MANAGEMENT.—Corn is the principal irrigated crop, but grain sorghum, alfalfa, soybeans, and tame grasses are also important crops.

Maintenance of soil fertility and proper distribution of irrigation water are the principal management concerns. Fertility can be maintained by returning crop residues to the soil during tillage and by adding commercial fertilizer or barnyard manure. Land leveling is needed in most areas to permit more uniform distribution of irrigation water. Management practices that reduce or eliminate waste of irrigation water at the end of fields need to be used.

CAPABILITY UNITS IIe-1 DRYLAND AND IIe-1 IRRIGATED

These capability units consist of the deep, well-drained, very gently sloping soils in the Blendon, Cozad, Hall, Hobbs, Holdrege, Hord, and Kenesaw series that have a medium-textured surface layer. They are on uplands and stream terraces. The subsoil and underlying material range from moderately fine to moderately coarse in texture.

These soils absorb water well and release it readily to plants. Natural fertility is medium to high. Available water capacity is moderate to high, and surface runoff is medium.

Soil blowing and water erosion are the principal hazards. Droughtiness is a concern in hot summer months when rainfall is below normal.

DRYLAND MANAGEMENT.—These soils are well suited to corn, wheat, grain sorghum, alfalfa, and tame grasses.

The cropping system on these soils consists principally of winter wheat and an occasional row crop or legume to break up disease and insect cycles. Crop residues can be returned to the soil. If residues are used as a mulch during crop-establishment periods, they help to control water erosion. Contour terraces and stubble-mulch tillage help to control both soil blowing and water erosion. Grassed waterways are needed in some areas to carry away runoff water and to help prevent soil loss.

IRRIGATION MANAGEMENT.—The crops best suited to irrigation are corn, grain, sorghum, alfalfa, soybeans, potatoes, and tame grasses.

Soil blowing, water erosion, maintenance of fertility, and proper distribution of irrigation water are the principal management concerns. Land leveling permits more uniform distribution of irrigation water. The slope of furrows needs to be controlled to reduce water erosion. This can be done by using contour furrows or bench leveling. Grassed field borders can be used to dispose of excess irrigation water. Fertility can be maintained by adding commercial fertilizer or barnyard manure. Crop residues can be returned to the soil to help maintain organic-matter content and tilth.

CAPABILITY UNITS IIe-2 DRYLAND AND IIIe-2 IRRIGATED

Wood River silt loam, 1 to 3 percent slopes, is the only soil in these capability units. It is a deep, moderately well drained soil that has a medium-textured surface layer. The subsoil is very firm silty clay, and the underlying material is silt loam.

Permeability is slow because the subsoil has a claypan. Available water capacity is high, organic-matter content is medium, and natural fertility is high. Surface runoff is slow.

Water erosion can be a hazard. Crops grow poorly in areas where the subsoil has been exposed during land leveling.

This soil is most productive in years that have above-average rainfall. Effective root penetration is difficult if the subsoil is dry.

DRYLAND MANAGEMENT.—Only a small part of the acreage is dryfarmed, but this soil is suited to wheat, grain sorghum, and tame grasses. Corn is not so suitable as other crops.

Widely spaced terraces, contour farming, and stubble-mulch tillage can be used to help control water erosion. Returning crop residues to the soil helps to maintain organic-matter content and makes the soil more friable. Grassed waterways help to prevent soil loss. The periodic use of legumes and grasses in the cropping system helps to maintain and improve water intake. It also helps to break up disease and insect cycles.

IRRIGATION MANAGEMENT.—Nearly all of the acreage is irrigated. It is suited to all of the commonly grown crops, such as corn, grain sorghum, alfalfa, soybeans, potatoes, and tame grasses. Maintenance of fertility is the principal management concern. Simple conservation methods can be used to check surface runoff and water erosion. Some land leveling is usually necessary. Applications of organic matter, gypsum, and sulfur are useful in correcting the harmful effects in those areas where the subsoil has been exposed at the surface. Management practices to control excess irrigation runoff at the end of fields can be used. Irrigation water needs to be applied slowly because water intake is slow in the claypan of the subsoil. Contour farming can be used for row crops

CAPABILITY UNITS IIe-3 DRYLAND AND IIe-3 IRRIGATED

These capability units consist of Kenesaw fine sandy loam, calcareous variant, 0 to 1 percent slopes, and the deep, well-drained, nearly level soils in the Blendon and

Cass series that have a moderately coarse textured surface layer. They are on bottom lands and stream terraces. The subsoil and underlying material range from medium to moderately coarse in texture.

These soils have a medium water intake rate and release water readily to plants. They are easily worked. Permeability is moderately rapid except in the Kenesaw soil, where it is moderate. Available water capacity is moderate to high, and surface runoff is slow. Organic-matter content is low to medium.

These soils are somewhat droughty if they are dry-farmed, and soil blowing can be a hazard if they are left bare.

Dryland Management.—These soils are suited to corn, grain sorghum, wheat, alfalfa, and tame grasses.

The use of row crops in the cropping system needs to be limited. Management practices to control soil blowing, such as stubble mulching, cover crops, field windbreaks, and wind stripcropping, can be used. The use of legumes and green-manure crops in the cropping system also helps to control soil blowing.

Irrigation Management.—Corn, grain sorghum, alfalfa, soybeans, and tame grass are suitable irrigated crops.

Soil blowing, depletion of fertility, and leaching of plant nutrients by excessive irrigation are the principal management concerns. Some land leveling is usually necessary to prepare the soil for efficient gravity irrigation. This permits more uniform distribution of irrigation water. Legumes need to be used in the cropping system. Crop residues can be left on the surface in winter to help control soil blowing. Adding barnyard manure to the soil helps to maintain fertility, increases water intake, and helps to control erosion. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIs-2 DRYLAND AND IIs-2 IRRIGATED

Wood River silt loam, 0 to 1 percent slopes, is the only soil in these capability units. It is a deep, nearly level, moderately well drained soil on stream terraces of the Platte River valley. It has a silt loam surface layer, and the subsoil has a claypan.

This soil has a medium water intake rate and releases water slowly to plants. Permeability is slow, available water capacity is high, and surface runoff is slow. The claypan in the subsoil restricts root and water penetration.

This soil is somewhat droughty in dry weather. Dry-farmed crops can be burned by dry weather because the claypan in the subsoil restricts water movement.

Dryland Management.—This soil is suited to wheat, grain sorghum, alfalfa, and tame grasses. Corn is not so suitable as other crops, because much of the growing season is in the hot summer months.

The use of legumes in the cropping system helps to keep the soil open and permits deeper penetration of water. Stubble-mulch tillage helps to improve tilth and reduces evaporation of soil moisture.

Irrigation Management.—Corn, grain sorghum, soybeans, alfalfa, potatoes, and tame grasses are suitable irrigated crops.

Maintenance of fertility and proper distribution of irrigation water are the principal management concerns. Some land leveling is usually necessary. If the subsoil is cut in land-leveling operations, undercutting and backfilling with 6 inches of topsoil should be considered. In areas where the subsoil has been exposed at the surface, adding organic matter or barnyard manure to the soil will make it more friable and increase water intake. The use of a legume or a grass-legume mixture in the cropping system every 4 to 6 years helps to keep the subsoil open and permits deeper water penetration. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIw-3 DRYLAND AND I-3 IRRIGATED

Rusco silt loam is the only soil in these capability units. It is in upland depressions that are artificially or naturally drained. This deep, well-drained, nearly level soil has a medium-textured surface layer and a subsoil that is firm and moderately fine textured. The underlying material is mottled silt loam.

Permeability is moderately slow, although the available water capacity is high. Organic-matter content is moderate, and natural fertility is medium.

Water ponds in some of the lowest areas and can damage alfalfa, and floodwater is a problem for short periods of time after rains. Although this soil is in depressions, lack of moisture can damage crops in years that have below-normal rainfall.

Dryland Management.—The principal crops are wheat and grain sorghum. Corn, alfalfa, and tame grasses are also suitable crops but are not commonly grown.

Diversion terraces in the higher areas help to prevent flooding by rainwater. Ditches can be used to drain low areas in which ponding occurs.

Irrigation Management.—Corn, grain sorghum, soybeans, potatoes, and alfalfa are suitable irrigated crops.

V-ditches can be used to drain the lowest areas. Diversion terraces in the higher areas keep excess water off the soil. Land leveling helps to provide more adequate drainage and permits more uniform distribution of irrigation water. The use of alfalfa, grass, or a grass-legume mixture in the cropping system helps to maintain fertility, tilth, and organic-matter content. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIw-31 DRYLAND AND IIw-3 IRRIGATED

Hobbs silt loam, occasionally flooded, is the only soil in these capability units. It is a deep, nearly level, medium-textured soil on bottom lands that are occasionally flooded. The surface layer is very thick, and the underlying material is medium textured.

Available water capacity is high. This soil absorbs water well and releases it readily to plants. It is easily worked, and natural fertility is high.

Occasional flooding is a hazard, although crops can benefit from the additional water if it does not come too fast or remain too long. Crops can be damaged after rains by scouring or by deposits of soil and debris left by floodwater. Wetness can delay spring planting.

Dryland Management.—Corn and grain sorghum are the principal crops, but wheat, alfalfa, and tame grasses are also suitable.

Cropping systems suited to this soil can have a fairly long period of continuous row crops. Occasionally a small grain or legume is needed to break up disease and insect cycles. Crop residues need to be returned to the soil, and fertilizer can be added to the soil to maintain tilth and productivity. Diversion terraces are needed in some areas to carry away runoff water from higher lying soils and prevent damage to crops. Drainage ditches help to remove excess water and damage to crops. Drainage ditches help to remove excess water and prevent drowning of crops.

Irrigation Management.—Corn, grain sorghum, soybeans, alfalfa, and tame grasses are suitable irrigated crops.

Flooding is the principal management concern and should be controlled. This can be done by installing diversion terraces in the higher areas. These terraces carry excess water to outlets where it will not damage crops or cause erosion. Drainage ditches are useful in some areas to prevent drowning of crops.

CAPABILITY UNITS IIw-4 DRYLAND AND IIw-4 IRRIGATED

These capability units consist of those soils in the Alda, Boel, Gibbon, Leshara, Lex, and Wann series that have a medium-textured surface layer. They are moderately deep to deep, somewhat poorly drained, nearly level soils on bottom lands and low stream terraces. They are not appreciably affected by alkali, and all are calcareous at the surface except the Boel soils. The underlying material ranges from moderately fine to moderately coarse in texture. The water table is at a depth of 2 to 8 feet.

These soils absorb water well and release it readily to plants. They are easily worked. Permeability is moderately slow to moderately rapid, and surface runoff is slow. Some crops can benefit from the water table during part of the growing season and in dry years.

Water erosion is not a severe problem, but during the wettest periods the water table is so high that it can limit crop production. Wetness delays seedbed preparation, planting, and other field work in some years.

Dryland Management.—These soils are best suited to corn, grain sorghum, wheat, alfalfa, and grasses. Alfalfa and grasses can benefit from the water table. Corn and grain sorghum do not grow so well as other crops because the water table is lowest by midsummer, and their roots cannot benefit from it at that time. These soils also can be used as range or hayland and for shelterbelts. Some areas are still in native grass, and trees are grown in shelterbelts in some areas.

In areas where wetness is a limitation, drainage ditches can be installed if a suitable outlet is available. The use of legumes or a grass-legume mixture in the cropping system helps to improve organic-matter content and tilth. Alfalfa can benefit from phosphate fertilizer.

Irrigation Management.—Corn, soybeans, grain sorghum, alfalfa, and tame grasses are suitable irrigated crops.

Maintenance of fertility is the principal management concern. Drainage ditches and land leveling can be used to remove excess water. The use of grasses or a grass-legume mixture in the cropping system helps to maintain organic-matter content and tilth. Legumes can benefit from phosphate fertilizers; nitrogen fertilizer is needed for most other crops.

CAPABILITY UNITS IIw-6 DRYLAND AND IIw-6 IRRIGATED

These capability units consist of the moderately deep to deep, nearly level soils in the Alda, Leshara, and Wann series that have a moderately coarse textured surface layer. The underlying material is medium to moderately coarse in texture. Mixed sand and gravel is at depths of 2 to 6 feet. The water table fluctuates between depths of 2 and 6 feet.

These soils absorb water well and release it readily to plants. They are easily worked. Permeability is moderate to moderately rapid, and surface runoff is slow. Organic-matter content is moderate. Available water capacity is low to high, depending on the thickness of the soil material above the sand and gravel.

Soil blowing is a hazard if these soils are left bare, and wetness in early spring can delay planting.

Dryland Management.—These soils are suited to corn, grain sorghum, wheat, alfalfa, and tame grasses. Alfalfa can benefit from the water table throughout the growing season, but other crops that are not so deep rooted can be damaged by drought in midsummer when the water table is lowest. In years that have average rainfall, most crops derive some benefit from the water table. The acreage can also be used as range or hayland and for shelterbelts.

Soil blowing can be controlled by keeping crop residues on the surface, especially during tillage operations and seedbed preparation. Stripcropping and field windbreaks help to reduce water erosion.

Irrigation Management.—Corn, grain sorghum, alfalfa, soybeans, and tame grasses are suitable irrigated crops.

Usually only a small amount of land leveling is needed to prepare these soils for efficient irrigation. Soil blowing, maintenance of fertility, and proper distribution of irrigation water are the principal management concerns. The use of alfalfa, grasses, or a grass-legume mixture in the cropping system every 6 or 8 years helps to maintain fertility, tilth, and organic-matter content. Barnyard manure and green manure crops help to increase fertility and tilth. Alfalfa can benefit from phosphate fertilizer, and nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIIe-1 DRYLAND AND IIIe-1 IRRIGATED

These capability units consist of Kenesaw-Coly silt loams, 3 to 5 percent slopes, and the deep, well-drained, gently sloping soils of the Cozad, Hobbs, Holdrege, and Kenesaw series. Except for the Holdrege soils, they are all medium textured throughout the profile. The subsoil of the Holdrege soils is moderately fine textured. The soils of these capability units are on uplands and stream terraces and at the base of slopes.

These soils absorb water well and are easily worked. Permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and natural fertility is medium to high except in the Coly soils, where it is low.

Water erosion is a hazard, and soil blowing is a hazard in fall and winter. Droughtiness limits crop production.

Dryland Management.—These soils are suited to corn, wheat, grain sorghum, alfalfa, tame grasses, and trees. The acreage can also be used as range, hayland, or cover for wildlife.

Simple conservation methods are needed to check surface runoff and preserve available moisture. Contour terraces, stubble-mulch tillage, and good management of crop residues help to control water erosion and soil blowing. Planting crops in sequence helps to break up disease and insect cycles.

Irrigation Management.—Corn, grain sorghum, and alfalfa are the principal irrigated crops, but soybeans, potatoes, and tame grasses are also grown.

Water erosion and maintenance of fertility are the principal management concerns. Furrows and sprinkler systems can be used for irrigation. Some land leveling is usually necessary to prepare the soil for efficient gravity irrigation. Bench leveling helps to control water erosion and conserves soil moisture. Row crops need to be planted on the contour if the soil has not been benched. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIIe-3 DRYLAND AND IIe-31 IRRIGATED

These capability units consist of the deep, well-drained to somewhat excessively drained, nearly level to gently sloping soils in the Blendon, Ortello, and Thurman series that have a moderately coarse surface layer. They are on bottom lands, stream terraces, and uplands. The subsoil and underlying material are moderately coarse textured to coarse textured.

Permeability is moderately rapid to rapid, and available water capacity is moderate to low. Natural fertility is low in the Thurman soils, medium in the Ortello soils, and high in the Blendon soils. Moisture intake in the surface layer is moderately rapid.

These soils are somewhat droughty, and soil blowing and water erosion are hazards. Conservation of organic-matter content, moisture, and fertility are other concerns of management.

Dryland Management.—These soils are suited to all of the commonly dryfarmed crops. They are also suited to tame grasses and trees. Corn, grain sorghum, small grains, and alfalfa are the principal crops. Small grains and the first cutting of alfalfa are generally dependable crops because they grow and mature in spring and early in summer when rainfall is highest.

Soil blowing and water erosion can be reduced and soil moisture can be conserved by the use of stripcropping, field windbreaks, and a cropping system that keeps the soil covered most of the time. Terracing is useful in the very gently sloping soils. The best crop results can be obtained by limiting row crops to 4 consecutive years and by using close-growing crops in the cropping system to protect the soil and conserve moisture.

Irrigation Management.—The most commonly grown irrigated crops are corn, soybeans, grain sorghum, alfalfa, potatoes, and tame grasses.

Soil blowing, water erosion, and maintenance of fertility are the principal management concerns. Wind stripcropping, shelterbelts, stubble mulching, and cover crops, such as rye or vetch, help to control soil blowing. Bench leveling helps to control water erosion. Terracing and contour farming help to control water erosion in the very gently sloping soils. Crop residues need to be returned to the soil, and legumes can be used in the cropping system every 4 to 6 years. Barnyard manure and green-manure crops help to improve organic-matter content. Nitrogen is the most commonly needed fertilizer.

CAPABILITY UNITS IIIe-31 DRYLAND AND IIIe-3 IRRIGATED

These capability units consist of those soils in the Inavale and Ortello series that are deep and have a moderately coarse textured surface layer. They are deep soils on bottom lands, stream terraces, and uplands and are well drained to excessively drained. The Inavale soils are nearly level to very gently sloping, and the Ortello soils are gently sloping. The subsoil and underlying material are moderately coarse to coarse in texture.

Permeability is moderately rapid to rapid, and available water capacity and organic-matter content are moderate to low. Natural fertility is medium to low.

These soils are droughty, and soil blowing is a severe hazard. Water erosion is a concern of management.

Dryland Management.—These soils are suited to corn, wheat, grain sorghum, alfalfa, tame grasses, and trees. The acreage can also be used for recreation purposes.

Stubble-mulch tillage is useful in maintaining productivity. The use of legumes or a grass-legume mixture in the cropping system will increase organic-matter content and help to control soil blowing. A crop sequence in which row crops are not planted consecutively helps to build up the soil, and terraces can be beneficial on the gently sloping soils in areas that are not too hummocky. Stripcropping and grassed waterways help to control water erosion.

Irrigation Management.—Corn, grain sorghum, soybeans, potatoes, alfalfa, and tame grasses are suitable irrigated crops.

Soil blowing and maintenance of fertility are the principal management concerns. Furrows and borders are the irrigation methods generally used on these soils, but sprinkler systems can also be used. Distributiin of irrigation water is most uniform in areas that have been leveled. If deep cuts are made into coarse-textured soil material, backfilling with finer textured soil material is advisable. Irrigation water can be applied frequently, but excessive application needs to be avoided because it leaches plant nutrients out of the root zone. The use of legumes in the cropping system every 4 to 6 years improves and maintains productivity, tilth, and organic-matter content. Crop residues that are returned to the soil help prevent soil blowing and improve fertility. Barnyard manure and green-manure crops are also useful for these purposes. Nitrogen is the most commonly needed fertilizer.

CAPABILITY UNITS IIIe-5 DRYLAND AND IVe-5 IRRIGATED

These capability units consist of the nearly level to very gently sloping soils in the Thurman and Valentine series that have a coarse-textured surface layer. They are on stream terraces and uplands, and some areas have low hummocks. The surface layer is loamy fine sand 5 to 20 inches thick, and the underlying material is loamy fine sand or fine sand.

Permeability is rapid, and available water capacity is low. Natural fertility is low, and organic-matter content is low, especially in cultivated areas that are winnowed by wind. Surface runoff is slow.

These soils can be droughty if they are dryfarmed, and soil blowing and water erosion are hazards.

Dryland Management.—Corn, grain sorghum, small grains, alfalfa, and tame grasses are the principal crops.

Small grains and the first cutting of alfalfa are generally dependable crops because they grow and mature in spring and early summer when rainfall is highest. These soils are also suited to trees, and the acreage can be used as cover for wildlife or for recreation purposes.

A cropping system that keeps the soil covered most of the time needs to be used. Limiting the consecutive use of row crops and using close-growing crops in the cropping system conserves soil moisture and helps to protect the soil from water erosion. Returning crop residues to the soil and adding fertilizer helps to maintain fertility and productivity. Adding barnyard manure to the soil increases organic-matter content.

IRRIGATION MANAGEMENT.—Corn, grain sorghum, alfalfa, and tame grasses are suitable irrigated crops. Rye and vetch are suitable cover crops.

Maintenance of fertility, proper distribution of irrigation water, and soil blowing are the principal management concerns. These soils are suited to both gravity and sprinkler irrigation. Some land leveling is usually necessary to prepare these soils for gravity irrigation. In areas where deep cuts are made, barnyard manure or above-normal amounts of commercial fertilizer need to be added. Stubble mulching, wind stripcropping, and emergency tillage help to control soil blowing. The use of legumes or a legume-grass mixture in the cropping system most of the time helps to improve fertility and control soil blowing. The best crop results can be obtained by limiting row crops to 2 consecutive years. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IIIw-2 DRYLAND AND IIIw-2 IRRIGATED

These capability units consist of Scott silt loam, drained, and the deep, somewhat poorly drained, nearly level soils in the Silver Creek series. These soils are on bottom lands and in upland depressions. They have a medium-textured surface layer. Their subsoil is fine textured and very sticky when wet.

These soils absorb water slowly and release it slowly to plants. Their subsoil is very hard when dry and not easily penetrated by air or roots. Movement of air and water in the subsoil is slow, and surface runoff is slow.

These soils are droughty during extended dry periods, but the principal hazard is wetness, either from external flooding or a moderately high water table in spring. Although in some years crops can benefit from the additional water that drains onto these soils, in other years they can be drowned by excessive water.

DRYLAND MANAGEMENT.—Small grains grow fairly well in most years, but corn is difficult to grow because the soils are wet for extended periods in spring and early in summer, especially after heavy rains. The Silver Creek soils are well suited to alfalfa. Tame grasses are also suitable.

Where it is needed, surface drainage can be improved by V-ditches. Phosphate fertilizer is beneficial in the Silver Creek soils.

IRRIGATED MANAGEMENT.—The principal irrigated crops are corn, alfalfa, grain sorghum, soybeans, and tame grasses.

In some areas excessive water can drown crops or delay seedbed preparation and planting. Surface drainage is needed in some areas, but water erosion is generally not a problem. V-ditches help to remove excess surface water. Because the slope of the soils should be such that it provides adequate drainage, a small amount of land leveling may be necessary. The use of alfalfa or a grass-legume mixture in the cropping system helps to maintain fertility and increases water absorption. Crop residues need to be returned to the soil. Green-manure crops improve tilth and fertility. Nitrogen fertilizer is needed for sustained production.

CAPABILITY UNITS IIIw-6 DRYLAND AND IIw-61 IRRIGATED

Boel fine sandy loam is the only soil in these capability units. It is a deep, somewhat poorly drained, nearly level soil on alluvial bottom lands. The underlying material is coarse textured, and the water table is at a depth of 24 to 60 inches.

Permeability is moderately rapid, and available water capacity is low. Surface runoff is slow, and fertility and organic-matter content are low. This soil is easily worked.

This soil can be droughty in summer. Wetness in early spring and soil blowing are the principal hazards.

DRYLAND MANAGEMENT.—Corn, grain sorghum, and wheat are the principal crops, but this soil is also suited to alfalfa and tame grasses.

The use of cover crops on this soil eliminates the need to work it in spring and protects it in dry weather. In cultivated areas V-ditches can help to provide adequate surface drainage. Stubble-mulch tillage helps to prevent soil blowing. Returning crop residues to the soil helps to maintain organic-matter content.

IRRIGATION MANAGEMENT.—Corn, soybeans, alfalfa, and tame grasses are the most commonly grown irrigated crops.

Wetness and soil blowing are the principal management concerns. Some land leveling usually is needed to improve surface drainage and eliminate slow drying of low areas. In some areas V-ditches can be useful if suitable outlets are available. Stubble-mulch tillage helps to prevent soil blowing. Small, frequent applications of irrigation water are needed to maintain high productivity. Nitrogen fertilizer is needed for nonlegume crops, and phosphate fertilizer is beneficial to legumes.

CAPABILITY UNITS IVe-1 DRYLAND AND IVe-1 IRRIGATED

These capability units consist of Uly, Holdrege, and Coly soils, 5 to 11 percent slopes, eroded, and the gently sloping to sloping soils in the Cozad and Uly series. They are on uplands and alluvial stream terraces. These soils have a medium-textured surface layer, and the underlying material ranges from moderately fine to medium in texture. The Coly soils have lime at shallower depths than the other soils in these capability units. All are well drained.

Permeability is moderate, and available water capacity is high. The water intake rate is medium, and these soils release water readily to crops. Surface runoff is medium to rapid. These soils are easily worked.

Water erosion and soil blowing are hazards if these soils are left bare.

DRYLAND MANAGEMENT.—These soils are suited to wheat, alfalfa, corn, grain sorghum, and tame grasses. About 50 percent of the acreage is cultivated, and these soils are moderately eroded. A few small areas are severely eroded. The remaining 50 percent of the acreage is used as range. Trees can be grown in shelterbelts.

If these soils are cultivated, management practices that control water erosion need to be used. Terracing, contour farming, and grassed waterways are suitable on the gently sloping soils. Close-growing crops can be used on the more strongly sloping soils, or these soils can be used for range or hay. Row crops can be limited to 2 consecutive years in order to maintain maximum tilth and adequate soil structure. The use of crop residues as mulch material during tillage and seedbed preparation helps to reduce soil loss caused by water erosion.

Irrigation Management.—Corn, grain sorghum, alfalfa, soybeans, potatoes, and tame grasses are the most suitable irrigated crops. The gently sloping soils are best suited to row crops.

Row crops can be planted on the contour or on level benches in order to reduce water and soil loss. Benches are suitable on the gently sloping soils. Row crops need to be limited to 3 consecutive years. If legumes or a grass-legume mixture are used in the cropping system, they help maintain fertility and tilth. Terraces can be used to supplement contour furrows. Applications of nitrogen, phosphate, and zinc fertilizers are beneficial in eroded areas.

CAPABILITY UNITS IVe-3 DRYLAND AND IVe-3 IRRIGATED

Ortello fine sandy loam, 5 to 11 percent slopes, is the only soil in these capability units. It is a deep, well-drained soil and is on uplands.

Permeability is moderately rapid, and available water capacity is moderate. Surface runoff is medium to rapid, depending on slope and vegetation. Fertility is medium, and organic-matter content is moderate but is lower in eroded areas. This soil is easily worked.

This soil can be droughty. Soil blowing is a hazard if it is cultivated, and because of the moderate slopes, water erosion is also a hazard.

Dryland Management.—This soil is suited to all of the commonly grown crops. Corn, grain sorghum, small grains, and alfalfa are the principal crops. This soil is also suited to tame grasses and trees, and it can be used as range, as cover for wildlife, or for recreation purposes.

Soil blowing and water erosion can be reduced and soil moisture can be conserved by using a cropping system that keeps the soil covered most of the time and by using wind stripcropping. The best crop results can be obtained by limiting the use of row crops in the cropping system and by using close-growing crops and legumes to protect the soil and conserve moisture. Returning crop residues to the soil helps to maintain and improve organic-matter content.

Irrigation Management.—Alfalfa and tame grasses are the only suitable irrigated crops. Because of its moderately coarse texture and moderate slopes, this soil is poorly suited to row crops.

Soil blowing, water erosion, maintenance of fertility, and proper distribution of irrigation water are the principal management concerns. Sprinkler systems are a suitable method of irrigation. Grass can be irrigated by contour ditches. Terraces and contour farming can be used to control water erosion. Stubble-mulch tillage helps to keep organic matter on the surface and control soil blowing. Emergency tillage may be necessary in winter. Irrigation water can be applied frequently, but excessive application needs to be avoided because it leaches plant nutrients out of the root zone.

CAPABILITY UNITS IVe-5 DRYLAND AND IVe-51 IRRIGATED

Thurman-Valentine loamy fine sands, 3 to 5 percent slopes, is the only mapping unit in these capability units. The soils in this mapping unit are deep, somewhat excessively to excessively drained, and gently sloping. Their surface layer is coarse textured and is slightly to moderately eroded.

Permeability is rapid, and available water capacity is low. Surface runoff is slow, and organic-matter content is moderately low to low.

These soils can be droughty, and soil blowing is a hazard. Crops are somewhat difficult to start because soil blowing can damage or destroy young plants.

Dryland Management.—Corn, grain sorghum, small grains, and alfalfa are the principal crops. These soils are also suited to tame grasses and trees, and they can be used as cover for wildlife or for recreational purposes. Rye is a suitable cover crop.

Soil blowing can be reduced, moisture conserved, and organic-matter content and fertility maintained by useing a cropping system that keeps these soils covered by crops, grasses, or crop residues. The best crop results can be obtained by limiting the consecutive use of row crops and by using mostly close-growing crops to protect these soils and conserve moisture. Stripcropping, field windbreaks, and grassed field borders can be used to control soil blowing. Returning crop residues to these soils helps to maintain and improve organic-matter content, and adding barnyard manure or commercial fertilizer helps to improve fertility.

Irrigation Management.—Corn, grain sorghum, alfalfa, and tame grasses are suitable irrigated crops.

Soil blowing, water erosion, maintenance of fertility, and proper distribution of irrigation water are the principal management concerns. Some land reshaping may be desirable. If deep cuts are made, barnyard manure or above-normal amounts of commercial fertilizer can be added to these soils to improve fertility. Sprinkling is the only method of irrigation that is suitable for all crops. Contour ditches can be used to irrigate tame grasses. Frequent applications of irrigation water are necessary because of the high intake raté, and as a result the water application rate is higher on these soils than any other irrigated soils in Buffalo County. Soil blowing can be controlled by using stubble-mulch tillage, by returning crop residues to these soils, and by using close-growing crops to keep these soils covered most of the time. Rye and vetch are suitable cover crops. The use of alfalfa or a grass-legume mixture in the cropping system helps to maintain fertility and control soil blowing. Nitrogen fertilizer is needed to maintain fertility.

CAPABILITY UNITS IVe-8 DRYLAND AND IVe-11 IRRIGATED

Coly silt loam, 5 to 11 percent slopes, is the only soil in these capability units. It is a deep, well-drained soil on uplands. The surface layer is thin, medium textured, and calcareous, and the underlying material is medium textured. This soil is severely eroded in most areas.

Permeability is moderate, and available water capacity is high. Runoff is medium to rapid, and organic-matter content and natural fertility are low.

Water erosion and soil blowing are the principal hazards. This soil is not so well suited to cultivation as the less steep soils in Buffalo County.

Dryland Management.—Corn, grain sorghum, small grains, and alfalfa are the principal crops, but some areas have been reseeded to native grasses. This soil is also suited to trees, and the acreage can be used as cover for wildlife or for recreation purposes.

Moisture needs to be conserved and organic-matter content maintained in this soil. Surface runoff and water erosion can be controlled by using terraces, grassed waterways, and contour farming and by returning crop residues to the soil. A cropping system that keeps the soil covered most of the time can be used. The use of close-growing crops helps to protect the soil and improve organic-matter content and fertility.

Irrigation Management.—Alfalfa, tame grasses, and small grains are suitable irrigated crops.

Water erosion, soil blowing, maintenance of organic-matter content and fertility, and proper distribution of irrigation water are the principal management concerns. Land reshaping usually improves the distribution of irrigation water, but only the more gently sloping soils should be irrigated. A sprinkler system can be used for small grains, and contour ditches can be used for grasses. In most areas terracing and contour farming help to control water erosion. Returning crop residues to the soil helps to improve water intake and increases organic-matter content and fertility. Adding barnyard manure and commercial fertilizer to the soil also improves fertility. Nitrogen and phosphate fertilizers produce the best crop results.

CAPABILITY UNITS IVs-1 DRYLAND AND IIIs-1 IRRIGATED

These capability units consist of Wood River-Slickspots complex, 0 to 1 percent slopes, and the moderately saline and alkali soils in the Gibbon series. These nearly level soils are on bottom lands and alluvial stream terraces. The Gibbon soils are somewhat poorly drained, and the Wood River soils are moderately well drained. These soils have a medium-textured surface layer except in areas of Slickspots, where the surface layer is moderately fine textured. The underlying material ranges from medium to fine in texture, and the water table is at a depth of 2 to 8 feet.

Permeability is moderate to slow, and available water capacity is high. Surface runoff is slow to very slow. Organic-matter content is moderate, and natural fertility is medium to high. Water intake is slow, and tilth is poor.

These soils are droughty, and alkalinity and salinity are limitations because they slow plant growth and reduce productivity. The salts are toxic to many crops, and the alkali makes the soils difficult to work because they are sticky when wet and very hard when dry. Small depressions and areas of Slickspots dry out slowly.

Dryland Management.—Corn, grain sorghum, small grains, and alfalfa are the principal crops. These soils are not well suited to potatoes. Small grains and the first cutting of alfalfa are the most dependable crops because they grow and mature in spring when rainfall is highest. Some areas are still in native grass and can be used as range. These soils are also suited to trees, and the acreage can be used as cover for wildlife or for recreation purposes.

The principal management concerns are alkalinity and salinity. It is possible to improve these soils by adding chemicals, but results are commonly disappointing. The best results can be obtained by growing alkali-tolerant crops.

Irrigation Management.—Corn, grain sorghum, alfalfa, and tame grasses are suitable irrigated crops. The areas in which alkali is strongest are best suited to grasses.

Alkalinity and salinity are the principal management concerns. Adequate surface drainage is needed. Land leveling can be used to fill small depressions and establish gentle slopes. Adding barnyard manure to areas of Slickspots makes them more friable and helps to increase water intake. Applying large amounts of irrigation water helps to leach salts out of the root zone. Sulfur and gypsum can neutralize some of the soils, but the use of these chemicals is expensive and results are commonly disappointing. The use of alfalfa or a grass-legume mixture in the cropping system opens the soil and permits deeper water penetration. Nitrogen and phosphate fertilizers produce the best crop results in most areas.

CAPABILITY UNIT IVw-2 DRYLAND

Scott silt loam is the only soil in this capability unit. It is a deep, poorly drained soil in frequently flooded upland depressions. The surface layer is thin and medium textured, and the subsoil is sticky and clayey. The underlying material is medium textured.

Permeability is very slow. This soil absorbs water slowly, and the subsoil becomes very hard when dry. The acreage is ponded during parts if each year, and the soil is difficult to work because it is commonly either too wet or too hard.

In areas where this soil can be drained, corn, grain sorghum, small grains, and tame grasses are suitable crops. Alfalfa does not grow well because it is sensitive to flooding. This soil is not suited to trees. If satisfactory drainage cannot be established, this soil can be seeded to flood-tolerant grasses and used as range.

Terraces in adjacent higher areas can help to control surface runoff and reduce flooding. Drainage ditches can be used in some areas if a suitable outlet can be established. Adding crop residues and barnyard manure makes this soil more friable. If this soil is cultivated only to depths of less than 6 inches, the sticky subsoil is not brought to the surface.

CAPABILITY UNIT Vw-1 DRYLAND

This capability unit consists of Wet alluvial land and the nearly level, poorly drained soils in the Loup series. These coarse to moderately coarse textured soils are on bottom lands. The water table fluctuates between depths of 0 and 2 feet.

Permeability is slow to rapid, depending on depth to the water table, and available water capacity is low to very low. Organic-matter content is moderate to high, and natural fertility is medium to low.

Excessive wetness is the principal management concern. These soils are not suited to cultivation; they are too wet, and it is generally not practical to drain them, though drainage can be installed in some areas.

These soils are best suited to grasses. Nearly all of the acreage is used as permanent range or hayland. Proper stocking and deferred grazing help to maintain the grasses and prevent development of boggy areas. Bog conditions develop in areas that are grazed when the water table is at the surface. In many areas adjacent to the South Loup River, there is little grass because of the thick tree cover.

CAPABILITY UNIT VIe-1 DRYLAND

This capability unit consists of Breaks-Alluvial land complex and Uly silt loam, 11 to 15 percent slopes. These soils are deep and silty. Breaks are strongly sloping to steep and border the drainageways, and Alluvial land is on narrow stream bottoms.

Permeability is moderate, and available water capacity is high. Surface runoff is very rapid on Breaks and medium to slow on Alluvial land.

The principal hazards are severe water erosion on Breaks and severe flooding on Alluvial land.

These soils are not suited to cultivation. They are best suited to grasses used as range. Proper stocking, deferred grazing, and control of weeds and brush help to maintain and improve stands of grass. More uniform grazing can be obtained by proper distribution of salt and water. Stock-water dams can be installed if care is used in selecting sites. Cultivated areas can be reseeded to native grasses. Terraces can be installed in some areas to help control gullying.

CAPABILITY UNIT VIe-5 DRYLAND

Valentine loamy fine sand, 3 to 17 percent slopes, is the only soil in this capability unit. It is a deep, excessively drained, gently sloping to rolling soil. Some areas are moderately to severely eroded.

Permeability is rapid, and available water capacity is low. Organic-matter content and fertility are low.

This soil is droughty, and severe soil blowing is a hazard if it is overgrazed or left bare. Water erosion is also a hazard.

This soil is not suited to cultivation; it is too sandy, droughty and erosive. It is best suited to grasses used as range or for hay. Most of the acreage is used as range. Soil blowing and maintenance of organic-matter content and fertility are the principal management concerns. Proper stocking, deferred and rotation grazing, and control of weeds and brush help to maintain and improve stands of grass. More uniform grazing can be obtained by proper distribution of salt and water. Cultivated areas can be reseeded to native grasses.

CAPABILITY UNIT VIe-8 DRYLAND

Coly silt loam, 11 to 31 percent slopes, is the only soil in this capability unit. It is a deep, well-drained, strongly sloping to steep soil on uplands. This soil has a thin, calcareous surface layer, and the underlying material is massive silt loam.

Permeability is moderate, and available water capacity is high. Organic matter-content and natural fertility are low. Surface runoff is very rapid, and water erosion is severe.

This soil is not suited to cultivation; it is too steep and erosive. It is best suited to grasses used as range. Much of the acreage has been seeded to native grasses and is used as range. Water erosion and surface runoff are the principal management concerns. Proper stocking, deferred grazing, and control of weeds and brush help to establish and maintain good stands of grass. Maintaining a good cover also reduces water erosion and surface runoff and conserves soil moisture. More uniform grazing can be obtained by proper distribution of salt and water. Stock-water dams, erosion-control structures, and flood-detention reservoirs can be installed in the bottoms of some drainageways.

CAPABILITY UNIT VIe-9 DRYLAND

Coly, Uly, and Hobbs soils, 15 to 31 percent slopes, is the only mapping unit in this capability unit. These soils are deep, well drained, and medium textured. The Coly and Uly soils are steep and border drains, and the Hobbs soils are in the lowest areas.

Permeability is moderate, and available water capacity is high. Organic-matter content is low to moderate, and natural fertility is low to high. Surface runoff is rapid.

Severe water erosion is a hazard if these soils are overgrazed or left bare.

These soils are not suited to cultivation; they are too steep and erosive. The acreage is still in native grass and is used as permanent range or hayland. Water erosion and surface runoff are the principal concerns. Proper stocking, deferred and rotation grazing, and control of weeds and brush help to maintain and improve grass stands. A good cover also reduces water erosion and surface runoff and maintains organic-matter content and natural fertility. More uniform grazing can be obtained by proper distribution of salt and water. Stock-water dams, erosion-control structures, and flood-detention reservoirs can be installed.

CAPABILITY UNITS VIs-4 DRYLAND AND IVs-4 IRRIGATED

Simeon sandy loam, 0 to 3 percent slopes, is the only soil in these capability units. It is a shallow, excessively drained, level to very gently sloping soil on alluvial stream terraces. The underlying material is medium sand with some gravel. A few areas are moderately eroded.

Permeability is rapid, and available water capacity is low. Organic-matter content and natural fertility are low, and surface runoff is slow. This soil is droughty, and severe soil blowing is a hazard if it is overgrazed or left bare. Grass grows poorly because of the low available water capacity of the soil.

DRYLAND MANAGEMENT.—This soil is best suited to grasses and is used principally as range. It is not suited to dryland cultivation because it is too shallow, droughty, and erosive.

Soil blowing and maintenance of productivity are the principal management concerns. Proper stocking, deferred grazing, and control of weeds and brush help to maintain and increase stands of grass. A good cover reduces soil blowing and maintains the low organic-matter content.

IRRIGATION MANAGEMENT.—Tame grasses and small grains are the most suitable irrigated crops. If good management practices are used, corn and grain sorghum also can be grown, but rows need to be short to avoid excessive water loss.

Maintenance of fertility and proper distribution of irrigation water are the principal management concerns. Land leveling is difficult because of the danger of exposing the underlying sand and gravel. Irrigation water needs to be applied frequently. Legumes or a grass-legume mixture need to be used in the cropping system to help control soil blowing and increase fertility and tilth. Adding barnyard manure to the soil helps to increase fertility and tilth.

CAPABILITY UNITS VIw-4 DRYLAND AND IVw-4 IRRIGATED

These capability units consist of the Platte-Alda complex and the shallow soils in the Platte series. These somewhat poorly drained soils are on bottom lands. The surface layer ranges from medium to moderately coarse in texture. Mixed sand and gravel is at depths of 10 to 40 inches. The water table is at a depth of 2 to 8 feet and fluctuates seasonally.

Permeability is moderate to moderately rapid, and available water capacity is low. Natural fertility is low, and surface runoff is slow. In some areas salt crusts are on the surface early in spring, but these are washed away by rains late in spring and in summer.

These soils are droughty, and conservation of soil moisture is a problem. The water table drops in summer and cannot subirrigate crops.

Dryland Management.—Most of the acreage is still in native grass and is used as range. These soils are not suited to dryfarmed crops. Native grasses benefit from the high water table during most of the year, but the water table drops in summer and is of no benefit to the more shallow rooted grasses. Production of grass is fair to good.

Proper stocking, deferred grazing, and control of weeds and brush help to maintain and increase stands of grass. Mowing helps to prevent weeds from using the available moisture and going to seed. Good conservation practices permit useful grasses to crowd out annuals and less desirable species.

Irrigation Management.—Tame grasses, alfalfa, and small grains are suitable irrigated crops. If good management practices are used, corn and grain sorghum can also be grown, but rows need to be short and irrigation water applied frequently.

Soils of the Platte-Alda complex are better suited to irrigation than Platte soils. Land leveling permits more uniform distribution of irrigation water, but care needs to be used to avoid exposing the underlying sand and gravel. Sprinkler systems can be used to irrigate cultivated crops, and borders can be used for grasses. The use of legumes or a grass-legume mixture in the cropping system increases tilth and fertility. Barnyard manure is also useful for these purposes. Nitrogen fertilizer is needed for sustained crop production, and legumes respond well to phosphate fertilizer.

CAPABILITY UNIT VIw-5 DRYLAND

Sandy alluvial land is the only soil in this capability unit. It consists primarily of deep, coarse-textured, water-deposited soil material on bottom lands. Thin stratified layers of finer soil material are common. Channels and hummocks created by floods make the landscape irregular, and the surface has been altered by soil blowing. Some of the acreage is covered by trees, and native grass grows in areas where tree stands are thin. The water table is moderately high in some areas.

Permeability is rapid, and available water capacity is low. Surface runoff is slow, and water intake in the surface layer is rapid. Organic-matter content is low.

This soil is droughty, and soil blowing and water erosion are hazards. The grass cover is difficult to maintain.

All of the acreage is used as range. This soil is not suited to cultivated crops; it is too droughty and erosive. The areas that have native grass provide grazing for livestock. The wooded and brushy areas provide little grazing but are excellent cover for wildlife.

Careful management of the grass cover helps to prevent soil blowing. Proper stocking and deferred and rotation grazing are suitable range management practices. Because grass production is poor, the acreage should be managed carefully to prevent soil blowing.

CAPABILITY UNIT VIIe-1 DRYLAND

Rough broken land, loess, is the only mapping unit in this capability unit. It is composed of deep, well-drained, very steep, medium-textured material on uplands. It formed in calcareous wind-deposited soil material. The surface layer is thin, and the underlying material is weakly developed. Canyons and broken topography make the landscape irregular.

Permeability is moderate, and available water capacity is high. Organic-matter content and natural fertility are low, and surface runoff is very rapid.

Water erosion is a hazard, and surface runoff and conservation of soil moisture are management concerns.

This soil is not suited to cultivation; it is too steep and erosive. It is best suited to grass. Most of the acreage is used as range.

Proper stocking and deferred grazing help to maintain the grass cover, reduce water erosion, and conserve soil moisture. Stock-water dams and erosion-control structures can be installed.

CAPABILITY UNIT VIIs-3 DRYLAND

Loamy alluvial land is the only mapping unit in this capability unit. It is on bottom lands and in abandoned channels of the Platte River. The surface layer is thin and ranges from medium to coarse in texture. Mixed sand and gravel is at depths of less than 10 inches. The water table is at or above the surface during parts of each year.

Permeability is very rapid, and available water capacity is very low. Water intake varies, depending on the texture of the surface layer, but in most areas it is rapid. Organic-matter content is very low, and surface runoff is slow.

Soil blowing is a hazard. Thickness of soil material and depth to water table limit the types and amounts of plants that grow in this soil. Grasses are sparse in the areas that have the coarsest textured soil, and total grass production is poor.

This soil is not suited to cultivation. The acreage can best be used as range, or cover for wildlife, or for recreation purposes. Some areas have brush and trees.

In areas that are used as range, proper management of grazing and control of brush help to prevent soil blowing.

CAPABILITY UNIT VIIIs-1 DRYLAND

Pits and dumps is the only mapping unit in this capability unit. Pits and dumps consist of piles of sand and gravel that remain after mining operations have ceased. The adjacent ponds and water areas from which this material was removed are also part of this capability unit.

Soil blowing is a hazard. These areas are not suited to cultivation and have little value as range. They can best be used for recreation purposes, especially fishing, and they provide limited cover for wildlife. Leveling the piles of sand and gravel and seeding the areas to sand-tolerant grasses stabilizes the areas and helps to prevent soil blowing.

CAPABILITY UNIT VIIIw-1 DRYLAND

This capability unit consists of two land types, Marsh and Riverwash. They are on nearly level bottoms and in river channels. Marsh and Riverwash are very poorly drained and are under water during most of the growing season. They are composed principally of coarse-textured soil material and gravel. Soils are not formed in these areas.

Cattails, rushes, sedges, and other aquatic plants grow on some of the acreage. The rest is covered by weeds and a sparse growth of trees and bush. Some open areas are covered with water.

These land types are not suited to cultivated crops, grasses, or trees. The acreage can best be used as cover for wildlife and for recreation purposes.

Predicted yields

Predicted average yields for the principal crops grown on soils of Buffalo County are given in table 2 under two levels of management. The yields are based on planted acres. Yields for most crops are listed for both irrigated and dryfarmed soils. Wheat is only shown under dryland management. It is seldom irrigated. Native grasses are not irrigated, and soybeans are grown principally under irrigation.

The yields in column A roughly represent the average of commercial farmers who are not failing during an average year. The farmer does not and often cannot do all the things necessary to produce exceptional yields. The yields in column B are the result of a high level of management used by the leading commercial farmers.

To keep management at a high level and obtain the yields in column B, a farmer must:

1. Use management practices to control soil blowing and water erosion where needed.
2. Use suitable cropping sequences so that tilth and the supply of organic matter are maintained.
3. Apply recommended kinds and amounts of fertilizer at the proper time.
4. Use row widths and planting rates that will produce optimum plant populations.
5. Plant adapted crop varieties.
6. Use necessary insect, weed, and disease controls.
7. Perform all management practices with care and at the proper time.

Table 2 represents the best current yield estimates as of 1970, but it may become obsolete in the future if new crop varieties and advanced technology are introduced. The predictions do not reflect yields from periods when outmoded farming methods were used. The frequency of hailstorms and other unpredictable catastrophies was not considered.

Table 2 shows how different soils compare with one another so far as total yields are concerned. It cannot be used as a measure of net income. Two soils that have drastically different properties can produce similar yields, but the costs of production may not be the same. The most common differences are the kinds and amounts of fertilizer required and the kind and frequency of tillage required. If the soils are irrigated, the irrigation system and the frequency of irrigation are important cost items.

The yield predictions in table 2 are based on information furnished by farmers during the course of the soil survey and from studies of yields made by Soil Conservation Service personnel on selected soils. Another source of information was cost-return data prepared by the Soil Conservation Service in cooperation with local farmers. Opinions of persons in related fields, such as the county agricultural agent and conservation technicians, were also used.

Management of the Soils for Range [4]

Rangeland makes up about 33 percent of the total land acreage in Buffalo County. It is in widely scattered areas throughout the county, but the largest area is in the Coly-Uly-Holdrege soil association. Rangeland is generally not suited to cultivation.

The raising of livestock, principally cow-calf herds from which the calves are sold in fall as feeder cattle, is the largest agricultural enterprise in the county.

Range sites and condition classes

Different types of rangeland produce different kinds and amounts of native grasses. To manage range properly, an operator should know the various kinds of land, or range sites, in his holding and the native plants that will grow on each site. He can then use management practices that will favor the growth of the best kinds of forage plants on each kind of land.

Range condition is classified according to the percentage of original, or climax, vegetation on each site. This classification is used to compare the kinds and amounts of current vegetation with that the site can produce. Changes in range condition are due primarily to the intensity of grazing and to drought.

Climax vegetation can be altered by intensive grazing. Livestock graze selectively, constantly seeking the more palatable and nutritious plants. Plants react to grazing in one of three ways: they decrease, increase, or invade. Decreaser and increaser plants are climax plants. *Decreasers* are generally the most heavily grazed and consequently the first to be injured by overgrazing. *Increasers* withstand grazing better or are less palatable to livestock. They increase under grazing and replace the decreasers. *Invaders* are weeds that become established after the climax vegetation has been reduced by grazing.

[4] Prepared by PETER N. JENSEN, range conservationist, Soil Conservation Service.

TABLE 2.—*Predicted average acre yields of*

[In columns A are yields under prevailing management; in columns B are yields under improved management.

Soil	Corn				Wheat	
	Dryland		Irrigated		Dryland	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Alda fine sandy loam	18	24	80	95	----	----
Alda loam	19	26	85	100	----	----
Blendon fine sandy loam, 0 to 1 percent slopes	22	32	90	130	20	28
Blendon fine sandy loam, 1 to 3 percent slopes	20	28	85	120	18	25
Blendon loam, 0 to 1 percent slopes	23	33	95	140	22	30
Blendon loam, 1 to 3 percent slopes	22	32	90	135	20	28
Boel fine sandy loam	18	25	70	95	----	----
Boel loam	20	28	80	105	----	----
Breaks-Alluvial land complex	----	----	----	----	----	----
Cass fine sandy loam	20	28	85	115	18	25
Cass loam	23	31	90	120	20	30
Coly silt loam, 5 to 11 percent slopes	14	20	65	85	15	20
Coly silt loam, 11 to 31 percent slopes	----	----	----	----	----	----
Coly, Uly, and Hobbs soils, 15 to 31 percent slopes	----	----	----	----	----	----
Cozad silt loam, 0 to 1 percent slopes	25	35	100	140	22	30
Cozad silt loam, 1 to 3 percent slopes	22	32	90	135	20	29
Cozad silt loam, 3 to 5 percent slopes, eroded	19	27	85	105	19	26
Cozad silt loam, 5 to 11 percent slopes, eroded	14	20	60	85	15	20
Gibbon silt loam	23	33	85	120	----	----
Gibbon silt loam, saline	----	----	75	90	----	----
Grisgston silt loam	30	38	100	150	25	33
Hall silt loam terrace, 0 to 1 percent slopes	26	37	100	150	22	30
Hall silt loam, terrace, 1 to 3 percent slopes	23	34	95	140	20	30
Hobbs silt loam, occasionally flooded	35	50	85	120	----	----
Hobbs silt loam, 0 to 1 percent slopes	32	42	100	150	25	33
Hobbs silt loam, 1 to 3 percent slopes	25	35	95	140	22	30
Hobbs silt loam, 3 to 5 percent slopes	21	30	85	105	20	30
Holdrege silt loam, 1 to 3 percent slopes	22	34	95	140	20	30
Holdrege silt loam, 3 to 5 percent slopes	20	31	85	105	19	26
Holdrege silt loam, 3 to 5 percent slopes, eroded	19	30	85	105	19	26
Holdrege-Hall silt loams, 0 to 1 percent slopes	26	36	100	150	22	30
Hord silt loam, terrace, 0 to 1 percent slopes	28	40	100	150	22	30
Hord silt loam, terrace, 1 to 3 percent slopes	24	35	95	140	20	30
Inavale fine sandy loam, 0 to 3 percent slopes	16	23	70	95	----	----
Kenesaw fine sandy loam, calcareous variant, 0 to 1 percent slopes	22	32	90	125	20	30
Kenesaw silt loam, 0 to 1 percent slopes	25	35	100	140	22	30
Kenesaw silt loam, 1 to 3 percent slopes	22	32	90	130	20	29
Kenesaw silt loam, 3 to 5 percent slopes	----	----	----	----	----	----
Kenesaw-Coly silt loams, 3 to 5 percent slopes	19	26	85	100	18	25
Leshara fine sandy loam	21	29	85	105	----	----
Leshara and Gibbon silt loams	23	33	90	120	----	----
Lex silt loam	19	26	80	100	----	----
Loamy alluvial land	----	----	----	----	----	----
Loup loam	----	----	----	----	----	----
Marsh	----	----	----	----	----	----
Ortello fine sandy loam, 5 to 11 percent slopes	12	18	----	----	10	15
Ortello fine sandy loam, loamy substratum, 0 to 3 percent slopes	20	28	85	120	18	25
Ortello fine sandy loam, loamy substratum, 3 to 5 percent slopes, eroded	18	25	70	90	15	23
Pits and dumps	----	----	----	----	----	----
Platte soils	----	----	45	55	----	----
Platte-Alda complex	----	----	50	65	----	----
Riverwash	----	----	----	----	----	----
Rough broken land, loess	----	----	----	----	----	----
Rusco silt loam	22	35	100	150	----	----
Sandy alluvial land	----	----	----	----	----	----
Scott silt loam	----	----	----	----	----	----
Scott silt loam, drained	20	25	85	110	----	----
Silver Creek silt loam	21	29	85	105	----	----
Simeon sandy loam, 0 to 3 percent slopes	----	----	----	----	----	----
Thurman fine sandy loam, terrace, 0 to 3 percent slopes	19	30	80	105	17	24
Thurman-Valentine loamy fine sands, 0 to 3 percent slopes	18	29	75	100	15	23
Thurman-Valentine loamy fine sands, 3 to 5 percent slopes	10	18	60	80	----	----

See footnote at end of table.

principal crops under two levels of management

Absence of figure indicates the crop is not suited to the soil, is not commonly grown, or that irrigation is not practical]

Grain sorghum				Alfalfa				Soybeans		Tame pasture			
Dryland		Irrigated		Dryland		Irrigated		Irrigated		Dryland		Irrigated	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]
25	42	80	95	1.6	2.1	2.0	3.6	28	38	1.3	2.3	7.0	9.0
28	45	85	100	1.8	2.2	2.5	4.0	30	44	1.3	2.3	7.0	9.0
30	42	90	120	1.7	2.1	3.5	6.4	34	49	1.4	2.2	8.5	10.5
27	35	85	115	1.5	1.8	3.3	5.8	33	48	1.4	2.2	8.5	10.5
34	46	95	125	1.9	2.4	3.6	6.5	35	50	2.0	3.0	9.0	11.0
32	45	90	120	1.7	2.1	3.5	6.4	33	48	2.0	3.0	9.0	11.0
25	33	70	95	1.6	2.6	2.6	4.2	----	----	1.2	1.7	7.0	9.0
26	35	80	105	1.6	2.6	2.6	4.5	----	----	1.2	1.7	7.0	9.0
27	35	85	115	2.2	2.7	3.5	6.0	33	45	1.4	2.2	8.5	10.5
35	50	90	120	2.3	2.8	3.5	6.0	35	50	1.6	2.6	8.5	10.5
20	30	65	85	1.2	1.7	2.4	5.0	----	----	1.2	2.2	7.0	8.0
----	----	----	----	----	----	----	----	----	----	----	----	----	----
40	47	95	125	2.0	2.5	4.0	7.0	35	50	2.0	3.0	9.0	11.0
35	46	90	120	1.9	2.4	3.6	6.5	33	48	2.0	3.0	9.0	11.0
29	42	85	105	1.5	2.0	3.0	5.7	----	----	1.4	2.3	8.3	10.3
20	30	60	85	1.2	1.7	2.4	5.0	----	----	1.2	2.2	7.0	8.0
33	50	85	120	2.3	3.0	3.0	5.0	30	50	2.0	3.0	9.0	11.0
----	----	75	95	2.1	2.6	2.8	4.5	----	----	1.4	2.0	8.0	10.0
45	55	100	130	2.4	3.1	4.0	7.0	38	55	2.0	3.0	9.0	11.0
40	50	95	125	2.0	2.8	4.0	7.0	38	55	2.0	3.0	9.0	11.0
35	47	90	120	1.9	2.4	3.6	6.5	35	50	2.0	3.0	9.0	11.0
40	60	85	120	----	----	----	----	----	----	2.2	3.2	9.0	11.0
45	55	100	130	2.1	3.0	4.0	7.0	38	55	2.0	3.0	9.0	11.0
40	50	90	120	2.0	2.9	3.6	6.5	----	----	2.0	3.0	9.0	11.0
35	45	85	105	1.9	2.4	3.0	5.7	----	----	1.6	2.5	8.3	10.3
35	47	90	120	1.9	2.4	3.6	6.3	35	50	2.0	3.0	9.0	11.0
31	45	85	105	1.6	2.3	3.0	5.7	----	----	1.4	2.3	8.3	10.3
29	42	85	105	1.4	2.2	3.0	5.7	----	----	1.4	2.3	8.3	10.3
40	50	95	125	2.0	2.5	4.0	7.0	38	55	2.0	3.0	9.0	11.0
40	50	95	125	2.0	2.8	4.0	7.0	38	55	2.0	3.0	9.0	11.0
35	47	90	120	1.9	2.5	3.6	6.5	35	45	2.0	3.0	9.0	11.0
23	30	70	95	1.3	2.0	2.5	4.0	----	----	1.0	1.5	7.0	9.0
33	45	90	120	1.6	2.2	3.5	5.9	33	48	1.5	2.3	8.5	10.5
40	47	95	125	2.0	2.5	4.0	6.6	35	50	2.0	3.0	9.0	11.0
35	46	90	120	1.9	2.4	3.6	6.2	33	48	2.0	3.0	9.0	11.0
28	40	85	100	1.4	1.9	3.0	5.7	----	----	1.4	2.3	8.3	10.3
30	46	85	105	2.3	2.7	3.0	5.0	33	45	2.0	3.0	9.0	11.0
33	50	90	120	2.3	2.8	3.0	5.0	35	50	2.0	3.0	9.0	11.0
27	38	80	100	1.8	2.3	2.5	4.0	30	42	1.3	2.3	7.0	9.0
----	----	----	----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----	----	----	----
12	20	----	----	1.0	1.3	----	----	----	----	.8	1.0	----	----
27	35	85	115	1.4	2.0	3.3	5.8	33	48	1.4	2.2	8.5	10.5
23	30	70	90	1.2	2.0	2.5	3.5	----	----	1.2	2.0	7.0	9.0
----	----	50	65	----	----	1.5	2.0	----	----	----	----	6.0	8.0
----	----	55	70	----	----	1.7	2.3	----	----	----	----	6.0	8.0
----	----	----	----	----	----	----	----	----	----	----	----	----	----
35	50	95	125	----	----	----	----	35	50	2.0	3.0	9.0	11.0
----	----	----	----	----	----	----	----	----	----	----	----	----	----
25	33	85	110	----	----	----	----	----	----	----	----	----	----
30	46	85	105	2.2	2.7	3.0	5.0	30	45	1.7	2.7	8.0	10.0
26	35	80	105	1.1	1.7	2.0	3.0	----	----	1.0	1.4	7.0	9.0
25	33	75	100	1.1	1.7	2.0	3.0	----	----	1.0	1.4	7.0	9.0
12	20	60	80	.9	1.2	1.5	2.5	----	----	.8	1.0	6.0	8.0

TABLE 2.—*Predicted average acre yields of principal*

Soil	Corn				Wheat	
	Dryland		Irrigated		Dryland	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Thurman-Valentine loamy fine sands, loamy substratum, 0 to 3 percent slopes	15	22	70	95	12	18
Thurman-Valentine loamy fine sands, terrace, 0 to 3 percent slopes	18	29	75	100	15	23
Uly silt loam, 11 to 15 percent slopes						
Uly, Holdrege and Coly soils, 5 to 11 percent slopes, eroded	17	24	75	95	17	24
Uly and Holdrege silt loams, 5 to 11 percent slopes						
Valentine loamy fine sand, 3 to 17 percent slopes						
Wann fine sandy loam	21	31	90	120		
Wann loam	23	33	90	120		
Wet alluvial land						
Wood River silt loam, 0 to 1 percent slopes	22	29	100	145		
Wood River silt loam, 1 to 3 percent slopes	20	26	95	135		
Wood River-Slickspots complex, 0 to 1 percent slopes	17	26	80	95		

[1] Animal-unit-months is a term used to express the carrying capacity of pasture. It is the number of animal units, or 1,000 pounds

Range condition is expressed in four classes to show the present condition of the vegetation on a range site in relation to the vegetation that grew on it originally. The condition is *excellent* if 76 to 100 percent of the vegetation is climax, *good* if 51 to 75 percent is climax, *fair* if 26 to 50 percent is climax, and *poor* if 0 to 25 percent is climax.

Range condition is determined by range management. The general practices of range management that apply in Buffalo County are discussed in the following paragraphs.

Regardless of other practices that are used, management practices that maintain or improve range condition are needed on all rangeland. These practices are proper grazing use (fig. 10), deferred grazing, and rotation and deferred grazing. The distribution of livestock in a pasture can be improved by the proper location of fences, livestock water developments, and salting facilities.

Range seeding can be used to improve range condition. In this management practice, wild-harvest or improved varieties of native grasses are established, either by seeding or reseeding, on land suited to range. Soils that are being used as cropland, such as Coly silt loam, 11 to 31 percent slopes, need to be range seeded. The most important grasses used in the seed mixture are big bluestem, little bluestem, indiangrass, switchgrass, and sideoats grama. Only proper management of grazing is needed to maintain forage composition.

Descriptions of the range sites

Range sites are distinctive types of rangeland that differ from one another in ability to produce a significantly different kind, proportion, or amount of climax vegetation. A significant difference is one that is great enough to require variation in management, such as a different stocking rate. Climax vegetation is the combination of plants that originally grew on a given site. It is generally the most productive range vegetation.

The range sites in Buffalo County are described in the following pages. In each site is given a brief description of the topography in the site, a brief description of the mapping units in the site, the dominant vegetation on the site when range condition is excellent (fig. 11), and the dominant vegetation when range condition is poor. Also given for each site is the annual production of forage in pounds, air-dry weight, for years in which rainfall is average and range condition is excellent. The range site for each mapping unit can be determined by referring to the "Guide to Mapping Units."

WET LAND RANGE SITE

This range site is principally on bottom lands and in depressions. Many areas are meadowland. The water table is high. It is at a depth of 0 to 3 feet most of the year and is generally over the surface in part of the early growing season. The only soils in this range site are Wet alluvial land and Loup soils. This soil is nearly level, varies in texture and depth, and is calcareous in some areas.

The climax plant cover is a mixture of such decreaser grasses as prairie cordgrass and reedgrass. These make up at least 65 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of Kentucky bluegrass, redtop, willows, and sparse amounts of prairie cordgrass and members of the sedge family.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 6,000 to 7,000 pounds, air-dry weight.

SUBIRRIGATED RANGE SITE

This range site is on bottom lands. Some areas are in meadowland. The kind of vegetation that grows on this site is primarily a result of a moderately high water table at a depth of 10 to 60 inches. The water table is rarely over the surface, but remains within the root zone during the growing season. The soils are nearly level and range from shallow to deep. Most of them are calcareous at the surface. The texture of the surface layer ranges from silt loam to fine sandy loam. Sandy alluvial *crops under two levels of management*—Continued

Grain sorghum				Alfalfa				Soybeans		Tame pasture			
Dryland		Irrigated		Dryland		Irrigated		Irrigated		Dryland		Irrigated	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]
22	28	70	95	2.0	2.8	2.5	4.5	--------	--------	1.0	1.4	7.0	9.0
25	33	75	100	1.1	1.7	2.0	3.0	--------	--------	1.0	1.4	7.0	9.0
25	38	75	95	1.2	1.7	2.4	5.0	--------	--------	1.5	2.5	8.0	9.0
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
31	47	90	120	2.0	2.6	3.0	4.5	33	48	2.0	3.0	9.0	11.0
33	50	90	120	2.0	2.6	3.0	4.5	35	50	2.0	3.0	9.0	11.0
30	43	100	125	1.8	2.3	3.5	6.0	35	50	1.6	2.6	8.5	10.5
27	40	95	120	1.8	2.3	3.5	6.0	33	48	1.6	2.6	8.5	10.5
27	40	80	100	1.7	2.2	3.0	5.7	--------	--------	1.6	2.6	8.0	10.0

of live weight, that can be grazed on an acre of pasture for a period of 30 days.

land and soils of the Alda, Boel, Gibbon, Leshara, Lex, Loup, Platte, Silver Creek, and Wann series are in this range site.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, indiangrass, switchgrass, prairie cordgrass, and Canada wildrye. These make up at least 75 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Little bluestem, western wheatgrass, and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of Kentucky bluegrass, foxtail barley, redtop, blue verbena, and small amounts of western wheatgrass and members of the sedge family. Eastern redcedar is a problem in managing grasslands if the areas are not mowed.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 5,000 to 6,000 pounds, air-dry weight.

SILTY OVERFLOW RANGE SITE

This range site is on overflowed bottom lands. The kind of vegetation that grows on this site is primarily a result of additional moisture from periodic overflows or run-in, silt deposits, the high available water capacity of the soils, and a moderate infiltration rate. The texture of the surface layer and the underlying material ranges from very fine sandy loam to silty clay loam. The Alluvial land part of Breaks-Alluvial land complex and the Hobbs soils are in this range site.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, indiangrass, switchgrass, and Canada wildrye. These make up at least 70 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Western wheatgrass, little bluestem, side-oats grama, and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of Kentucky bluegrass, Baldwin ironweed, western wheatgrass, and blue grama.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 4,000 to 4,500 pounds, air-dry weight.

CLAYEY OVERFLOW RANGE SITE

This range site is in upland depressions. The kind of vegetation that grows on this site is primarily a result of flooding, surface run-in, and poor internal drainage. The surface layer is silt loam, and the subsoil is silty clay. The only soil in this range site is Scott silt loam, drained.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, indiangrass, little bluestem, switchgrass, and Canada wildrye. These make up at least 60 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Western wheatgrass, blue grama, and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of western ragweed, Kentucky bluegrass, Baldwin ironweed, and small amounts of western wheatgrass and blue grama.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 2,500 to 4,000 pounds, air-dry weight.

SANDY LOWLAND RANGE SITE

This range site is on bottom lands. The kind of vegetation that grows on this site is primarily a result of additional moisture from periodic overflows and a water table that is at a depth of 5 to 8 feet. The soils are nearly level to very gently sloping. Soil texture ranges from loam to fine sandy loam in the surface layer and from fine sandy loam to fine sand in the underlying material. Soils of the Cass and Inavale series are in this range site.

The climax plant cover is a mixture of such decreaser grasses as sand bluestem, indiangrass, switchgrass, little bluestem, needle-and-thread, and Canada wildrye. These make up at least 75 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Prairie sandreed, sand dropseed, western wheatgrass,

***Figure 10.*—To right of fence, the result of improper grazing on Platte soils; to the left, on the same soils, range vegetation properly managed after reseeding to grasses suited to the Subirrigated range site.**

and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of sand dropseed, blue grama, and western ragweed.

If rainfall is average and the site is in excellent condition, the annual production of forage is 3,000 to 4,000 pounds, air-dry weight.

SILTY LOWLAND RANGE SITE

This range site is on seldom-flooded bottom lands and stream terraces. The kind of vegetation that grows on this site is primarily a result of additional moisture from surface run-in, the high available water capacity of the soils, and a moderate infiltration rate. Soil texture ranges from silt loam to fine sandy loam in the surface layer and from silt loam to silty clay loam in the subsoil. The nearly level to very gently sloping Cozad and Hord soils, the Hall soils on terraces, the nearly level to gently sloping Hobbs soils, the Hobbs soils that are seldom flooded, Grigston and Rusco soils, and the Kenesaw soils, calcareous variant, are in this range site.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, indiangrass, little bluestem, switchgrass, needle-and-thread, and Canada wildrye. These make up at least 75 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, side-oats grama, and western wheatgrass are the principal increasers. The representative plant community, when the site is in poor range condition, consists of Kentucky bluegrass, western wheatgrass, blue grama, Baldwin ironweed, and western ragweed.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 3,000 to 4,500 pounds, air-dry weight.

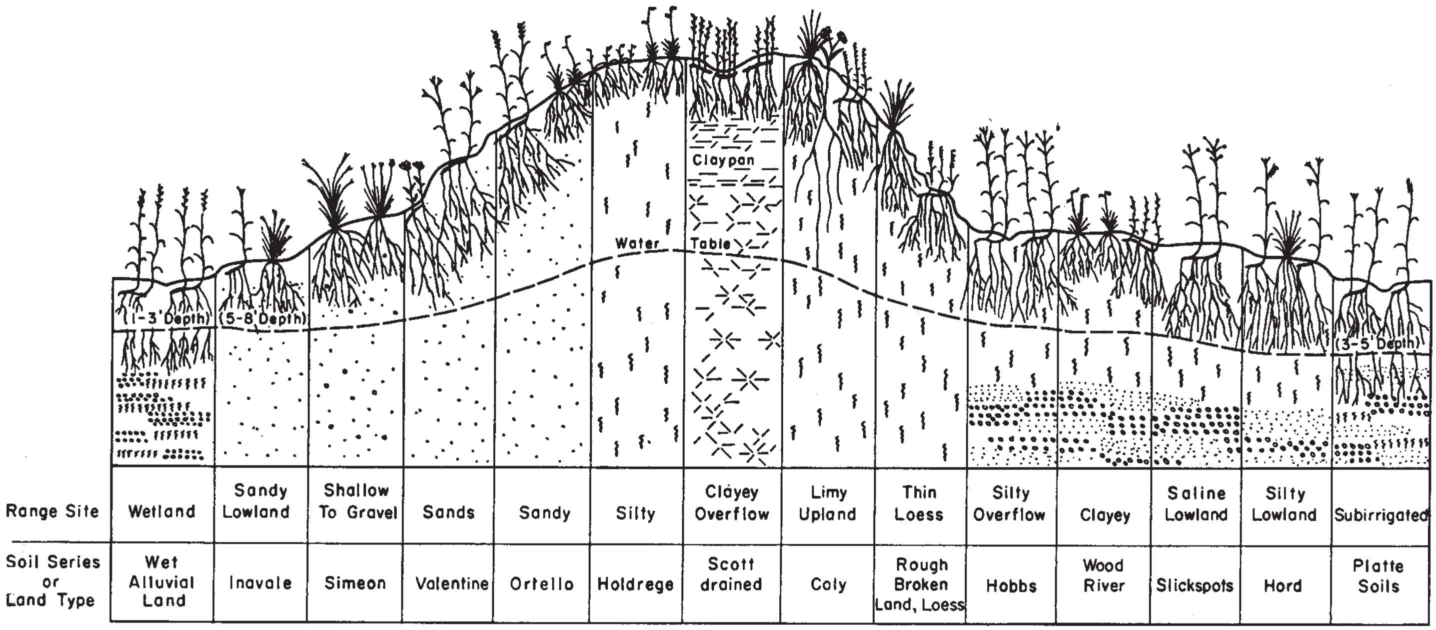

***Figure 11.*—Relation of soils to range sites, topography, and water table.**

SALINE LOWLAND RANGE SITE

This range site is on high bottom lands. The kind of vegetation that grows on this site is primarily a result of additional moisture from surface run-in and a water table that is at a depth of 5 to 8 feet. The site is also affected by saline and alkali conditions that inhibit the growth of grasses that are not halophytes. The nearly level soil is silty clay loam in the subsoil. This range site consists of Slickspots, which is in complex with the Wood River soils.

The climax plant cover is a mixture of such decreaser grasses as switchgrass, alkali sacaton, indiangrass, western wheatgrass, and Canada wildrye. These make up about 65 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Inland saltgrass and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of inland saltgrass, Kentucky bluegrass, and annuals.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 3,000 to 4,500 pounds, air-dry weight.

SANDS RANGE SITE

The soil in this range site is gently undulating to rolling. The kind of vegetation that grows on this site is primarily a result of deep storage of moisture that is readily released to plants. The surface layer is loamy fine sand, and the texture of the underlying material ranges from loamy fine sand to sand. The only soil in this range site is Valentine loamy fine sand, 3 to 17 percent slopes.

The climax plant cover is a mixture of such decreaser grasses as indiangrass, sand bluestem, sand lovegrass, switchgrass, prairie junegrass, and Canada wildrye. These make up at least 65 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, little bluestem, needle-and-thread, prairie sandreed, sand dropseed, and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of sand dropseed, blue grama, western ragweed, and annuals.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 2,000 to 3,000 pounds, air-dry weight.

SANDY RANGE SITE

This range site is on stream terraces and uplands. The kind of vegetation that grows on this site is primarily a result of a moderately rapid infiltration rate and the well-drained to excessively drained soils. Soil texture ranges from loam to loamy fine sand in the surface layer and from fine sandy loam to fine sand in the subsoil and underlying material. Soils of the Blendon, Ortello, and Thurman series and the nearly level to very gently sloping Valentine soils are in this range site.

The climax plant cover is a mixture of such decreaser grasses as sand bluestem, indiangrass, switchgrass, and needle-and-thread. These make up at least 70 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Little bluestem, prairie sandreed, blue grama, sand dropseed, and western wheatgrass are the principal increasers. Blue grama, sand dropseed, sand paspalum, and western wheatgrass are the last of the climax grasses to disappear in a deteriorated range. The representative plant community, when the site is in poor range condition, consists of blue grama, sand dropseed, sand paspalum, windmillgrass, and tumblegrass.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 2,000 to 3,000 pounds, air-dry weight.

SILTY RANGE SITE

This range site is on stream terraces and uplands. The kind of vegetation that grows on this site is primarily a result of the high available water capacity of the soils and a moderate to moderately slow infiltration rate. These soils are well drained. The surface layer is silt loam, and the texture of the subsoil ranges from silt loam to silty clay loam. Soils of the Holdrege, Kenesaw, and Uly series, Hall soils on uplands, the gently to moderately sloping Cozad soils and the Breaks part of the Breaks-Alluvial land complex are in this range site.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, little bluestem, indiangrass, and switchgrass. They make up at least 65 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, buffalograss, side-oats grama, and western wheatgrass are the principal increasers. The representative plant community, when the site is in poor range condition, consists of blue grama, buffalograss, western ragweed, blue verbena, and plains pricklypear.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 2,500 to 3,500 pounds, air-dry weight.

CLAYEY RANGE SITE

This range site is on stream terraces. The kind of vegetation that grows on this site is primarily a result of slow permeability. The soils are deep and nearly level to very gently sloping and have a silt loam surface layer and a silty clay subsoil. Soils of the Wood River series are in this range site.

The climax plant cover is a mixture of such decreaser grasses as big bluestem, little bluestem, switchgrass, indiangrass, and Canada wildrye. These make up at least 45 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, buffalograss, tall dropseed, and western wheatgrass are the principal increasers. The representative plant community, when the site is in poor range condition, consists of buffalograss, blue grama, blue verbena, western wheatgrass, and other annual grasses.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 2,500 to 3,500 pounds, air-dry weight.

LIMY UPLAND RANGE SITE

This range is on uplands. The kind of vegetation that grows on this site is primarily a result of good water relationships and limy soil conditions. The soils are well drained and gently sloping to steep. They are calcareous at or near the surface and in the underlying material. The surface layer and the underlying material are silt loam. Soils of the Coly series are in this range site.

The climax plant cover is a mixture of such decreaser grasses as little bluestem, big bluestem, switchgrass, and indiangrass. These make up at least 65 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, buffalograss, and side-oats grama are the principal increasers. The representative plant community, when the site is in poor range condition, consists of blue grama, buffalograss, western ragweed, blue verbena, and plains pricklypear.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 1,500 to 3,000 pounds, air-dry weight.

SHALLOW TO GRAVEL RANGE SITE

This range site is on bottom lands. The kind of vegetation that grows on this site is primarily a result of the low available water capacity of the soil. The soil is 10 to 20 inches deep over mixed sand and gravel, and the surface layer is moderately coarse in texture. Simeon sandy loam, 0 to 3 percent slopes, is the only soil in this range site.

The climax plant cover is a mixture of such decreaser grasses as sand bluestem, little bluestem, side-oats grama, and prairie sandreed. These make up at least 70 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, sand dropseed, western wheatgrass, and members of the sedge family are the principal increasers. The representative plant community, when the site is in poor range condition, consists of blue grama, sand dropseed, brown snakeweed, western ragweed, and plains pricklypear.

If rainfall is above average and the site is in excellent condition, the total annual production of forage is 1,500 to 2,500 pounds, air-dry weight.

THIN LOESS RANGE SITE

This range site is on uplands that contain catsteps and landslips. The kind of vegetation that grows on this site is primarily a result of steepness of soil slope, very rapid surface runoff, lack of soil development, and calcareous soil conditions. The soils are deep and well drained. They are calcareous at or near the surface and in the underlying material. The thin surface layer and underlying material are silt loam. This range site consists of Rough broken land, loess. It is steep to very steep, and slopes generally exceed 30 percent.

The climax plant cover is a mixture of such decreaser grasses as little bluestem, big bluestem, side-oats grama, switchgrass, and plains muhly. These make up at least 75 percent of the total plant volume, and other perennial grasses and forbs account for the rest. Blue grama, sand dropseed, and western wheatgrass are the principal increasers. The representative plant community, when the site is in poor range condition, consists of blue grama, sand dropseed, broom snakeweed, and various annuals.

If rainfall is average and the site is in excellent condition, the total annual production of forage is 1,500 to 2,500 pounds, air-dry weight.

Management of the Soils for Woodland and Windbreaks [5]

Native woodland in Buffalo County is mainly along the Platte, South Loup, and Wood Rivers, but there is very limited woody growth along a few of the larger tributaries of these streams. The timbered area generally is in a narrow strip on the overflow lands and nearby stream terraces, but occasionally it extends up onto breaks and bluffs.

The stand on the Platte River commonly is an over-

[5] Prepared by GEORGE W. ALLEY and JAMES W. CARR, JR., foresters, Soil Conservation Service.

story of cottonwood intermingled with eastern redcedar and American elm. Some green ash, boxelder, and mulberry is in the understory. Russian-olive, an introduced small tree, has spread on the overflow land and is regarded as a pest. The native trees grow close to the river and on islands in the river on soils of the Platte and Wann series and on Loamy alluvial land.

The stand along the South Loup River has cottonwood and a fair growth of better than average green ash (fig. 12). The area west of Ravenna has some American elm. These trees grow on soils of the Boel, Inavale, Wann, and Leshara series. There is a scattering of bur oak on the Leshara and Boel soils east of Ravenna.

The Hobbs, Cozad, and Hord soils and the Breaks-Alluvial land complex along the Wood River support a stand that is mainly American elm mixed with some green ash, boxelder, and cottonwood.

Some woody shrubs grow in all these areas. The most common are willows, American plum, coralberry, and roughleaved dogwood. Some woody shrubs and a few eastern redcedars grow throughout the county on bluffs, breaks, and the strongly sloping to steep Coly and Uly soils.

Native trees and shrubs of Buffalo County add to the beauty of the landscape. They also provide important cover for food and wildlife. Otherwise, the native stand is not economically important. Poles, fuelwood, and cedar posts are harvested in small amounts. Some native wilding cedars are dug for windbreak plantings. Development of a market for the considerable volume of cottonwood growing in the river valleys could lead to a profitable logging enterprise, but there is no indication that this is likely to occur soon.

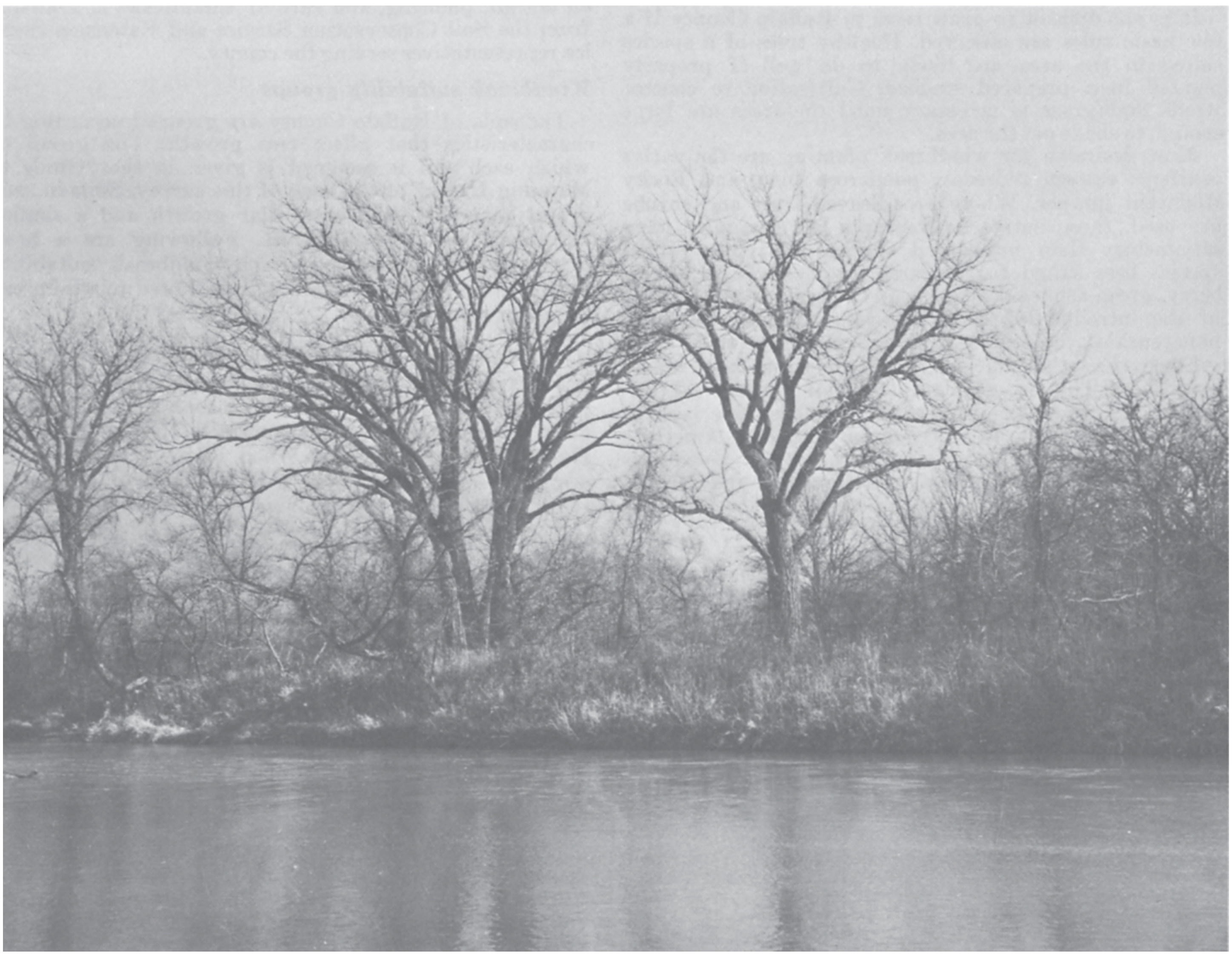

Figure 12.—**Native woodland on Boel fine sandy loam along the South Loup River. Cottonwood, green ash, and American elm are dominant in the stand.**

Windbreaks

Trees are planted in Buffalo County principally to provide protection from wind. There are no windbreaks on many farmsteads, and some farms have inadequate windbreaks. Many windbreaks are composed entirely of broadleaf trees that lose their leaves in winter and offer the least protection when the need is greatest.

A good farmstead windbreak can substantially reduce home heating costs. If properly located, it will control snow drifting. Windbreak protection of feedlots can significantly reduce the amount of feed consumed by each animal. Incidental benefits, such as providing wildlife habitat and enhancing the beauty of the landscape, are also important.

Some of the important cropland soils of Buffalo County are subject to damage from soil blowing. In this group are soils of the Ortello and Thurman series. Well-planned windbreaks, combined with good cropping practices, can reduce the hazard of soil blowing to a minimum.

It is not difficult to grow trees in Buffalo County if a few basic rules are observed. Healthy trees of a species suited to the area are likely to do well if properly planted in a prepared seedbed. Cultivation to control weeds and grass is necessary until the trees are large enough to shade out the area.

Most desirable for windbreak planting are the native conifers: eastern redcedar, ponderosa pine, and Rocky Mountain juniper. Where broadleaved trees and shrubs are used, those native to Nebraska are generally more satisfactory than introduced species. Native broadleaf species best suited to this area are honeylocust, hackberry, green ash, chokecherry, and American plum. Some of the introduced broadleaf shrubs, such as the bush honeysuckles, cotoneaster, and lilac, also grow well.

Some trees that have early, fast growth tend to be shortlived. This is commonly true of cottonwood. Siberian elm grows vigorously but is undesirable because it often spreads to adjoining fields and lots. American elm is a poor choice because of the hazard of Dutch elm disease. Russian-olive is relatively shortlived and spreads in overflow land. Care needs to be exercised in selecting the species of trees to use in windbreaks.

The rate of growth of trees in windbreaks varies widely, depending on soil conditions and tree species. Available moisture is important, as are soil fertility, exposure, and arrangement of trees species within the planting. Eastern redcedar usually grows slightly less than 1 foot per year in height. At maturity it generally reaches a height of 30 to 40 feet. Pines and broadleaf trees usually grow somewhat faster and are generally taller at maturity.

Table 3 gives the expected height of trees suitable for windbreaks in Buffalo County at 20 years of age. Detailed measurements were taken on the soils of the four major windbreak suitability groups in the county. The soils in each group are listed in the description of the groups. They are similar in the characteristics that affect tree growth.

A good windbreak needs to be designed to fit the soils in which it will grow. The intended purpose of the planting should also be considered. Specific information on design, planting, and care of windbreaks is available from the Soil Conservation Service and Extension Service representatives serving the county.

Windbreak suitability groups

The soils of Buffalo County are grouped according to characteristics that affect tree growth. The group to which each soil is assigned is given in the "Guide to Mapping Units," at the back of this survey. Soils in each group generally produce similar growth and a similar percentage of surviving trees. Following are a brief description of the soils in each windbreak suitability group and a list of trees and shrubs suited to windbreak plantings on these soils.

SILTY TO CLAYEY WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of Breaks-Alluvial land complex and those soils in the Blendon, Cass, Coly, Cozad, Grigston, Hall, Hobbs, Holdrege, Hord, Kenesaw, Uly, and Wood River series that have a medium-textured surface layer. The subsoil and underlying material range from fine to moderately coarse in texture. The subsoil of the Wood River soils has a clay-

TABLE 3.—*Estimated height of trees at 20 years of age on soils of the major windbreak suitability groups* [1]

[Dashed line means not applicable]

Species	Silty to Clayey		Sandy		Very Sandy		Moderately Wet		Shallow	
	Relative vigor	Average height	Relative vigor	Average height	Relative vigor	Average height	Relative vigor	Average height	Relative vigor	Average height
		Ft.		*Ft.*		*Ft.*		*Ft.*		*Ft.*
Cottonwood	Unsuited	----	Unsuited	----	Unsuited	----	Good	58	Unsuited	----
Eastern redcedar	Excellent	17	Excellent	22	Excellent	15	Excellent	17	Excellent	15
Green ash	Good	22	Good	26	Unsuited	----	----	(2)	Unsuited	----
Hackberry	Good	18	----	(2)	Unsuited	----	----	(2)	Unsuited	----
Honeylocust	Good	22	Good	22	Unsuited	----	----	(2)	Unsuited	----
Ponderosa pine	Excellent	21	Excellent	29	----	(2)	Unsuited	----	Excellent	20

[1] The Very Wet, Moderately Saline or Alkali, and Undersirable windbreak suitability groups are not included because windbreaks generally are not needed on the soils of those groups.

[2] Sufficient data not available.

pan. These deep, nearly level to very steep, well-drained soils are on bottom lands, stream terraces, and uplands.

These soils generally provide good tree-planting sites that are beneficial to the survival and growth of suitable species. Drought and moisture competition from weeds and grasses are the principal limitations. Water erosion is a hazard on some of the sloping soils. Trees and shrubs suitable for planting are:

Conifers: Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Scotch pine, Austrian pine.
Low broadleaf: Russian-mulberry, Russian-olive.
Tall broadleaf: Hackberry, honeylocust, bur oak, green ash, boxelder.
Shrubs: Lilac, honeysuckle, chokecherry, cotoneaster, American plum.

SANDY WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of those nearly level to sloping soils in the Blendon, Cass, Inavale, and Ortello series that have a moderately coarse textured surface layer; of Kenesaw soils, calcareous variant; and of those soils in the Thurman and Valentine series that are nearly level to very gently sloping. The subsoil and underlying material range from medium to coarse in texture. These soils are on bottom lands, stream terraces, and uplands.

These soils are suited to tree planting if soil blowing is prevented by maintaining strips of sod or other vegetation between the tree rows. Cultivation generally must be restricted to the tree rows. Drought and moisture competition from weeds and grasses are limitations. Water erosion is a hazard on some of the sloping soils. Trees and shrubs suitable for planting are:

Conifers: Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Scotch pine, Austrian pine.
Low broadleaf: Russian-mulberry, Russian-olive.
Tall broadleaf: Honeylocust, green ash.
Shrubs: Lilac, cotoneaster, skunkbush sumac, American plum, Nemaha plum.

VERY SANDY WINDBREAK SUITABILITY GROUP

The only soil in this windbreak suitability group is Valentine loamy fine sand, 3 to 17 percent slopes. The surface layer and underlying material are coarse textured. This deep soil is on uplands.

Because this soil is so loose, trees need to be planted in shallow furrows and not cultivated. Young seedlings can be damaged by high winds and can be covered by drifting sand. Trees suited to planting are:

Conifers: Eastern redcedar, ponderosa pine, Rocky Mountain juniper, Scotch pine.

MODERATELY WET WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of Sandy alluvial land and of soils in the Alda, Boel, Gibbon, Hobbs, Leshara, Lex, Platte, Rusco, Scott, Silver Creek, and Wann series. These shallow to deep, nearly level, nonsaline soils are moderately wet as a result of a moderately high water table or surface flooding for short periods of time. They are principally on bottom lands, but Rusco silt loam and Scott silt loam, drained, are in upland depressions.

These soils are suited to tree planting if the species selected can tolerate occasional flooding or a moderately high water table. Trees and shrubs suitable for planting are:

Conifers: Eastern redcedar, Austrian pine.
Low broadleaf: Russian mulberry, diamond willow, Russian-olive.
Tall broadleaf: Honeylocust, green ash, white willow, golden willow, cottonwood.
Shrubs: Redosier dogwood, buffaloberry, chokecherry, Nemaha plum, American plum.

VERY WET WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of Wet alluvial land and of soils in the Loup series. These soils are deep and nearly level. They are wet most of the year as a result of a water table at or near the surface or as a result of frequent and prolonged flooding. They are on bottom lands and in upland depressions.

These soils are suited only to trees and shrubs that can tolerate a high water table. Trees and shrubs suitable for planting are:

Low broadleafs: Diamond willow.
Tall broadleafs: White willow, golden willow, cottonwood.
Shrubs: Redosier dogwood, buffaloberry.

MODERATELY SALINE OR ALKALI WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of Gibbon silt loam, saline, and Wood River-Slickspots complex, 0 to 1 percent slopes. These deep, nearly level soils are affected by moderate salinity and alkalinity. They are on high bottom lands and low terraces.

These soils are suited to trees and shrubs that can tolerate moderate salinity or alkalinity. Trees and shrubs suitable for planting are:

Conifers: Eastern redcedar, Austrian pine.
Low broadleaf: Diamond willow, Russian-olive.
Tall broadleaf: Honeylocust, green ash, cottonwood.
Shrubs: Skunkbush sumac, buffaloberry.

SHALLOW WINDBREAK SUITABILITY GROUP

Simeon sandy loam, 0 to 3 percent slopes, is the only soil in this windbreak suitability group. This excessively drained soil is 10 to 20 inches deep over medium sand and some gravel. It is on bottom lands.

A limited root zone and low available water capacity are the principal limitations. Drought is a hazard to trees in most years. The only species suitable for planting is eastern redcedar.

UNDESIRABLE WINDBREAK SUITABILITY GROUP

This windbreak suitability group consists of Scott silt loam, Marsh, Pits and dumps, Loamy alluvial land, Rough broken land, loess; and Riverwash. These soils and land types are nearly level to very steep, and the texture of the soil material varies.

These soils and land types are too gravelly or too steep for tree planting by use of machinery, and they are too droughty or too wet for good survival and growth of tree and shrub plantings. Because of these unfavorable characteristics, the soils and land types in this windbreak suitability group are generally not suited to windbreak plantings of any kind. Some areas can be used as cover for wildlife or for recreation purposes if tolerant tree or shrub species are hand planted or if other special management practices are used.

Management of the Soils for Wildlife [6]

Wildlife management requires a knowledge of soils and the kind of vegetation they are capable of producing. The kind, amount, and distribution of vegetation largely determine the kind and amount of wildlife that can be produced and maintained.

Fertility and such soil characteristics as topography affect the wildlife-carrying capacity of an area. Fertile soils generally produce more wildlife, and waters drained from such soils commonly produce more fish than those from infertile soils.

Topography affects wildlife through its influence on how soils can be used. Rough, steep soils present hazards to livestock and are impractical to cultivate for crop production. Undisturbed vegetation on these soils is valuable for wildlife, and where such cover is lacking, it can often be developed.

Permeability and rate of water infiltration are important soil characteristics in constructing ponds for fish and in developing and maintaining wetland habitat for waterfowl. Marsh areas are suited to the development of aquatic and semiaquatic habitat for waterfowl and some species of furbearers.

The soils of Buffalo County provide suitable habitats for many species of game and nongame birds and mammals.

It may seem strange that those soil associations that have the largest wildlife populations do not rate highest on the potential for producing wildlife. This can be seen in table 4. The reason for this is that the better soils are intensively cultivated and do not produce the maximum wildlife population of which they are capable. Some of the poorer soils are extensively cultivated and have large wildlife populations.

The Coly-Uly-Holdrege association provides some of the best habitats for pheasant in Buffalo County. Production of corn, grain sorghum, and wheat provides an excellent supply of food for this species, and wheatland provides nesting areas that are generally undisturbed until after the peak of the pheasant hatch has passed. Soil topography in this association provides many odd areas that produce native shrubby, grassy, and herbaceous vegetation that is relatively undisturbed. These areas are important for songbirds and other nongame birds, as well as for a variety of game species.

Although water is scarce for some furbearers, such as beaver and muskrat, in the Coly-Uly-Holdrege association, satisfactory habitat is abundant for others, such as raccoon, coyote, and opossum. Habitat for squirrels and cottontail rabbits is adequately provided by wooded areas in the deeper draws. These areas also provide suitable conditions for deer.

The Valentine-Ortello and Blendon-Thurman-Valentine associations are important for wildlife species that require a grassland type of habitat, such as the prairie grouse. Production of crops on some of the better cultivated soils provides a food supply of waste grain for pheasants and prairie chickens. Where the nature of the soil and topography is such that crops cannot be grown or cattle grazed, undisturbed natural vegetation provides good wildlife habitat.

[6] Prepared by ROBERT J. LEMAIRE, conservation biologist, Soil Conservation Service.

Good production of pheasants is obtained in the Hord-Hall-Cozad, Wood River, and Holdrege-Hall associations. Although the soils are intensively cultivated, their high productivity provides many of the requirements for good pheasant populations. Nevertheless, adequate interspersion of a variety of vegetative cover is lacking because of intensive cropping of the nearly level to gently sloping soils. Odd areas are scarce. The soils have the potential for producing excellent cover for wildlife where they are managed for this purpose.

The Interstate Highway No. 80 is mainly in the Gibbon-Leshara-Alda association, and it enhances opportunities for developing outdoor recreation facilities by attracting many out-of-state tourists to Buffalo County and providing convenient access. The timber, water, and wildlife provide excellent opportunities for using land for outdoor recreation. There are also some historic sites in and adjacent to the county that add interest in using land for recreation enterprises. The most important of these is restored Fort Kearney, just south of the Platte River in Kearney County.

Some areas of stream valleys in the county, such as those in the Gibbon-Leshara-Alda association, are wooded and provide habitat for squirrels, quail, cottontail rabbits, deer, and a number of other animals. Mourning doves are especially abundant.

In the Wood River-Slickspots-Gibbon, saline association, pheasants and cottontail rabbits are common. Deer are attracted to the alfalfa. Bobwhite quail are primarily along woodland borders.

An important fishery in Buffalo County is located in the Platte-Loamy alluvial land-Boel association along the Platte and South Loup Rivers. Sandpits and borrow-pit lakes along Interstate Highway No. 80, some of which have been stocked with fish, provide good pond fishing (fig. 13). The woodland on bottom lands of this association provides food and cover for a number of nongame and game species. Among the game are deer, bobwhite quail, pheasants, squirrels, and cottontail rabbits. Furbearers, such as mink and muskrat, also inhabit the area. The river and marshy areas in this association are used by waterfowl primarily during spring and fall migrations.

Wet areas in the Platte-Loamy alluvial land-Boel association offer opportunities for developing ponds for fish. A few marsh areas provide habitat for wildlife requiring this type of cover.

Upland areas in the Kenesaw and Coly-Uly-Holdrege associations have many sites that are suitable for the construction of dams and the creation of ponds. The ponds are suitable for the production of warm-water fish, such as bass, bluegill, and channel catfish. The turbidity that results from silt and clay in suspension in most impounded waters causes some problems in fish production.

Table 4 gives the potential of the soil associations for producing various kinds of vegetation that form habitats required by some of the more important game species in Buffalo County. The ratings of *very good*, *good*, *fair*, and *poor* take into account the soils present and their characteristics with respect to potential for producing the kind of vegetation needed for wildlife habitat. For descriptions of the associations and their location, refer to the section "General Soil Map." In other parts of this

***Figure 13.*—An abandoned channel of the South Loup River frequently used as a fishing hole. Platte-Loamy alluvial land-Boel soil association.**

survey is given more detailed information on the soils in each association and their use and management, which indicates the kinds of vegetation that can be produced.

Developing habitat for wildlife requires proper location and distribution of vegetation. Technical assistance in planning wildlife developments and determining which species of plants to use can be obtained at the work unit office of the Soil Conservation in Kearney. Additional information and assistance can be obtained from the Nebraska Game and Parks Commission, the Bureau of Sports Fisheries and Wildlife, and the Federal Extension Service. The Soil Conservation Service provides technical assistance in the planning and application of conservation practices for developing outdoor recreation facilities.

Engineering Uses of the Soils [7]

Soil properties are of special interest to engineers because they affect the construction of foundations for buildings, dams, and highways. Soils provide a source of sand and gravel for road paving, surfacing, and structural concrete. Soils also provide water conveyance and storage sites.

Among the properties most important to engineers are particle-size distribution, permeability, shear strength, compressibility, compaction characteristics, and plasticity. Depth to the water table, depth to sand and gravel, and topography are also important. 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, business, residences, and recreation facilities.
2. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, underground utilities, and airports.
3. Make estimates that will help in planning drainage systems, farm ponds, irrigation systems, sewage systems, and feedlot runoff-disposal systems.
4. Locate sources of borrow material for highway embankments and for highway subbase, base, and surface courses.
5. Estimate the size of drainage areas and the volume of runoff in designing bridges and culverts.
6. Estimate the maintenance of structures and vegetation.

[7] Prepared by F. Stewart Bohrer, area engineer, and Louie L. Buller, soil scientist, Soil Conservation Service, with the assistance of Robert J. Frederickson, civil engineer, Soil Conservation Service, and William J. Ramsey, Division of Materials and Tests, Nebraska Department of Roads.

TABLE 4.—*Potential of soil associations for producing various kinds of wildlife habitat, and the importance of vegetation types for food and cover for the important game species*

[Dashed line means not applicable]

POTENTIAL FOR PRODUCING HABITAT ELEMENTS

Soil association	Woody plants	Herbaceous plants	Grain and seed crops	Aquatic habitat
Coly-Uly-Holdrege	Fair	Fair	Poor to fair.	
Valentine-Ortello	Poor	Fair to good	Poor to fair.	
Hord-Hall-Cozad	Very good	Very good	Very good.	
Wood River	Good	Fair	Poor.	
Blendon-Thurman-Valentine	Good	Fair	Fair.	
Wood River-Slickspots-Gibbon, saline	Fair	Fair	Poor.	
Gibbon-Leshara-Alda	Good	Good	Good	Good.
Platte-Loamy alluvial land-Boel	Fair	Poor	Poor	Very good.
Holdrege-Hall	Very good	Very good	Very good.	
Kenesaw	Fair	Fair	Poor.	

IMPORTANCE OF VEGETATION TYPES FOR FOOD AND COVER

Wildlife species	Woody plants		Herbaceous plants		Grain and seed crops	
	Food	Cover	Food	Cover	Food	Cover
Pheasant	Low	High	High	High	High	High.
Bobwhite quail	Low	High	High	High	High	Low.
Deer	High	High	Medium [1]	Low	High	Low.
Waterfowl	----------	----------	----------	----------	High.[2]	

[1] Medium for white-tailed deer; high for mule deer.
[2] For dabbling ducks, geese, and sandhill cranes, principally in spring and fall.

7. Determine the need for detailed investigations at a selected site.
8. Estimate possible corrosion of underground structures.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depth of layers here reported. Even in these situations the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that can be expected. Estimates generally are to a depth of 5 feet, and interpretations normally do not apply to greater depths.

Some of the mapping units shown on the maps in this publication include small areas of different soil material. These areas are too small to be mapped separately and generally are not significant to the farming in the area, but they may be important in engineering planning. The soils of Buffalo County are deep enough over bedrock so that the bedrock does not affect their use.

The terms used in this survey are those used by soil scientists. Many of these terms are defined in the Glossary. Most of the information in this section is given in tables 5, 6, and 7.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system used by the SCS engineers, Department of Defense (*7*) and others, and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML-CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is shown in table 5; the estimated classification, without group index numbers, is given in table 6 for all soils mapped in the county.

Engineering test data

Table 5 shows engineering test data for nine soils representing nine soil series. The soils were sampled and tested by the Division of Materials and Tests, Nebraska Department of Roads, according to standard procedures of the American Association of State Highway Officials. The samples taken were of natural horizons.

Each soil listed in table 5 was sampled at only one location, and the data given for the soil are those for that location. From one location to another, a soil may differ considerably in characteristics that affect engineering. Even where soils are sampled at more than one location, the test data probably do not show the widest range in characteristics.

Moisture-density data in table 5 were obtained by mechanical compaction. If soil material is compacted at successively higher moisture content and the compaction effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is the *maximum dry density*. Moisture-density data are important in earthwork, for, as a rule, soil is most stable if it is compacted to the maximum dry density when it is at the optimum moisture content.

The mechanical analysis was made by a combination of the sieve and hydrometer methods. The percentages of clay obtained by the hydrometer method should not be used in naming textural classes of soils. The classifications in the last two columns of table 5 are based on data obtained by mechanical analysis and on tests made to determine liquid and plastic limits.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to plastic state and from a plastic to a liquid state. The *plastic limit* is the moisture content, expressed as a percentage of the oven-dry weight, at which the soil material passes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the material passes from a plastic to a liquid state. The *plasticity index* is the numerical difference betwen the liquid limit and the plastic limit. It indicates a range of moisture content within which a soil material is in a plastic condition. Some silty and sandy soils are nonplastic: they do not become plastic at any moisture content.

Engineering properties of the soils

Several estimated soil properties significant in engineering are given in table 6. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 6.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Soil texture is described in table 6 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 6 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary. In Buffalo County the pH value of most soils ranges from 6.1 to 7.8. The Wood River-Slickspots complex and areas of Alda, Gibbon, Leshara, Lex, Platte, Silver Creek, and Wann soils have pH values that are generally above 7.8 and should be investigated for potential corrosive hazards to metal pipe. These and other soils used as construction materials, when either moist or wet, should be tested for corrosive potential.

Soil dispersion is not a serious limitation in Buffalo County, because few areas contain enough salts to produce moderate dispersion. Salinity is generally not a limitation. However, in the somewhat poorly drained bottomland soils along the Platte River, some areas are saline. Onsite investigations need to be made in these areas where salinity poses a hazard to construction work.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating. Several series, such as the Silver Creek and Wood River, have moderate to high shrink-swell potential.

Engineering interpretations of the soils

In table 7 the soils are rated as sources of topsoil, sand or mixed sand and gravel, and road fill. Soil features are named that affect highway location, dikes and levees, farm ponds, agricultural drainage systems, irrigation systems, terraces and diversion systems, and grassed waterways. Also listed are soil limitations for sewage disposal systems. Table 7 is a guide to planning and further investigation of the soils. Onsite investigation of the soils to determine type, quantity, and engineering properties is important.

TABLE 5.—*Engineering*

[Tests performed by the Nebraska Department of Roads in accordance with

Soil name and location	Parent material	Nebraska report No. S64	Depth	Moisture-density data [1]	
				Maximum dry density	Optimum moisture
			In.	*Lb. per cu. ft.*	*Pct.*
Boel fine sandy loam: 0.3 mile N. and 0.1 mile W. of SE. corner sec. 26, T. 12 N., R. 17 W. (Modal profile).	Sandy alluvium.	7444	0–6	106	15
		7445	20–40	113	11
Gibbon silt loam: 0.54 mile S. and 150 feet W. of NE. corner sec. 4, T. 8 N., R. 13 W. (Modal profile).	Silty alluvium.	7446	0–7	110	15
		7447	21–30	107	19
		7448	38–60	116	10
Hall silt loam, terrace: 0.37 mile W. and 300 feet S. of NE. corner sec. 31, T. 9 N., R. 15 W. (Modal profile).	Loess and alluvium.	7438	0–8	104	17
		7439	21–29	96	23
		7740	33–46	102	20
Hobbs silt loam: 150 feet E. and 0.18 mile N. of SW. corner sec. 14, T. 9 N., R. 16 W. (Modal profile).	Silty alluvium.	7441	0–7	100	20
		7442	7–28	92	22
		7443	38–60	100	20
Holdrege silt loam: 0.75 mile W. and 0.17 mile S. of NE. corner sec. 6, T. 10 N., R. 16 W. (Modal profile).	Loess.	7449	0–7	104	19
		7450	19–31	99	19
		7451	48–60	97	20
Hord silt loam, terrace: 100 feet N. and 0.25 mile W. of SE. corner sec. 5, T. 9 N., R. 16 W. (Modal profile).	Silty alluvium.	7429	0–8	103	17
		7430	14–28	97	21
		7431	28–48	105	18
Kenesaw silt loam: 150 feet N. and 150 feet E. of SW. corner sec. 25, T. 12 N., R. 13 W. (Modal profile).	Eolian silts and sands.	7432	0–8	105	18
		7433	8–22	118	11
		7434	22–60	106	17
Ortello fine sandy loam, loamy substratum: 300 feet N. and 180 feet E. of SW. corner sec. 19, T. 12 N., R. 13 W. (Modal profile).	Eolian sands.	7435	0–7	115	11
		7436	7–17	120	11
		7437	17–46	121	10
Wood River silt loam: 0.48 mile E. and 1,350 feet S. of NW. corner sec. 6, T. 9 N., R. 13 W. (Modal profile).	Loess and silty alluvium.	7426	0–8	103	18
		7427	16–23	92	25
		7428	36–50	94	22

[1] Based on AASHO Designation T99–57, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation T88–47(*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis used in this table is not suitable for use in naming textural classes.

test data

standard procedures of the American Association of State Highway Officials (AASHO) ([1])]

Mechanical analysis [2]								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—				Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [3]	Unified [4]
								Pct.			
100	91	70	28	21	10	6	4	([5])	([5])	A-2-4(0)	SM
100	92	72	12	8	5	3	3	([5])	([5])	A-2-4(0)	SP-SM
[6] 98	90	85	75	65	26	15	12	24	([5])	A-4(8)	ML
100	97	94	87	67	40	26	20	34	11	A-6(8)	ML-CL
[7] 76	24	6	2	2	2	2	1	([5])	([5])	A-1-b(0)	SP
---------	100	99	96	86	36	19	17	31	7	A-4(8)	ML-CL
---------	100	99	96	90	60	41	31	50	27	A-7-6(17)	CL
---------	---------	100	99	87	52	27	20	39	15	A-6(10)	ML-CL
---------	---------	100	98	87	41	22	17	34	8	A-4(8)	ML
---------	---------	100	99	93	53	30	21	39	14	A-6(10)	ML-CL
---------	---------	100	97	87	45	28	23	34	11	A-6(8)	ML-CL
---------	---------	100	98	88	40	22	16	30	7	A-4(8)	ML-CL
---------	---------	100	99	92	57	39	31	42	20	A-7-6(12)	CL
---------	---------	100	98	89	48	22	13	37	12	A-6(9)	ML-CL
---------	---------	100	99	84	44	23	18	34	10	A-4(8)	ML-CL
---------	---------	---------	100	92	56	34	28	43	19	A-7-6(12)	CL
---------	---------	100	99	85	43	26	21	34	12	A-6(9)	ML-CL
100	98	94	87	77	36	20	17	32	10	A-4(8)	ML-CL
100	93	81	56	44	20	14	12	21	3	A-4(4)	ML
[6] 99	99	99	98	83	41	18	14	31	6	A-4(8)	ML
100	99	91	50	38	15	10	8	([5])	([5])	A-4(3)	SM
100	97	85	32	24	18	12	12	([5])	([5])	A-2-4(0)	SM
100	95	70	22	19	14	9	7	([5])	([5])	A-2-4(0)	SM
---------	---------	100	99	91	42	21	15	34	10	A-4(8)	ML-CL
---------	---------	---------	100	88	64	46	41	57	33	A-7-6(19)	CH
100	99	99	97	88	53	31	20	43	18	A-7-6(12)	ML-CL

[3] Based on AASHO Designation M 145-49(*1*).
[4] Based on the Unified soil classification system (*7*).
[5] Nonplastic.
[6] One hundred percent passed the No. 4 sieve.
[7] Ninety-five percent passed the No. 4 sieve, 98 percent passed the 3/8-inch sieve, and 100 percent passed the 3/4-inch sieve.

TABLE 6.—*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 in the first column of this

Soil series and map symbols	Depth to— Sand or mixed sand and gravel	Depth to— Seasonal high water table	Depth from surface of typical profile	Classification: USDA texture	Classification: Unified [1]	Classification: AASHO [1]
	Feet	*Feet*	*Inches*			
Alda:						
Ax	2–3	2.5–6	0–8	Fine sandy loam	SM or ML	A–4
			8–26	Fine sandy loam	SM	A–4
			26–50	Sand and gravel	SP, SP–SM	A–1 or A–3
Ay	2–3	2–6	0–8	Loam	ML, ML–CL	A–4
			8–26	Fine sandy loam	SM	A–4
			26–50	Sand and gravel	SP, SP–SM	A–1 or A–3
Blendon:						
Bdn, BdnA	3–6	(3)	0–26	Fine sandy loam	SM or ML	A–4
			26–42	Fine sandy loam and loamy sand.	SM	A–2 or A–4
			42–52	Sand and gravel	SM, SP–SM	A–1 or A–3
Bed, BedA	3–6	(3)	0–17	Loam	ML, ML–CL	A–4
			17–42	Fine sandy loam and loamy sand.	SM	A–4 or A–2
			42–52	Sand and gravel	SP, SP–SM	A–1 or A–3
Boel:						
Bob	1–2	2–5	0–14	Fine sandy loam and loamy fine sand.	SM, SC	A–2
			14–60	Fine sand	SP–SM	A–2
Boc	1–2	2–5	0–6	Loam	ML, ML–CL	A–4
			6–14	Loamy fine sand	SM	A–2
			14–60	Fine sand	SP–SM	A–2
Breaks-Alluvial land complex: By. Too variable to rate.	(4)	(3)				
Cass:						
Cm	3–6	(3)	0–11	Loam	ML or ML–CL	A–4
			11–33	Fine sandy loam	SM or ML	A–2 or A–4
			33–60	Fine sand	SM or SP–SM	A–2 or A–3
Cs	3–6	(3)	0–11	Fine sandy loam	SM or ML	A–4
			11–33	Fine sandy loam	SM or ML	A–2 or A–4
			33–60	Fine sand	SP, SP–SM	A–2 or A–3
*Coly: CbC, CbE, CYE. For Hobbs and Uly parts of CYE, see their respective series.	(4)	(3)	0–60	Silt loam	ML or CL	A–4 or A–6
Cozad: Coz, CozA, CozB2, CozC2	(4)	(3)	0–18	Silt loam	ML	A–4
			18–60	Loam	ML or ML–CL	A–4
Gibbon: Gg, 2Gg	3–6	2–6	0–18	Silt loam	ML or CL	A–4
			18–38	Silt loam or loam	ML or CL	A–6 or A–4
			38–60	Sand and gravel	SP or SP–SM	A–1 or A–3
Grigston: Gk	3–6	(3)	0–33	Loam to silt loam	ML or CL	A–4
			33–42	Fine sandy loam	ML or SM	A–4
			42–60	Fine sand	SP–SM	A–2
Hall: Ha, HaA	(5)	(3)	0–17	Silt loam	ML or CL	A–4
			17–29	Silty clay loam	CL or CH	A–7
			29–60	Silt loam	ML or CL	A–6 or A–4
Hobbs: 2Hb, Hb, HbA, HbB	(4)	(3)	0–28	Silt loam	ML or CL	A–4 or A–6
			28–60	Silt loam	ML or CL	A–6 or A–4
*Holdrege: HoA, HoB, HoB2, HQ. For Hall part of HQ, see Hall series.	(4)	(3)	0–13	Silt loam	ML or CL	A–4 or A–6
			13–22	Light silty clay loam	CL	A–7
			22–60	Silt loam	ML or CL	A–6 or A–4
Hord: Hd, HdA	(6)	(3)	0–14	Silt loam	ML or CL	A–4
			14–48	Silt loam	ML or CL	A–6
			48–60	Silt loam	ML or CL	A–4

See footnotes at end of table.

properties of the soils

such mapping unit may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for table. The symbol < means less than; the symbol > means more than]

Percentage less than 3 inches passing sieve—			Percentage less than 0.002 mm.	Permeability	Available water capacity [2]	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
				Inches per hour	*Inches per inch of soil*	*pH value*	
100	95–100	40–55	5–15	2. 00–6. 30	0. 16–0. 18	7. 9–8. 4	Low.
100	95–100	36–45	5–15	2. 00–6. 30	0. 15–0. 17	7. 9–8. 4	Low.
90–100	65–80	3–22	0–3	>20. 0	0. 02–0. 04	----------	Low.
100	95–100	60–75	7–17	0. 63–2. 00	0. 20–0. 22	7. 9–8. 4	Low.
100	95–100	36–45	5–15	2. 00–6. 30	0. 15–0. 17	7. 9–8. 4	Low.
90–100	65–80	3–20	0–3	>20. 0	0. 02–0. 04	----------	Low.
----------	100	40–55	5–15	2. 00–6. 30	0. 16–0. 18	6. 6–7. 8	Low.
----------	100	30–45	0–15	2. 00–6. 30	0. 15–0. 17	7. 4–8. 4	Low.
----------	95–100	3–20	0–2	>20. 0	0. 02–0. 04	7. 4–8. 4	Low.
----------	100	65–80	7–17	0. 63–2. 00	0. 20–0. 22	6. 6–7. 8	Low.
----------	100	30–45	5–15	2. 00–6. 30	0. 15–0. 17	7. 4–8. 4	Low.
----------	95–100	3–20	0–3	>20. 0	0. 02–0. 04	----------	Low.
----------	100	25–35	3–15	2. 00–6. 30	0. 16–0. 18	6. 6–7. 3	Low.
----------	100	10–20	0–3	6. 30–20. 0	0. 06–0. 08	7. 4–7. 8	Low.
----------	100	60–75	7–17	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Low.
----------	100	5–15	2–7	6. 30–20. 0	0. 09–0. 11	7. 4–7. 8	Low.
----------	100	10–20	0–3	6. 30–20. 0	0. 05–0. 07	----------	Low.
----------	100	60–75	7–17	0. 63–2. 00	0. 20–0. 22	6. 1–7. 3	Low.
----------	100	30–55	0–10	2. 00–6. 30	0. 17–0. 19	6. 6–7. 3	Low.
----------	100	5–20	0–3	6. 30–20. 0	0. 05–0. 07	6. 6–7. 3	Low.
----------	100	40–55	0–10	2. 00–6. 30	0. 16–0. 18	6. 1–7. 3	Low.
----------	100	30–55	0–10	2. 00–6. 30	0. 15–0. 17	6. 6–7. 3	Low.
----------	100	5–15	0–3	6. 30–20. 0	0. 05–0. 07	6. 6–7. 3	Low.
----------	100	70–90	15–27	0. 63–2. 00	0. 20–0. 22	7. 4–7. 8	Low to moderate.
----------	100	70–90	3–15	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Low.
----------	100	60–75	7–15	0. 63–2. 00	0. 20–0. 22	----------	Low.
100	95–100	70–90	7–20	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Low.
----------	100	70–90	10–27	0. 63–2. 00	0. 20–0. 22	7. 4–8. 4	Low to moderate.
90–100	65–80	0–5	0–3	>20. 0	0. 02–0. 04	7. 9–8. 4	Low.
----------	100	60–90	7–20	0. 63–2. 00	0. 20–0. 22	6. 6–7. 8	Low.
----------	100	40–55	3–11	0. 63–2. 00	0. 15–0. 17	6. 6–7. 8	Low.
----------	100	5–15	0–3	6. 30–20. 0	0. 05–0. 07	7. 9–8. 4	Low.
----------	100	95–100	12–20	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Low to moderate.
----------	100	95–100	27–36	0. 20–0. 63	0. 18–0. 20	6. 6–7. 3	Moderate to high.
----------	100	95–100	15–25	0. 63–2. 00	0. 20–0. 22	6. 6–7. 8	Moderate.
----------	100	90–100	15–27	0. 63–2. 00	0. 22–0. 24	6. 1–6. 5	Low to moderate.
----------	100	90–100	15–27	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Moderate.
----------	100	95–100	15–27	0. 63–2. 00	0. 22–0. 24	6. 1–6. 5	Low to moderate.
----------	100	95–100	27–35	0. 63–2. 00	0. 18–0. 20	6. 1–7. 3	Moderate.
----------	100	95–100	10–20	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Low to moderate.
----------	100	95–100	15–23	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate.
----------	100	95–100	15–23	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Moderate.
----------	100	95–100	15–23	0. 63–2. 00	0. 20–0. 22	6. 6–7. 8	Moderate.

TABLE 6.—*Estimated engineering*

Soil series and map symbols	Depth to— Sand or mixed sand and gravel	Depth to— Seasonal high water table	Depth from surface of typical profile	Classification: USDA texture	Classification: Unified [1]	Classification: AASHO [1]
	Feet	*Feet*	*Inches*			
Inavale: In	1–2	5–10	0–10 10–60	Fine sandy loam Fine sand	SM SP-SM	A–4 A–1 or A–3
*Kenesaw: KCB, Ks, KsA, KsB. For Coly part of KCB, see Coly series.	(4)	(3)	0–8 8–22 22–60	Silt loam Loam Silt loam	ML or CL ML ML or CL	A–4 A–4 A–4
Kenesaw, calcareous variant: 2Kt	(4)	(3)	0–12 12–58	Fine sandy loam Loam	SM or ML ML or ML–CL	A–4 A–4
Leshara: Lf	3–6	2–6	0–9 9–51 51–60	Fine sandy loam Loam Loamy fine sand	SM or ML ML or ML–CL SM	A–4 A–4 A–2
*Leshara and Gibbon: LG. For Gibbon part, see Gibbon series.	3–6	2–6	0–9 9–51 51–60	Silt loam Loam Loamy fine sand	ML or CL ML, ML–CL SM	A–4 or A–6 A–4 A–2
Lex: Lex	2–3	2–5	0–9 9–18 18–24 24–60	Silt loam Silty clay loam Fine sandy loam Sand and gravel	CL or ML CL or CH SM or ML SP–SM or SP	A–4 A–6 or A–7 A–4 A–1 or A–3
Loamy alluvial land: Lx. Too variable to rate.	0–1	0–3				
Loup: Lm	1–2	0–3	0–10 10–24 24–50	Loam Loamy fine sand Fine sand	ML SM SP–SM	A–4 A–2 A–1 or A–3
Marsh: M. Too variable to rate.	1–5	0				
Ortello: 2Or, 2Orb2, OrC	(4)	(3)	0–7 7–17 17–53 53–60	Fine sandy loam Fine sandy loam Loamy fine sand Silt loam	SM or ML SM or ML SM ML or CL	A–4 A–2 or A–4 A–2 A–4 or A–6
Pits and dumps: GP. Too variable to rate.	0	3–20				
*Platte: P, PL. For Alda part of PL, see Alda series.	1–2	2–5	0–8 8–17 17–60	Loam Fine sandy loam Fine sand to coarse sand with some gravel.	ML or ML–CL ML or SM SP–SM or SP	A–4 A–4 A–1 or A–3
Riverwash: Rw. Too variable to rate.	0	0–3				
Rough broken land, loess: RB. Too variable to rate.	(4)	(3)				
Rusco: Ru	(4)	(3)	0–10 10–18 18–40 40–60	Silt loam Silty clay loam Loam Fine sandy loam	ML or CL CL or CH ML or CL SM or ML	A–4 A–6 or A–7 A–4 or A–6 A–4
Sandy alluvial land: Sx. Too variable to rate.	0–1	3–6				
Scott: Sc, 2Sc	(4)	(3)	0–9 9–42 42–60	Silt loam Silty clay Silty clay loam to silt loam.	CL CH CL or ML	A–4 or A–6 A–7 A–4 or A–6

See footnotes at end of table.

properties of the soils—Continued

Percentage less than 3 inches passing sieve—			Percentage less than 0.002 mm.	Permeability	Available water capacity [2]	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
				Inches per hour	*Inches per inch of soil*	*pH value*	
------------	100	36–50	3–10	2.00–20.0	0.16–0.18	6.6–7.3	Low.
------------	100	5–15	0–3	6.30–20.0	0.06–0.08	7.4–8.4	Low.
------------	100	70–90	12–20	0.63–2.00	0.22–0.24	6.6–7.3	Low to moderate.
------------	100	50–75	7–15	0.63–2.00	0.17–0.19	6.6–7.3	Low.
100	95–100	90–100	12–20	0.63–2.00	0.20–0.22	7.4–7.8	Low to moderate.
------------	100	40–55	5–15	2.00–6.30	0.16–0.18	6.6–7.3	Low.
------------	100	60–75	7–17	0.63–2.00	0.17–0.19	6.6–7.3	Low to moderate.
------------	100	40–55	5–15	2.00–6.30	0.16–0.18	7.3–7.8	Low.
------------	100	60–75	7–20	0.63–2.00	0.17–0.19	7.3–7.8	Low to moderate.
------------	90–100	15–25	3–10	6.30–20.0	0.08–0.10	7.9–8.4	Low.
------------	100	70–90	12–22	0.63–2.00	0.22–0.24	7.3–7.8	Low to moderate.
------------	100	60–75	7–20	0.63–2.00	0.17–0.19	7.3–7.8	Low to moderate.
------------	90–100	15–25	3–10	6.30–20.0	0.08–0.10	7.9–8.4	Low.
------------	100	70–90	7–20	0.63–2.00	0.22–0.24	7.4–7.8	Moderate.
------------	100	90–95	27–35	0.20–0.63	0.18–0.20	7.4–7.8	Moderate to high.
100	95–100	40–55	5–15	2.00–6.30	0.11–0.13	7.4–7.8	Low.
90–100	65–80	5–15	0–3	>20.0	0.02–0.04	------------	Low.
------------	100	60–75	7–15	0.63–2.00	0.20–0.22	7.4–7.8	Low.
------------	100	15–25	3–10	6.30–20.0	0.09–0.11	7.4–7.8	Low.
------------	100	5–15	0–3	6.30–20.0	0.05–0.07	7.4–7.8	Low.
------------	100	40–55	5–15	2.00–6.30	0.16–0.18	5.8–6.5	Low.
------------	100	25–45	5–15	2.00–6.30	0.15–0.17	6.1–6.5	Low.
------------	100	15–30	3–10	6.30–20.0	0.08–0.10	6.6–7.3	Low.
------------	100	95–100	10–20	0.63–2.00	0.20–0.22	6.6–7.3	Low.
100	95–100	50–75	7–15	0.63–2.00	0.16–0.18	7.4–7.8	Low.
100	95–100	40–75	3–12	2.00–6.30	0.15–0.17	7.9–8.4	Low.
90–100	65–80	2–15	0–3	>20.0	0.02–0.04	------------	Low.
------------	100	70–90	12–25	0.63–2.00	0.22–0.24	6.6–7.3	Low to moderate.
------------	100	90–95	27–35	0.20–0.63	0.18–0.20	6.6–7.3	Moderate to high.
------------	100	60–75	7–27	0.63–6.30	0.17–0.19	6.6–7.3	Low to moderate.
------------	100	40–55	5–20	2.00–6.30	0.14–0.16	6.6–7.3	Low to moderate.
------------	100	70–90	17–27	0.63–2.00	0.22–0.24	6.1–6.5	Moderate.
------------	100	90–100	40–60	<0.063	0.11–0.13	6.1–6.5	High.
------------	100	70–90	15–35	0.63–2.00	0.20–0.22	6.6–7.3	Moderate.

TABLE 6.—*Estimated engineering*

Soil series and map symbols	Depth to— Sand or mixed sand and gravel	Depth to— Seasonal high water table	Depth from surface of typical profile	Classification: USDA texture	Classification: Unified [1]	Classification: AASHO [1]
	Feet	*Feet*	*Inches*			
Silver Creek: Slc	3–5	5–8	0–10	Silt loam	CL	A–6 or A–4
			10–27	Silty clay	CH	A–7
			27–38	Silt loam	CL or ML	A–6 or A–4
			38–60	Loamy sand and fine sand.	SP–SM, SP	A–2 or A–3
Slickspots. Mapped only in a complex with Wood River soils. Requires onsite investigation.	5–10	3–8				
Simeon: SdA	1–2	(3)	0–14	Sandy loam	SM	A–2 or A–4
			14–60	Sand and gravel and fine sand.	SP or SP–SM	A–1 or A–2
*Thurman: TsA, TXA, 2TXA, TXB, TYA. For Valentine part of TXA, 2TXA, TXB, and TYA, see Valentine series.	(7)	(3)	0–25	Loamy fine sand	SM	A–2
			25–60	Fine sand	SP, SP–SM, or SM	A–1 or A–3
*Uly: UHC, UHC2, UsD. For Coly part of UHC2 and Holdrege part of UHC2 and UHC, see the Coly and Holdrege series.	(4)	(3)	0–14	Silt loam	ML or CL	A–4 or A–6
			14–60	Silt loam	ML or CL	A–4 or A–6
Valentine: VbC	0–1	(3)	0–5	Loamy fine sand	SM	A–2
			5–60	Fine sand	SP–SM, SM, SP	A–1 or A–3
Wann:						
Wb	3–6	3–6	0–13	Fine sandy loam	SM or ML	A–2 or A–4
			13–48	Fine sandy loam	SM or ML	A–2 or A–4
			48–60	Fine sandy loam	SP–SM or SM	A–2
Wm	3–6	3–6	0–13	Loam	ML	A–4 or A–6
			13–48	Fine sandy loam	SM or ML	A–2 or A–4
			48–60	Fine sandy loam	SP–SM or SM	A–2
Wet alluvial land: Wx. Too variable to rate.	4–6	0–3				
*Wood River: Wr, WrA, WS. For Slickspots part of WS, see Slickspots.	(4)	(3)	0–11	Silt loam	ML or CL	A–4 or A–6
			11–36	Silty clay to silty clay loam.	CH or CL	A–7 or A–6
			36–60	Silt loam	ML or CL	A–7 or A–6

[1] When two or more classifications are shown, the classification listed first is considered to be the most common.
[2] The figures for available water capacity are averages based on the water retention difference as determined by laboratory tests. Studies are continuing. Current evidence indicates that the readily available water capacity of fine-textured soils may be slightly lower than that given, and that of moderately coarse textured and coarse textured soils may be slightly higher.
[3] Water table is at a depth too great to be significant.

properties of the soils—Continued

Percentage less than 3 inches passing sieve—			Percentage less than 0.002 mm.	Permeability	Available water capacity [2]	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
				Inches per hour	*Inches per inch of soil*	*pH value*	
	100	70–90	17–27	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate.
	100	90–100	40–60	0. 06–0. 20	0. 11–0. 13	7. 9–8. 4	High.
	100	70–90	17–27	0. 63–2. 00	0. 20–0. 22	7. 9–8. 4	Moderate.
	100	5–25	0–8	6. 30–20. 0	0. 08–0. 10	7. 9–8. 4	Low.
	100	25–35	0–7	2. 00–6. 30	0. 13–0. 15	6. 1–6. 5	Low.
100	75–90	5–15	0–3	>20. 0	0. 02–0. 04	6. 6–7. 3	Low.
	100	15–25	0–10	6. 30–20. 0	0. 10–0. 12	6. 1–6. 5	Low.
	100	5–25	0–5	6. 30–20. 0	0. 06–0. 08	6. 6–7. 3	Low.
	100	70–90	10–25	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Low to moderate.
	100	70–90	10–27	0. 63–2. 00	0. 20–0. 22	6. 6–7. 8	Low to moderate.
	100	5–20	0–10	6. 30–20. 0	0. 10–0. 12	6. 1–7. 3	Low.
	100	5–20	0–3	6. 30–20. 0	0. 06–0. 08	6. 6–7. 3	Low.
100	95–100	30–55	0–10	2. 00–6. 30	0. 16–0. 18	6. 1–7. 3	Low.
100	95–100	25–55	0–10	2. 00–6. 30	0. 15–0. 17	7. 4–7. 8	Low.
90–100	65–80	25–35	0–10	6. 30–20. 0	0. 14–0. 16		Low.
100	95–100	60–75	7–15	0. 63–2. 00	0. 20–0. 22	6. 1–7. 3	Low.
100	95–100	25–55	0–10	2. 00–6. 30	0. 15–0. 17	7. 4–7. 8	Low.
90–100	65–80	25–35	0–10	6. 30–20. 0	0. 14–0. 16		Low.
	100	95–100	15–27	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Low to moderate.
	100	95–100	30–60	0. 06–0. 20	0. 11–0. 13	7. 4–8. 4	High.
	100	95–100	15–27	0. 63–2. 00	0. 20–0. 22	7. 9–8. 4	Moderate.

[4] Sand or mixed sand and gravel are below the depth that is normally sampled.
[5] Sand or mixed sand and gravel generally below a depth of 6 feet.
[6] Sand or mixed sand and gravel generally below a depth of 5 feet.
[7] Fine sand at depth of 1 to 3 feet.

TABLE 7.—*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 such mapping unit may have

Soil series and map symbols	Suitability as source of—			Soil properties affecting—		
	Topsoil	Sand or mixed sand and gravel	Road fill	Highway location	Dikes and levees	Farm ponds: Reservoir area
Alda: Ax, Ay	Good to fair	Good for fine sand, sand, and mixed sand and gravel below depth of 3 feet.	Fair to good: wet in some places.	Erosive slopes; seasonal high water table; minimum fills necessary; moderate to low susceptibility to frost heave. As subgrade: fair to good for pavement, fair to poor for gravel.	Erosive slopes; subject to piping in some places.	High seepage; can be used for dugout ponds; water table at depth of 2 to 6 feet.
Blendon: Bdn, BdnA, Bed, BedA.	Good to fair	Fair to fine sand below depth of 3 feet.	Good to fair below depth of 2 feet.	Erosive slopes; low susceptibility to frost heave. As subgrade: good to fair for pavement, fair to poor for gravel.	Erosive slopes; subject to piping and seepage.	High vertical seepage.
Boel: Bob, Boc	Fair in upper 1 foot: limited amount.	Good for fine sand at depth of approximately 1 foot.	Good to fair: wet in some places.	Very erosive slopes; seasonal high water table; minimum fills necessary; low susceptibility to frost heave. As subgrade: good for pavement, poor for gravel.	Erosive slopes; subject to piping; flat slopes needed.	High seepage; can be used for dugout ponds; water table at depth of 2 to 5 feet.
Breaks-Alluvial land complex: By. Too variable to rate.						
Cass: Cs, Cm	Good to fair	Good for fine sand below depth of 3 feet.	Good to fair	Erosive slopes; low susceptibility to frost heave; subject to soil blowing; fine sand below depth of 3 feet requires special hauling equipment. As subgrade: good to fair for pavement, fair to poor for gravel.	Erosive slopes; subject to piping.	Moderate seepage; high seepage if sand is exposed.
*Coly: CbC, CbE, CYE. For Uly and Hobbs parts of CYE, see their respective series.	Good to fair	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave; steep slopes make large cuts and fills necessary. As subgrade: fair to poor for pavement, good to fair for gravel.	Erosive slopes [4]	Moderate seepage; high vertical seepage in some places.
Cozad: Coz, CozA, CozB2, CozC2.	Good to fair	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave. As subgrade: fair to poor for pavement, good to fair for gravel.	Erosive slopes	Moderate vertical seepage.
Gibbon: Gg, 2Gg	Good to fair	Good for fine sand below depth of 3 feet; sand and some gravel below depth of 6 feet.	Fair to depth of 3 feet; fine sand below depth of 3 feet requires special hauling equipment.	Erosive slopes; very high susceptibility to frost heave.	Erosive slopes; subject to piping in some places.	High seepage; can be used for dugout ponds; water table at depth of 2 to 6 feet.

See footnotes at end of table.

interpretations of the soils

different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil properties affecting—Continued						Soil limitations for sewage disposal by—	
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations	Septic tank filter fields	Sewage lagoons
Fair to good stability and compaction; subject to piping in some places; low compressibility; wet because of water table in some places.	Water table at depth of 2 to 6 feet; adequate outlets not available in some places.	Low available water capacity; limited root zone; subject to leaching; erosive.	Erosive if used on slopes of diversions.[1]	Erosive slopes; cuts expose sand in places; fertility low in cuts.	Good bearing capacity if soil is confined and compacted.	Moderate: water table at depth of 2 to 6 feet.[2]	Severe: moderately rapid permeability; sealing or lining needed in places because of very rapid permeability in substratum.
Fair to good stability and compaction; high piping potential; low compressibility; erosive slopes.	Generally well drained, but excessively drained in some places.	Moderate available water capacity; subject to moderately severe soil blowing.	Moderate to severe erosion; sandy below depth of 2 feet.[1]	Moderately erosive by water; low fertility if sand is exposed.	Fair to good bearing capacity if soil is well compacted and confined.	Slight	Severe: moderately rapid permeability; sealing or lining needed in places.
Fair to good stability and compaction; low compressibility; erosive slopes; may be subject to seepage and wet in places.	Water table at depth of 2 to 5 feet; rapid internal drainage.	Low available water capacity; rapid intake rate; subject to leaching and soil blowing; droughty.	Erosive if used on slopes of diversions; erosive; sandy substratum within 1 foot of surface.[1]	Erosive slopes; cuts expose sand in places; fertility low.	Generally good bearing capacity if soil is confined; wet in some places.	Moderate: water table at depth of 2 to 5 feet.[2]	Severe: moderately rapid permeability; sealing or lining needed in places.
Fair to good stability with good control; good workability; subject to piping.	Generally well drained.	Moderate available water capacity; erosive.	Moderately erosive slopes.[1]	Moderately erosive slopes; deeper cuts expose sand in places; fertility low.	Good bearing capacity if sand is confined.	Moderate to severe.[2]	Severe: moderately rapid permeability; sealing or lining needed in places; very rapid permeability in substratum.
Fair to good stability and compaction; subject to piping; moderate to high compressibility; erosive slopes.	Moderately steep to very steep slopes.	High available water capacity; erosive slopes; units CbE and CYE not suited.	Highly erosive; maintenance costs may be high; irregular slopes can make good alinement difficult.	Highly erosive slopes; low fertility in some cuts; maintenance costs may be high.	Good bearing capacity if soil is dry; subject to high consolidation upon wetting and loading.	Severe: steep slopes.	Moderate on slopes of more than 10 percent: moderate permeability; sealing or lining needed in places.
Fair to good stability and compaction.	Generally well drained.	High available water capacity; erosive on sloping grades.	Erosive slopes	Moderately erosive slopes.	Good bearing capacity if soil is dry; settles in some places upon wetting and loading.	Slight: moderate: permeability.	Moderate: severe on slopes of more than 10 percent; sealing or lining needed in places.
Good stability and workability; close compaction control required in some places.	Surface runoff slow; water table at depth of 2 to 6 feet.	High available water capacity; subirrigation beneficial for deep-rooted crops; adequate drainage necessary.	Erosive if used on slopes of diversions.[1]	Erosive slopes; drainage required in some places.	Good bearing capacity in the sand.	Slight to moderate: water table at a depth of 2 to 6 feet.	Severe: moderate permeability; sealing or lining needed in places; substratum very rapidly permeable.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil properties affecting—		
	Topsoil	Sand or mixed sand and gravel	Road fill	Highway location	Dikes and levees	Farm ponds: Reservoir area
Grigston: Gk	Good	Fair for fine sand and gravel below depth of 4 feet.	Fair to depth of 3.5 feet; fine sand available below 3.5 feet.	Erosive slopes; moderate to high susceptibility to frost heave; fine sand below depth of 3.5 feet requires special hauling equipment. As subgrade: fair to good for pavement, fair to poor for gravel.	Erosive slopes	High vertical seepage
Hall: Ha, HaA	Good	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave. As subgrade: fair to poor for pavement, good for gravel.	Erosive slopes; cracks when dry in some places.	Generally low seepage
Hobbs: 2Hb, Hb, HbA, HbB.	Good	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave; occasional flooding; requires minimum fills. As subgrade: fair to poor for pavement, fair to good for gravel.	Some slopes subject to erosion.	Low seepage
*Holdrege: HoA, HoB, HoB2, HQ. For Hall part of HQ, see Hall series.	Good	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave. As subgrade: fair to poor for pavement, good for gravel.	Erosive slopes	Low seepage
Hord: Hd, HdA	Good	(3)	Fair	Erosive slopes; high susceptibility to frost heave. As subgrade: fair to poor for pavement, good to fair for gravel.	Erosive slopes	Generally low seepage
Inavale: In	Good to poor in upper 1 foot; poor below.	Good for fine sand below depth of 1 foot.	Good	Very erosive slopes; low susceptibility to frost heave. As subgrade: good for pavement; poor for gravel.	Erosive slopes; subject to horizontal seepage; flat slopes needed.	High seepage; can be used for excavated dugout ponds where water table is high.
*Kenesaw: KCB, Ks, KsA, KsB. For Coly part of KCB, see Coly series.	Good to fair	(3)	Fair to poor	Erosive slopes; moderate to high susceptibility to frost heave. As subgrade: fair to poor for pavement, fair to good for gravel.	Erosive slopes	Moderate vertical seepage.
Kenesaw, calcareous variant: 2Kt.	Good to fair	(3)	Fair	Erosive slopes; moderate susceptibility to frost heave. As subgrade: fair for pavement and gravel.	Erosive slopes	Moderate vertical seepage.

See footnotes at end of table.

of the soils—Continued

Soil properties affecting—Continued						Soil limitations for sewage disposal by—	
Farm ponds—Con.: Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations	Septic tank filter fields	Sewage lagoons
Fair to good stability, workability; close compaction control required; erosive slopes.	Generally well drained.	High available water capacity.	Erosive if used on slopes of diversions.[1]	Erosive slopes; deep cuts expose fine sand in some places.	Good bearing capacity if soil is confined.	Moderate to severe [2]	Severe: moderate permeability; sealing or lining needed in places; substratum very rapidly permeable.
Fair to good stability and compaction; subject to piping in some places; moderate compressibility.	Generally well drained.	High available water capacity.	Moderately erosive slopes.	Moderately erosive slopes.	Fair to poor bearing capacity; moderate shrink-swell potential.	Severe: moderately slow permeability.	Moderate: moderately slow permeability.
Fair to good stability and compaction; moderate to high compressibility.	Slow to medium surface runoff, but may be subject to seasonal flooding.	High available water capacity; overflow protection necessary on unit 2Hb.	Moderately erosive slopes.	Moderately erosive slopes; protection against flooding necessary.	Fair to good bearing capacity.	Moderate: moderate permeability is severe limitation on unit 2Hb because of occasional flooding.	Moderate: moderate permeability; flood protection required on unit 2Hb.
Fair to good stability and compaction; impervious; medium to high compressibility; fair to good workability.	Generally well drained.	High available water capacity; erosive on gently sloping grades.	Moderately erosive slopes.	Moderately erosive slopes; fertility low in some deeper cuts.	Fair bearing capacity; settles in some places upon wetting and loading.	Moderate: moderate permeability.	Moderate: moderate permeability; sealing or lining needed in places.
Fair to good stability and compaction; close compaction control required; fair to good workability; moderate compressibility.	Well drained	High available water capacity; erosive on steeper grades.	Moderately erosive slopes.	Moderately erosive slopes.	Good bearing capacity if soil is dry.	Slight to moderate: moderate permeability.	Moderate: moderate permeability.
Good stability; good workability; low compressibility; subject to horizontal seepage in some places; erosive slopes.	Excessively drained	Low available water capacity; rapid intake rate; subject to leaching and soil blowing; fertility low.	Fine sand below depth of 1 foot; erosive if used on slopes of diversions.[1]	Erosive slopes; cuts expose sand in some places; fertility low; vegetation difficult to establish.	Good bearing capacity if soil is confined; subject to settling of low-density layers in some places.	Moderate: water table at depth of 5 to 10 feet.[2]	Severe: rapid permeability; sealing or lining needed in places.
Fair to good stability and compaction; medium compressibility; erosive slopes; subject to soil blowing.	Well drained	High available water capacity; erosive on steeper slopes; subject to soil blowing in some places.	Moderately erosive slopes.	Moderately erosive slopes; fertility medium.	Good bearing capacity if soil is dry; subject to settling upon wetting and loading.	Moderate: moderate permeability.	Moderate: moderate permeability; sealing or lining needed in places.
Fair to good stability and compaction; medium compressibility; erosive slopes.	Well drained	High available water capacity; subject to soil blowing.	Moderately erosive slopes.	Moderately erosive slopes; fertility medium.	Good bearing capacity.	Moderate: moderate permeability.	Moderate: moderate permeability.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil properties affecting—		
	Topsoil	Sand or mixed sand and gravel	Road fill	Highway location	Dikes and levees	Farm ponds — Reservoir area
*Leshara: Lf, LG. For Gibbon part of LG, see Gibbon series.	Good to fair.	Good below depth of 4 feet.	Fair to depth of 5 feet; good below depth of 5 feet: wet in some borrow ditches.	Erosive slopes; high susceptibility to frost heave; seasonal high water table; minimum fills; subject to soil blowing. As subgrade: poor to good for pavement; good to poor for gravel.	Erosive slopes; subject to horizontal seepage in some places.	High vertical seepage; can be used for dugout ponds; water table at a depth of 2 to 6 feet.
Lex: Lex.	Good in upper 2 feet; not suited below.	Good for sand and gravel below depth of 2 feet.	Good to fair: good below depth of 2 feet.	Erosive slopes; high susceptibility to frost heave above water table; seasonal high water table; requires minimum fills. As subgrade: poor to good for pavement, good to poor for gravel.	Erosive slopes.	High vertical seepage; can be used for dugout ponds; water table at depth of 2 to 6 feet.
Loamy alluvial land: Lx. Too variable to rate.						
Loup: Lm.	Good to poor in upper 1 foot: wet.	Good for fine sand below depth of 2 feet.	Fair to good: fine sand below depth of 2 feet; wet and poorly drained.	Very erosive slopes; high susceptibility to frost heave; high water table; requires minimum fills. As subgrade: poor to fair for pavement, good to poor for gravel.	Erosive slopes; subject to horizontal seepage; flat slopes needed.	High vertical seepage; can be used for dugout ponds; water table at depth of 0 to 3 feet.
Marsh: M. Too variable to rate.						
Ortello: 2Or, 2OrB2, OrC.	Good to fair.	(3)	Good to fair.	Erosive slopes; low susceptibility to frost heave. As subgrade: good to fair for pavement, fair for gravel.	Erosive slopes; slope protection needed.	Moderate seepage.
Pits and dumps: GP. Too variable to rate.						
*Platte: P, PL. For Alda part of PL, see Alda series.	Fair to poor.	Good for fine sand, coarse sand, and gravel below depth of 2 feet.	Good.	Very erosive slopes; high susceptibility to frost heave in upper 3 feet; seasonal high water table and standing water in channels; requires minimum fills. As subgrade: poor to good for pavement, good to poor for gravel.	Subject to sand boils; flat slopes needed in some places.	High seepage; can be used for dugout ponds; water table at depth of 2 to 5 feet.
Riverwash: Rw. Too variable to rate.						
Rough broken land, loess: RB. Too variable to rate.						

See footnotes at end of table.

of the soils—Continued

Soil properties affecting—Continued						Soil limitations for sewage disposal by—	
Farm ponds—Con.	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations	Septic tank filter fields	Sewage lagoons
Embankment							
Fair to good stability; moderate compressibility.	Water table at depth of 2 to 6 feet; adequate outlets not available in some places.	Moderate to high available water capacity; subirrigation beneficial for deep-rooted crops; subject to soil blowing; adequate drainage required in some places.	Erosive if used on slopes of diversions.[1]	Erosive slopes	Fair to poor bearing capacity above underlying sand.	Moderate: water table at a depth of 2 to 6 feet; moderate permeability.[2]	Moderate to severe: moderate permeability; sealing or lining needed in places because of very rapid permeability in substratum.
Fair stability, workability, and compaction above depth of 2 feet; sands wet below 2 feet.	Water table at depth of 2 to 6 feet; adequate outlets not available in some places.	Moderate available water capacity; limited root zone; subject to leaching; adequate drainage necessary.	Erosive if used on slopes of diversions.[1]	Wetness in some places; sand below depth of 2 feet.	Very good bearing capacity if sand is confined; wet.	Moderate: water table at depth of 2 to 6 feet.[2]	Severe: moderate permeability; water table at depth of 2 to 6 feet; sealing and lining in places because of very rapid permeability in substratum.
Good stability; fair to good compaction and workability; moderate compressibility above depth of 2 feet.	Water table at depth of 0 to 3 feet; adequate outlets probably not available.	Low available water capacity; fertility low; drainage necessary; not suited without drainage.	Erosive if used on slopes of diversions; wet.[1]	Erosive slopes; cuts expose sand in some places; poorly drained.	Good bearing capacity if sand is confined: subject to seepage; high water table; poorly drained.	Severe: water table at depth of 0 to 3 feet.	Severe: rapid permeability; water table at depth of 0 to 3 feet.
Fair to good stability and compaction; low to moderate compressibility.	Well drained	Moderate available water capacity; subject to soil blowing.	Erosive slopes	Fertility low; highly erosive slopes; maintenance costs may be high.	Good to fair bearing capacity.	Slight	Severe: moderately rapid permeability; sealing or lining needed in places.
Good stability with close compaction control; good workability; low compressibility; subject to horizontal seepage.	Adequate outlets not available in some places; water table at depth of 2 to 5 feet.	Low available water capacity; rapid intake rate; adequate drainage necessary; subject to soil blowing; shallow root zone.	Erosive if used on slopes of diversions; shallow.[1]	Erosive slopes; fertility low if sands are exposed; maintenance costs may be high; shallow soil.	Good bearing capacity if soil is confined; wet in some places; subject to seepage.	Severe: water table at depth of 2 to 5 feet.[2]	Severe: moderately rapid permeability; sealing or lining needed in places because of very rapid permeability in substratum.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil properties affecting—		
	Topsoil	Sand or mixed sand and gravel	Road fill	Highway location	Dikes and levees	Farm ponds — Reservoir area
Rusco: Ru	Good to fair	(3)	Fair to poor	Erosive slopes; high susceptibility to frost heave; infrequent ponding. As subgrade: fair to poor for pavement, fair to good for gravel.	Moderately erosive slopes.	Low to moderate seepage.
Sandy alluvial land: Sx. Too variable to rate.						
Scott: Sc, 2Sc	Poor	(3)	Fair to poor: subsoil highly plastic.	Erosive slopes; moderate to high susceptibility to frost heave; ponding; requires minimum fills. As subgrade: poor for pavement, good for gravel.	Erosive slopes; cracks when dry.	Very low seepage
Silver Creek: Slc	Good to fair	Poor: fine sand and some gravel layers available below depth of 5 feet.	Fair to poor to depth of 3.5 feet; good below 3.5 feet in sand and gravel.	Erosive slopes; moderate to high susceptibility to frost heave; occasional ponding; requires minimum fills. As subgrade: fair to poor for pavement, fair to good for gravel.	Erosive slopes; sometimes cracks when dry if upper 3.5 feet of soil is used.	Low to moderate seepage above depth of 3.5 feet.
Simeon: SdA	Fair in upper 1 foot	Good for fine sand and coarse sand with varying amounts of fine gravel below depth of 1 foot.	Good	Erosive slopes; low susceptibility to frost heave; loose sand below depth of 1 foot requires special hauling equipment. As subgrade: good for pavement, poor for gravel.	Erosive slopes; flat slopes needed in some places; subject to soil blowing.	High vertical seepage
Slickspots. Mapped only in complex with Wood River soils. Too variable to rate.						
*Thurman: TsA, TXA, 2TXA, TXB, TYA. For Valentine part of TXA, 2TXA, TXB, and TYA see Valentine series.	Fair to poor	Good for fine sand below depth of 1.5 feet.	Fair to good: erosive slopes.	Erosive slopes; low susceptibility to frost heave; loose sand requires special hauling equipment. As subgrade: good for pavement, poor for gravel.	Flat slopes needed in some places; subject to soil blowing.	High vertical seepage
*Uly: UHC, UHC2, UsD. For Holdrege part of UHC2 and UHC see Holdrege series; for Coly part of UHC2, see Coly series.	Good to fair	(3)	Fair	Erosive slopes; high susceptibility to frost heave; steep topography makes large cuts and fills necessary. As subgrade: poor for pavement, good for gravel.	(4)	Low to moderate seepage.

See footnotes at end of table.

of the soils—Continued

Soil properties affecting—Continued						Soil limitations for sewage disposal by—	
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations	Septic tank filter fields	Sewage lagoons
Fair to good stability and compaction; moderate compressibility; erosive slopes.	Infrequent surface ponding.	High available water capacity; protection against flooding necessary.	Erosive if used on slopes of diversions.[1]	Moderately erosive slopes; maintenance costs may be high because of silting.	Fair to poor bearing capacity.	Generally moderate: moderately slow permeability.	Moderate: moderately slow permeability.
Fair to good stability; moderate compressibility; poor workability; impervious; erosive slopes; compaction control difficult in some places.	Very poor surface drainage; adequate outlets not available in some places at a reasonable cost; slow internal drainage; frequent flooding on unit Sc.	Low to moderate available water capacity; slow intake rate; adequate surface drainage necessary; unit Sc not suited.	Erosive if used on slopes of diversions.[1]	Erosive slopes; fertility low to medium.	Fair to poor bearing capacity; wet in some places because of lack of surface drainage.	Severe: very slow permeability.	Slight: very slow permeability.
Fair stability and compaction; impervious; moderate compressibility; erosive slopes; compaction control difficult in some places because of clay content.	Somewhat poorly drained; slow internal drainage and surface runoff.	Moderate to high available water capacity; moderate to slow intake rate; subirrigation beneficial for deep-rooted crops.	Erosive if used on slopes of diversions.[1]	Erosive slopes; cuts expose clayey subsoil in some places.	Poor to fair bearing capacity, depending on depth; subsoil has high shrink-swell potential.	Moderate to severe: slow permeability in underlying material; very rapid permeability in sandy substratum.[2]	Severe: slow permeability in upper 3 feet; very rapid permeability in substratum.
Good stability and compaction; good workability; low compressibility; pervious; subject to seepage in some places.	Excessively drained.	Low available water capacity; rapid intake rate; fertility low; subject to soil blowing.	Highly erosive slopes; maintenance costs may be high.[1]	Highly erosive slopes; fertility low; vegetation difficult to establish.	Good bearing capacity if soil is confined.	Slight [2]	Severe: rapid permeability; sealing or lining needed in places.
Fair to good stability and compaction; highly pervious; low compressibility; erosive slopes.	Somewhat excessively drained.	Low available water capacity; rapid intake rate; subject to severe soil blowing.	Erosive slopes; soil blowing and silting can increase maintenance costs; hummocky topography may make good alinement difficult.	Erosive slopes; fertility low; maintenance costs may be high; vegetation difficult to establish.	Good bearing capacity with good density if soil is confined.	Slight [2]	Severe: rapid permeability; sealing or lining needed in places.
Fair to good stability with close compaction control; fair to good compaction; moderate compressibility; impervious; erosive slopes.	Surface runoff medium to rapid.	High available water capacity; moderately steep slopes are erosive; unit UsD not suited.	Erosive slopes; moderately steep slopes with high siltation may increase maintenance costs.	Erosive slopes; fertility low in deeper cuts; maintenance costs may be high on steeper slopes.	Generally good to fair bearing capacity if soil is dry.	Moderate: moderately high water table [2]	Severe: moderately rapid permeability; sealing or lining needed in places because of very rapid permeability in substratum.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil properties affecting—		
	Topsoil	Sand or mixed sand and gravel	Road fill	Highway location	Dikes and levees	Farm ponds: Reservoir area
Valentine: VbC	Poor	Good for fine sand below depth of 1 foot.	Good if soil binder is added.	Highly erosive slopes require protection; low susceptibility to frost heave; loose sand requires special hauling equipment; steep topography makes large cuts and fills necessary. As subgrade: good for pavement, poor for gravel.	(4)	High vertical seepage.
Wann: Wb, Wm	Good to fair	Good for sand and gravel below depth of 3 feet.	Generally good	Erosive slopes; moderate to low susceptibility to frost heave; seasonal high water table; subject to soil blowing. As subgrade: good for pavement, poor for gravel; may require minimum fills.	Erosive slopes; flat slopes needed in some places.	Moderate to high vertical seepage; can be used for dugout ponds; water table at depth of 3 to 6 feet.
Wet alluvial land: Wx. Too variable to rate.						
*Wood River: Wr, WrA, WS. For Slickspots part, see Slickspots.	Good	(3)	Fair: subsoil material plastic; subject to cracking upon drying.	Erosive slopes; moderate to high susceptibility to frost heave. As subgrade: fair to poor for pavement, good to fair for gravel.	Erosive slopes; cracks when dry in some places.	Low seepage

[1] Terraces generally not applicable on these soils.

[2] Because of rapidly permeable substratum materials, raw sewage may contaminate the underground water supply.

Topsoil is used to cover road and dam embankments and is also used on gardens and lawns. In table 7 topsoil is rated *good*, *fair*, or *poor*, depending on fertility or organic-matter content, erodibility and workability.

Several soils in Buffalo County are a source of sand and gravel, but onsite investigation is needed to determine quantity and gradation. Alda, Boel, Gibbon, Lex, and Platte soils are sources of sand.

Some of the factors considered in rating soils for use as road fill are suitability for embankments and foundations for embankments, erodibility of cut slopes, and potential frost action. Sand and gravel are rated *good to fair* for subgrades under pavement and *poor* for gravel-road subgrades. Silt and clay on the road subgrade surface are more stable under gravel surfacing. Thus, for paved road soils in AASHO classifications, A–1 and A–3 are rated *good;* A–2, *good to fair;* A–4, *fair to poor;* and A–6 or A–7, *poor*. For most soils the classification for road subgrade (foundation) and road fill is the same as that for paved roads because the engineering requirements are approximately the same.

In table 7 soil properties affecting highway location are described acording to potential limitations of frost heave, flooding or ponding, erodibility of cut and fill slopes, and depth to the water table; also, the soils are rated *good*, *fair* or *poor* for road subgrade. Frost heave is caused by the expansion of freezing water in silty or clayey soils and increases the need for maintenance of paved roads. A high water table can result in potential frost heave.

Dikes and levees are used to control surface water and are subject to soil blowing and water erosion. They are also subject to horizontal seepage if they are not properly compacted or if they are constructed of clean sand. Some soils are subject to shrinkage cracking when they dry. Dikes and levees constructed of sandy soils should have more gentle slopes than those constructed of medium-textured or fine-textured soil material.

Reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

Some soil properties that affect agricultural drainage are depth to the water table, availability of outlets, internal drainage, slope of the soil, surface runoff, flooding, and ponding.

The suitability of soils for irrigation depends on available water capacity, permeability, water intake rate, steepness of slopes, and possible limiting depths of level-

of the soils—Continued

Soil properties affecting—Continued						Soil limitations for sewage disposal by—	
Farm ponds—Con.: Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations	Septic tank filter fields	Sewage lagoons
Fair to good stability and compaction; highly pervious; low compressibility; subject to soil blowing.	Excessively drained.	Low available water capacity; rapid intake rate; subject to severe soil blowing; soil not suited.	Highly erosive slopes; maintenance costs may be high; good alinement difficult because of irregular topography.[1]	Erosive slopes; fertility low; vegetation difficult to establish; maintenance costs may be high.	Fair to good bearing capacity, depending on density; soil must be confined.	Slight[2]	Severe: rapid permeability; sealing or lining needed in places.
Generally fair stability above depth of 4 feet; good below 4 feet, generally low compressibility; good workability.	Seasonal high water table; adequate outlets not available in some places; if drained, moisture deficiency can result in dry periods.	Moderate available water capacity; adequate drainage necessary; erosive slope.	Erosive if used on slopes of diversions.[1]	Erosive slopes	Good bearing capacity, depending on density; sand must be confined.	Moderate: water table at depth of 3 to 6 feet.[2]	Severe: moderately rapid permeability; sealing or lining needed in places because of very rapid permeability in substratum.
Fair to good stability; moderate compressibility; fair to poor compaction and workability; impervious.	Generally slow internal drainage and surface runoff.	Moderate to high available water capacity; slow intake rate; depth to clay subsoil can limit desirable cuts in land leveling.	Moderately erosive slopes; water intake rate is slow.	Moderately erosive slopes; vegetation difficult to establish on clayey subsoil.	Fair bearing capacity; subsoil has high shrink-swell potential.	Moderate to severe: slow premeability in subsoil; moderate permeability in underlying material.	Moderate: slow permeability.

[3] Sand or sand and gravel generally not available.
[4] Dikes and levees generally not applicable on these soils.

ing cuts.[8] In table 7 the interpretations of available water capacity in the irrigation column are for the upper 5 feet of soil. The rating is *high* if the soil holds more than 9 inches of water in the top 5 feet, *moderate* if the soil holds 6 to 9 inches, *low* if the soil holds 3 to 6 inches, and *very low* if the soil holds less than 3 inches.

The intake rate is the amount of water that enters the soil and moves downward through the plow layer or an equivalent depth. Intake rates for some soils are given in table 7, and a permeability range is given in table 6. The intake rate is *rapid* if the soil takes more than 2 inches of water per hour, *moderate* if the soil takes 0.5 to 2 inches per hour, and *slow* if the soil takes less than 0.5 inch per hour.

Properties that affect use of the soils for level terraces, diversion terraces, and grassed waterways are described in table 7 according to severity of soil blowing and water erosion, fertility, and capability of supporting vegetation. Maintenance costs for level terraces and diversion terraces are higher in areas where soil material from higher elevations is deposited by wind or water. Depth to erodible sand limits the depth of cuts for diversion terraces and grassed waterways. Rough topography and steep soils affect alinement of level terraces and diversion terraces.

[8] Additional information on the use of irrigation is contained in IRRIGATION GUIDE FOR NEBRASKA, Soil Conservation Service, U.S. Dept. Agr., 100 pp.

Soils that are to be used for foundations are generally rated on their bearing, or load-carrying, capacity. Most soils have a high bearing capacity when dry. Some of the windblown soils are subject to high consolidation when saturated under load. Sands and gravels have high bearing capacity when confined. Specific values for bearing capacity should not be assigned to estimated engineering properties that are expressed in words, whether these properties are given in tables or text. Wet excavations for buildings can be a limitation; therefore, depth to the water table should be determined for building sites. The shrink-swell potential given in table 6 is also an important consideration if a particular soil is to be used for foundations.

In table 7 soil limitations are given for the sewage disposal by septic tank filter fields and by sewage lagoons. Some of the soil properties that affect sewage disposal, such as soil classification, permeability, and available water capacity, are also given in table 6. Soil limitations are rated slight, moderate, or severe. *Slight* indicates good infiltration without contamination of underground water, *moderate* indicates a finer grained soil that has a lower intake rate, and *severe* indicates a high water table or an impervious soil. Water must be retained in a sewage lagon if aerobic decomposition of fresh sewage is to occur. Thus an impervious soil is desirable for a sealed or lined lagoon. A lagoon constructed in sand that has a high water table would be the least desirable sewage disposal facility. A septic tank filter field or sewage lagoon must be located so that it does not contaminate any well used for domestic water supply or for stock water.

Formation and Classification of the Soils

This section consists of two main parts. The first part tells how the factors of soil formation have affected the development of soils in Buffalo County. The second part explains the system of soil classification currently in use and places each soil series in some of the categories of that system.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil profile that is formed and in extreme cases determines it almost entirely. Finally, time is needed for changing the parent material into a soil profile. It may be much or little, but some time is always required for differentiation of soil horizons. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent material

Buffalo County soils developed in Peoria loess, silty alluvium, sandy alluvium, and eolian sands.

Most of the loess in the county is Peoria loess. It is a light brownish-gray, calcareous silt loam. The silt content generally ranges from 60 to 70 percent, the clay content ranges from 20 to 25 percent, and the sand content ranges from 10 to 15 percent. The principal soils formed from this material are in the Holdrege, Hall, Uly, and Coly series (fig. 14).

Beneath the Peoria loess is the reddish-brown to light-brown, calcareous Loveland Formation. Most of the Loveland Formation is silty, but texture ranges from clay to fine sand. The formation ranges from a few feet to more than 100 feet in thickness, and it outcrops only on valley sides and along deeply entrenched drainageways in the uplands.

Loess and loess mixed with alluvium are the principal soil parent materials on the stream terraces. Floodwater from upland drainageways spread over the stream terraces and deposited silty soil parent materials, and loess was mixed with this alluvium to varying degrees. The silty layer of loess and alluvium ranges from 4 feet to more than 20 feet in thickness over mixed sand and gravel. The principal soils on the stream terraces are in the Hord, Hall, Wood River, and Cozad series.

The soils on bottom lands of the Platte River valley consist of materials of mixed textures. The soil parent materials are thin over coarse sand and gravel, and the water table is at a depth of 2 to 8 feet. The soils on these bottom lands are in the Alda, Platte, Lex, Gibbon, Leshara, Silver Creek, and Wann series. Loamy alluvial land is an important land type.

The surface materials on stream terraces of the South Loup River valley are predominantly noncalcareous, sandy alluvium that contains a sprinkling of pebbles. Wind has reworked the sand into an undulating and hummocky landscape. The principal soils are in the Thurman and Valentine series. The soil parent materials on the South Loup River bottom lands are predominantly noncalcareous, sandy alluvium. The soils are in the Boel, Inavale, Wann, and Gibbon series.

South of the South Loup River valley is an area of deep, noncalcareous, sandy soils developed in sandy parent materials that were blown out of the South Loup River valley. The sandy material covers the underlying loess to depths that vary from a few inches to more than 30 feet. The principal soils are in the Valentine, Ortello, and Thurman series. On the south edge of the sandy area is a transition zone where the soil parent materials are mixed sand and loess. The most extensive of these areas is south and east of Ravenna, and Kennesaw is the principal soil series.

A basal deposit of coarse sand or mixed sand and gravel underlies much of Buffalo County. It is an important source of water. The sand and gravel bed is thickest beneath the river channels and is thin beneath many areas in the uplands. Soils in the Platte, Alda, Lex, Simeon, and Gibbon series are underlain by mixed sand and gravel.

The Ogallala Formation is also an important source of water. It is composed of calcareous sandstone and mixed clayey, silty, and sandy material. The formation outcrops as sandstone bedrock in only one place in the county. The outcrop is about 3 miles south of the Loup River on the Buffalo-Dawson County line.

Climate

Buffalo County has a continental climate characterized by wide seasonal variations. Winter temperatures below zero and summer temperatures above 100° F. are common. The average annual temperature is 50.5°.

The average annual precipitation is 23.8 inches. Rainfall is heaviest in May, June, July, and August, when most of it occurs during local thunderstorms. Thunderstorms often come as hard, dashing rains that cause erosion of steep soils, which seldom absorb all of the rain that falls during a thunderstorm. Water erosion is a less severe hazard on gently sloping soils in areas that are in native grass, but it is a hazard in areas where the soil is not protected.

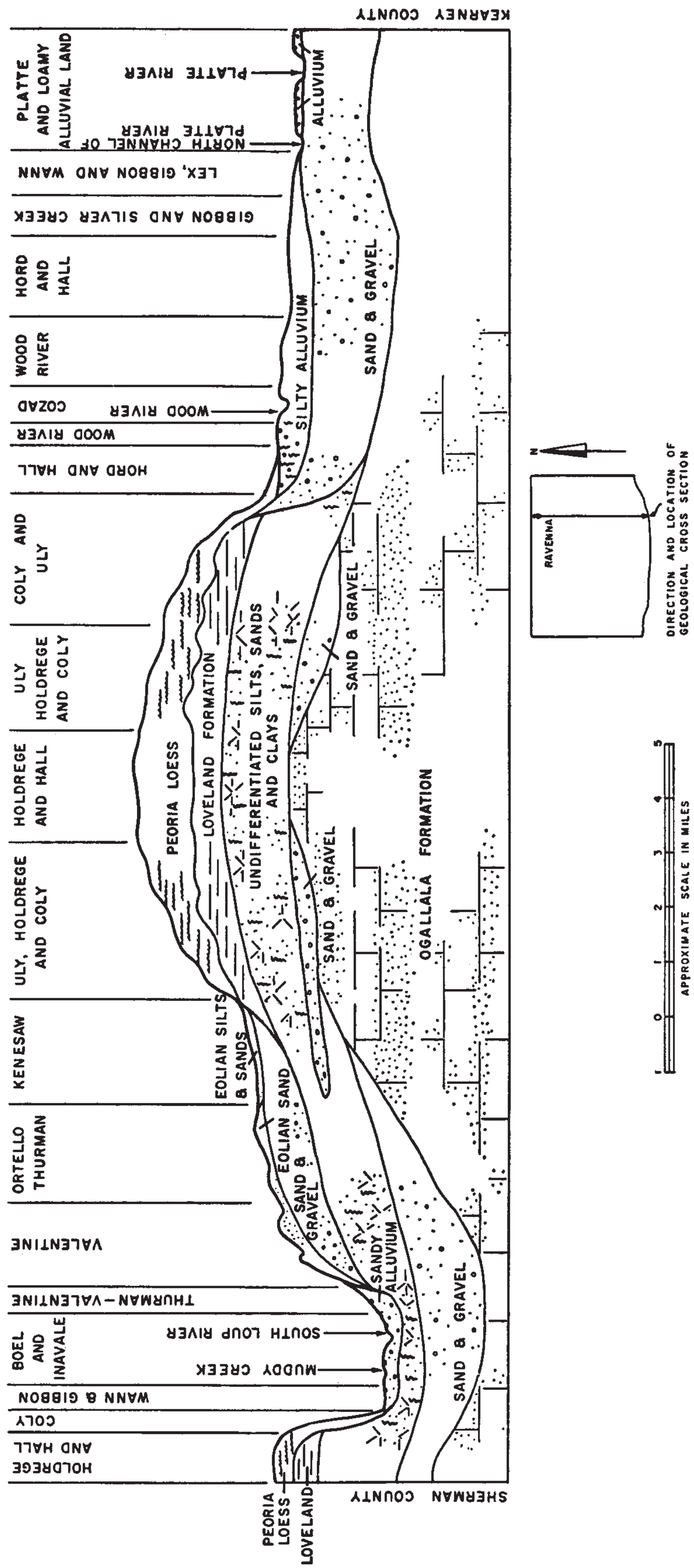

Figure 14.—Relation of soils to geological materials in north-south section across Buffalo County.

Rainfall leaches calcium carbonate in the silty loess soils to a depth of 2 or 3 feet. Permeability is more rapid in sandy soils, and leaching to a depth of more than 3 feet is common. Translocation of colloids has occurred, and many of the silty soils have more clay in the subsoil.

Strong winds affected the formation of the sandy upland soils south of the South Loup River. Wind was the mode of deposition and resulted in a mixing and reworking of the sandy materials. This substantially retarded uniform genetic development. The loess was also transported by wind. Small hummocks and gently undulating topography are characteristic of deposition by wind and are evident in the younger loess soils. In recent years all soils have received small amounts of windblown materials that have been mixed with the surface layer. Because of soil blowing, some soils have lost materials.

Plant and animal life

Trees, plants, micro-organisms, earthworms, and various other forms of plant and animal life live on and in the soil and are active in the soil-forming processes. The kinds of plants and animals that exist in the soil are largely determined by climate.

Severe electrical storms and resulting prairie fires were common before white men settled the area that is now Buffalo County. This is one reason why the dominant vegetation of the county was grass instead of trees. Trees influenced the development of very few soils in Buffalo County. Nearly all of the soils formed under a prairie type of grassland cover.

Grasses cover the soil and thereby reduce or eliminate soil erosion and increase the intake of water. Grasses take up nutrients from the soil and form a nutrient-rich residue at the surface when they die. Micro-organisms decompose the residue and return the nutrients to the soil. Lignins, or organic matter, make up a small percentage of the total residue, and they decompose slowly. The lignins bind soil particles together into water-stable aggregates. Deep percolation of water can carry small amounts of organic matter downward through the soil to a depth of 2 to 4 feet, but the principal accumulation is in the top 8 to 18 inches. Organic matter is the darkening agent in the surface layer.

Small rodents, earthworms, and some kinds of insects burrow into the soil and thereby mix it. They furnish openings and channels that permit deep percolation of water and aid in aeration. They also add to the organic matter when they die.

Man's activities, particularly in altering drainage conditions, maintaining fertility, and changing the kinds of vegetation, will have an important effect upon both the rate and the direction of soil formation in the future.

Relief

Relief influences development of soils by the effect it has on water runoff and erosion. The degree of slope, the shape of the surface, drainage, and other features of relief affect each soil that develops.

Relief is important where steep slopes cause rapid runoff. Little water penetrates the soil, and this reduces the amount of vegetation produced. Water runoff can remove soil material as fast as it is formed. The result is a shallow, poorly developed, or immature soil.

On level to gently sloping soils, water runoff and erosion are not hazards under native conditions. Well-developed, mature soils are in these areas.

Depressions collect rainwater, and the result is excessive, deep percolation. Clay colloids are leached into the subsoil and form a heavy claypan that takes water slowly.

A high water table is common in the young, immature soils of bottom lands. A high water table causes imperfect or poor internal drainage. The additional water limits the kinds and amount of vegetation that will grow. It can also change the chemical composition of the nutrient complex in the parent material.

Time

Soil development is inherently a very slow process. Young, immature soils have not been in place long enough for soil-forming factors to have any marked effect on development of genetically related horizons. Steep soils, such as the Coly, are constantly losing material through erosion and therefore do not have well-developed genetic horizons, regardless of the length of time the process has been continuing.

Most of the upland and stream terrace soils in Buffalo County that are level to gently sloping have been in place for a long time. These soils have well-defined genetic horizons and are approaching an equilibrium with their environment.

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 understand their behavior and their response to manipulation. Through classification and through the use of soil maps, we can apply our knowledge of soils 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 used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The current system of classification was adopted for general use by the National Cooperative Soil Survey in 1965. This system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*2,4*). In table 8 the soil series of Buffalo County are placed in some categories of the current system as of April, 1972.

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 orgin are grouped together. Most of the classes

TABLE 8.—*Classification of soil series*

Series	Family	Subgroup	Order
Alda	Coarse-loamy, mixed, mesic	Fluvaquentic Haplustolls	Mollisols.
Blendon	Coarse-loamy, mixed, mesic	Pachic Haplustolls	Mollisols.
Boel [1]	Sandy, mixed, mesic	Aquic Haplustolls	Mollisols.
Cass	Coarse-loamy, mixed, mesic	Fluventic Haplustolls	Mollisols.
Coly	Fine-silty, mixed (calcareous), mesic	Typic Ustorthents	Entisols.
Cozad	Fine-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Gibbon	Fine-silty, mixed (calcareous), mesic	Typic Haplaquolls	Mollisols.
Grigston	Fine-silty, mixed, mesic	Fluventic Haplustolls	Mollisols.
Hall	Fine-silty, mixed, mesic	Pachic Argiustolls	Mollisols.
Hobbs	Fine-silty, mixed. mesic	Cumulic Haplustolls	Mollisols.
Holdrege	Fine-silty, mixed, mesic	Typic Argiustolls	Mollisols.
Hord	Fine-silty, mixed, mesic	Pachic Haplustolls	Mollisols.
Inavale	Mixed, mesic	Typic Ustipsamments	Entisols.
Kenesaw	Coarse-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Leshara [2]	Fine-silty, mixed, mesic	Typic Haplaquolls	Mollisols.
Lex	Fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic.	Typic Haplaquolls	Mollisols.
Loup	Sandy, mixed, mesic	Typic Haplaquolls	Mollisols.
Ortello	Coarse-loamy, mixed, mesic	Udic Haplustolls	Mollisols.
Platte	Sandy, mixed, mesic	Mollic Fluvaquents	Entisols.
Rusco	Fine-silty, mixed, mesic	Aquic Argiustolls	Mollisols.
Scott	Fine, montmorillonitic, mesic	Typic Argialbolls	Mollisols.
Silver Creek	Fine, mixed (calcareous), mesic	Typic Haplaquolls	Mollisols.
Simeon	Mixed, mesic	Typic Ustipsamments	Entisols.
Thurman	Sandy, mixed, mesic	Udorthentic Haplustolls	Mollisols.
Uly	Fine-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Valentine	Mixed, mesic	Typic Ustipsamments	Entisols.
Wann	Coarse-loamy, mixed, mesic	Fluvaquentic Haplustolls	Mollisols.
Wood River	Fine, montmorillonitic, mesic	Typic Argiustolls	Mollisols.

[1] Boel soils in Buffalo County are taxadjuncts to the Boel series because they have free calcium carbonate lower in the profile than is allowed in the range for the series.

[2] Leshara soils in Buffalo County are taxadjuncts to the Leshara series because they are darker and noncalcareous to a greater depth than is allowed in the range for the series.

of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. They are Entisols, 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. The two exceptions are the Entisols and Histosols, which occur in many different kinds of climate. The two soil orders in Buffalo County are Entisols and Mollisols.

Entisols are light-colored soils that do not have natural genetic horizons or have only very weakly expressed beginnings of such horizons. These soils do not have traits that reflect soil mixing caused by shrinking and swelling.

Mollisols formed under grass and have a thick, dark-colored surface horizon that contains colloids dominated by bivalent cations. The soil material in these soils has not been mixed by shrinking and swelling.

SUBORDER. Each order has been subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are principally those that reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUPS. Suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that contain a pan that interferes with the growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (principally calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 8 because it is the last word in the name of the subgroup.

SUBGROUP. Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties 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 great group.

FAMILY. Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

Mechanical and Chemical Analyses

Data are available on Hord and Silver Creek soils that were collected in Buffalo County and analyzed by the Soil Conservation Service, Soil Survey Laboratory, now located in Lincoln, Nebraska. Data for these profiles are given in Soil Survey Investigations Report No. 5 (*6*). Useful data on other soil series that are in Buffalo County but were sampled in adjoining counties are also recorded in this report. In this group are the Cass, Hall, Holdrege, Kenesaw, Leshara, Thurman, Wann, and Wood River series.

Laboratory data are useful to soil scientists in classifying soils and in developing concepts of soil genesis. Such information is helpful in estimating available water capacity, soil blowing, fertility, tilth, and other practical aspects of soil management. Data on reaction, electrical conductivity, and percentage of exchangeable sodium are helpful in evaluating the possibility of reclaiming and managing saline-alkali areas.

General Nature of the County

This section provides general information about the settlement and development of Buffalo County. It also gives facts about climate, relief and drainage, farming, water supply and irrigation, and transportation and markets.

Settlement and Development

In the early days men moved westward through what is now Buffalo County to seek gold, land, and adventure. It was not until 1850 that people started using the area and its resources. The earliest settlers were cattlemen who were attracted by free grazing. Many cattle died during the severe winters, but grass was free, and profits were high on the cattle that survived.

In 1853 a group of Mormons settled in the Shelton area. They planted corn and vegetable crops and sold them to people in wagon trains going west.

Buffalo County was organized in 1870, and in 1871 homesteaders began to arrive. Many were Civil War veterans. Fort Kearney was closed in 1871, and some of the soldiers stationed at the fort took their discharge there and remained in the area. By 1880 there were more than 7,000 people in the county. Immigrants from Germany and Czechoslovakia began to arrive, and by 1890 the population had grown to more than 22,000. By 1900 most of the ground now being cultivated had been broken out of sod.

Industry began in 1882, when a group of eastern investors started the Kearney Canal. The canal furnished water for power, and the power was used to operate a cotton mill. The mill closed after 9 years of operation. Stable industry did not come to Buffalo County until after the Second World War.

State institutions have played an important role in the economy of Buffalo County. Kearney State College, the Boys' Training School, and the Hospital for Tuberculosis are located at Kearney.

Climate[9]

Buffalo County, in south-central Nebraska, is located near the center of a large landmass; hence, the climate is typically continental. The Rocky Mountains have a pronounced warming and drying effect on the air that reaches this region from the west. Normally, the cold winters and hot summers are interrupted by frequent temperature changes. Rainfall is moderate and highly variable. Nearly 80 percent of the annual precipitation falls from April through September, when the prevailing winds are southerly. The location of the county in the boundary zone between the rain shadow of the Rocky Mountains and the more humid regions to the east results in large variations in precipitation from year to year as a result of small changes in the prevailing winds. Nearly all of the moisture that falls in this area is carried in on warm winds from the Gulf of Mexico and the Caribbean; drought conditions develop when these currents maintain a more easterly position. Table 9 shows this variation to be very strong in summer. For example, one July out of 10 has an inch or less of rain, while at the other end of the scale, one July out of 10 receives more than 7 inches.

Precipitation early in spring is generally slow and steady. It is usually well distributed, but as spring and summer advance, more and more precipitation falls during erratic thundershower activity and distribution is more irregular. Thunderstorms in spring and early in summer are severe at times and may be accompanied by local downpours, hail, and damaging winds. Damage to crops within the principal hail strips is often severe, but the area covered is generally small. Late in summer and in fall, showers gradually become lighter and further apart.

Weather in fall is characterized by an abundance of sunshine, mild days, and cool nights.

Precipitation in winter is generally light, and nearly all of it falls in the form of snow, although many winters have one or more periods of freezing rain. The snow is often accompanied by strong northerly winds and a change to colder weather. Average annual snowfall is about 27 inches, but there is considerable variation from year to year. Frequently the snow melts before the next snowfall occurs, and during an average winter there are only 41 days when the ground is covered by snow.

Average daily maximum and minimum temperatures can be determined from table 9. The frequency of very high and low temperatures is indicated in the same table. For example, column 3 shows that in a fifth of the years at least 4 days in July can be expected to have a high temperature of 102° F. or more, and that the average high is 103°. Column 4 shows that in one January out of five the temperature will fall to 9° below zero or lower on four nights, and that the average annual minimum is 16° below zero. Temperatures as high as 144° (in 1936) and as low as 34° below zero (in 1899) have been recorded.

The probabilities of freezing temperatures occurring at Kearney after specified dates in spring and before

[9] Prepared by RICHARD E. MYERS, climatologist for Nebraska, National Weather Service, U.S. Department of Commerce.

certain dates in fall are given in table 10. For example, in 5 years out of 10 the air temperature will not fall below 32° after April 30 (average date of the last freeze), but in 1 year out of 10 it will freeze as late as May 15. In fall it will freeze before September 26 in 1 year out of 10. Records from Ravenna indicate that the average date of the last freeze in spring in the northern part of the county is about 7 to 10 days later than at Kearney, and that the first in fall is about that much earlier.

Annual free water evaporation from shallow lakes averages about 46 inches, and approximately 76 percent of the total occurs during the 6-month period from May through October.

Relief and Drainage

Buffalo County is in the Central Nebraska Loess Hills, a part of the Central Great Plains. The general slope of the land is from west to east. The highest elevation, 2,500 feet, is in the northwestern part of the county. The lowest elevation, 1,930 feet, is in the northeastern corner where the South Loup River leaves the county.

TABLE 9.—*Temperature and precipitation*

[All data but those on snow recorded at Kearney; data on snow recorded at Grand Island in Hall County]

Month	Temperature				Precipitation				
	Average daily maximum[1]	Average daily minimum[1]	Two years in 10 will have at least 4 days with[2]—		Average monthly total[1]	One year in 10 will have—[3]		Days with 1 inch or more of snow cover[1]	Average depth of snow on days with snow cover[1]
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Equal to or less than—	Equal to or more than—		
	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Number	Inches
January	35	11	56	−9	.5	[4]	1.1	12	4
February	39	16	64	−2	.7	0.1	1.4	11	3
March	47	24	73	5	1.4	.1	2.4	7	4
April	61	37	82	25	2.4	.6	5.0	1	2
May	72	49	89	35	3.9	1.2	7.5	[5]	3
June	82	59	100	46	4.6	1.3	7.4	0	----------
July	89	64	102	55	3.3	1.0	7.3	0	----------
August	88	63	100	53	2.3	1.0	4.7	0	----------
September	78	52	95	38	2.5	.5	4.6	0	----------
October	69	40	85	26	1.2	.2	3.7	0	----------
November	51	25	70	10	.6	[4]	2.0	2	3
December	40	16	60	−3	.5	[4]	1.4	8	3
Year	63	38	[6] 103	[7] −16	23.8	17.2	32.2	41	3

[1] Based on data from 1938–67.
[2] Based on data from 1931–63.
[3] Based on data from 1949–67.
[4] Trace.
[5] Less than one-half day.
[6] Average annual maximum.
[7] Average annual minimum.

TABLE 10.—*Probabilities of last freezing temperature in spring and first in fall*[1]

[All data recorded at Kearney]

Probability	Dates for given probability and temperature				
	16° F.	20° F.	24° F.	28° F.	32° F.
Spring:					
1 year in 10 later than	April 3	April 10	April 20	May 4	May 15
2 years in 10 later than	March 29	April 5	April 15	April 28	May 10
5 years in 10 later than	March 19	March 26	April 5	April 18	April 30
Fall:					
1 year in 10 earlier than	October 31	October 26	October 17	October 6	September 26
2 years in 10 earlier than	November 5	October 31	October 22	October 11	October 1
5 years in 10 earlier than	November 16	November 9	November 1	October 21	October 11

[1] All freeze data are based on temperatures in a standard National Weather Service thermometer shelter at a height of approximately 5 feet above the ground and in a representative exposure. Lower temperatures will exist at times nearer the ground and in local areas subject to extreme air drainage.

The uplands consist of nearly level areas that are surrounded by extensive areas of steeper, dissected, rolling loess hills. The northern two-thirds of the county is mainly uplands.

The Platte is the largest and most important river in the county. It is a braided stream that ranges up to a mile in width and from 1 to 3 three feet in depth. It is often dry in the middle of the summer. The Platte River valley is about 4 miles wide in the western part of the county. At Kearney the Wood River valley and the Platte River valley join, and the combined width is 8 to 10 miles. The two rivers flow parallel to each other but do not join in Buffalo County. The stream terraces of the combined Platte and Wood River valley are broad flats that have silty soils.

The South Loup River enters the county in the northwest corner and leaves it in the northeast corner. It is deeply entrenched, and its valley is generally less than a mile wide. The soils are sandy.

An area of sandhills is east and south of Ravenna in the northeastern part of the county. This is an area of relatively young topography, and adequate surface drainage has not yet been established. Depressions that hold water are numerous.

On the bottom land along the Platte and South Loup Rivers, the water table is generally within 8 feet of the surface. On the stream terraces along the Wood, Platte, and South Loup Rivers, it is at a depth of 20 to 50 feet.

Farming

Farming is Buffalo County's biggest business. In 1964 farm products valued at more than 22 million were sold. Most of this sum is represented by the sale of grain and livestock, but a significant amount was derived from farm-related industries, among them the production of hybrid corn for seed. Production of dehydrated alfalfa is another farmer-related industry. Most alfalfa in Buffalo County is cut and hauled to mills where it is dried. Dried alfalfa meal is high in protein and is used in livestock feeds.

According to the Nebraska Agricultural Statistics of 1966, the acreages of principal crops grown in Buffalo County were as follows:

Corn, for all purposes	76,120
Grain sorghum, for all purposes	42,650
Wheat	26,820
Alfalfa	46,300
Soybeans	6,500

In 1966, 66,000 pigs were farrowed, 29,800 calves were born, and 35,000 cattle were put into feedlots.

Water Supply and Irrigation

Adequate supplies of water are available throughout Buffalo County. In the uplands, wells are 150 to 300 feet deep and the chief source of water is the Ogallala Formation. On the Platte River and on the bottom lands and stream terraces of the South Loup River, wells are 10 to 80 feet deep. Thick deposits of sand or mixed sand and gravel are the water-bearing formations. Some water is derived from the Ogallala Formation. The earliest irrigation was from the Kearney Canal. Its water right dates back to 1882. Nine thousand acres was developed under this system. In 1929 the Elm Creek Canal was organized, and 22,000 acres was irrigated by this system. This canal is no longer in use. Both canals took water from the Platte River.

Pump irrigation from streams or deep wells began about 1910 but was not widely used until about 1940. At that time a combination of high farm prices and advanced technology greatly increased the use of pump irrigation. In 1967, 130,000 acres was irrigated in Buffalo County by more than 2,000 registered wells.

Transportation and Markets

Rail transportation in Buffalo County is provided by three railroads. The main line of the Union Pacific serves Kearney, Gibbon, Shelton, Odessa, and Elm Creek. A Union Pacific branch line serves Miller, Amherst, and Riverdale and connects to the main line at Kearney. The Burlington Northern serves Ravenna.

The east-west roads in Buffalo County are Interstate 80 and U.S. 30, which serve in Elm Creek, Kearney, Odessa, Gibbon, and Shelton. Ravenna is served by Nebraska Highway 2. The north-south roads are U.S. 183 in the western part of the county and Nebraska Highways 10 and 40 in the central part. The railroads and highways provide good, fast methods of transporting grain and cattle to the principal market terminals in Omaha, Kansas City, and Chicago.

Frontier Airlines provides daily flights to Lincoln, Omaha, and Denver.

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Glossary

Alkali soils. 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 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 percentage of soil water at field capacity and the percentage at wilting point. This difference multiplied by the bulk density and divided by 100 gives a value in surface inches of water per inch of soil depth. In this survey, the classes of available water capacity for a 60-inch profile, or to a limiting soil layer, are:

Very low	0 to 3 inches
Low	3 to 6 inches
Moderate	6 to 9 inches
High	more than 9 inches

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catsteps. Narrow steps on moderately steep and steep hillsides; produced by slumping or soil slippage.

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.

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.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

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, adhere 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.

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 a low available water 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. They commonly have a moderately high water table and mottling in the upper C horizon.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes, or to loess in blankets on the surface.

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.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

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 0 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 horizons; 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.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching. The removal of soluble materials from soils or other material by percolating water.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

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.

Parent material. The disintegrated and partly weathered rock from which soil has formed.

Permeability, soil. The quality of a moist soil that enables water or air to move through it. In this survey permeability applies to that part of the soil below the Ap or equivalent layer, and above a depth of 60 inches, or above bedrock if it occurs at a depth of less than 60 inches. Classes of soil permeability in inches of water per hour are as follows:

Very slow	Less than 0.063
Slow	0.063 to 0.20
Moderately slow	0.20 to 0.63
Moderate	0.63 to 2.00
Moderately rapid	2.00 to 6.30
Rapid	6.30 to 20.0
Very rapid	20.0 or more

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

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; or contains harmful salts and has a highly alkaline reaction; or contains harmful salts and exchangeable sodium and is strongly alkaline in reaction. The salts, exchangeable sodium, and alkaline reaction occur in the soil in such location that growth of most crop plants is less than normal.

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.

Slick spots. Small areas in a field that are slick when wet because they contain excess exchangeable sodium, or alkali.

Slope. Deviation of a soil surface from the horizontal, expressed as a percentage. In this soil survey, the following slope classes are recognized:

	Percent
Nearly level	0 to 1
Very gently sloping or very gently undulating	1 to 3
Gently sloping or gently rolling	3 to 5
Sloping or undulating	5 to 11
Strongly sloping or rolling	11 to 15
Moderately steep or hilly to steep	15 to 31
Very steep	More than 31

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.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

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).

Subirrigation. Supplying of water to plants from a natural water table or from a system of underground tile lines, perforated pipe, or the like.

Subsoil. Technically, the B horizon of a soil; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Terrace (engineering). 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. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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.

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