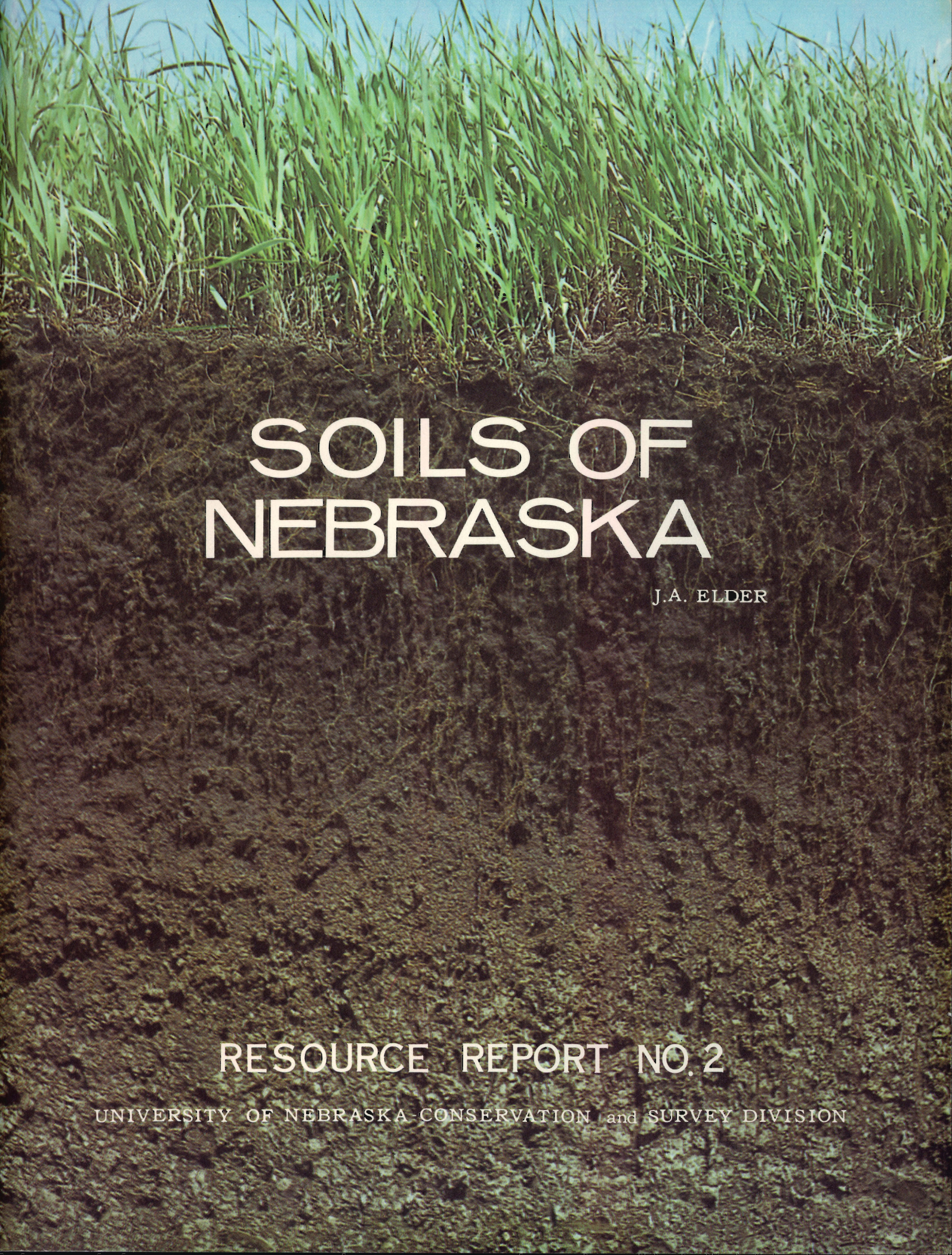

SOILS OF NEBRASKA

J.A. ELDER

RESOURCE REPORT NO. 2

UNIVERSITY OF NEBRASKA-CONSERVATION and SURVEY DIVISION

RESOURCE REPORT

NUMBER 2 MAY 1969

SOILS OF NEBRASKA

By

JOHN A. ELDER

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Publication and price lists are furnished upon request.

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Soils of Nebraska

INTRODUCTION

Nebraska's growth and development are directly related to an abundance of soils of high natural fertility and a citizenry who retain the pioneering attributes of adaptability and innovation. Large areas of the state have soils that are well suited to producing cultivated crops. Some of the soils are poorly suited to growing cultivated crops but well suited for use as grazing and hayland.

Nebraska agriculture is young in years of development and we are still attempting to correct some of the errors made in selecting and altering the land to be used for cultivated crops. More recently, the widespread development of irrigation has opened a new frontier in agricultural development, and the practices of using commercial fertilizers to enrich the soil and chemicals to control weeds and insects are now applied to large areas of our agricultural land. The effect, however, of the continued use of these chemical additives on the soil environment is not known. The knowledge and experience gained from a century of dryland farming are outmoded and we must accelerate our research and studies of the changing agricultural technology. Also, the expansion of urban and industrial areas presents problems and the promise of future problems.

The solution of these problems will require the interest and cooperation of many people. Research must study and analyze the effect of the changes in agricultural management and use of our soils. The public must be advised of the information gained from these studies. The agricultural community must recognize and attempt to minimize the problems and pitfalls associated with agricultural development. Home owners, urban planners, real estate developers, and others engaged in planning the use of nonagricultural lands and soils, all have a responsibility to their communities to recognize the potential and, in some cases, the limitations imposed by the soils on the developments and actions that are contemplated.

The information in this bulletin has been assembled for the use of those who are interested in the soils of Nebraska so that they can better understand and participate in the solution of the problems that relate to soils. The soil association map shows the distribution and extent of the soils and the text, diagrams, and charts give the characteristics, relationship, and general properties of the soils. The county soil survey reports should be consulted when more detailed information is desired. A list of the published soil survey reports appears on page 60.

FACTORS IN THE DEVELOPMENT OF NEBRASKA SOILS

The soil that develops in an area is a product of the earth materials and environment. The maps on pages 3, 4, and 5 present information on climate, relief, and the earth materials of the state. The vegetation throughout the state during the period in which the present soils developed has been almost entirely prairie grasses. The time of development for most of the soils on the stable upland sites is thought to be about 10 thousand years. The soils that are developing on flood plains are examples of soils with a minimum time of development. Each overflow shifts and alters the surface of these soils and the existing cycle of soil development is "wiped out" and another cycle begins.

Soil development is a dynamic process that is active today. It has been active in past years, and it will continue into the future. The soils that are present today are not the first soils which have occupied the Nebraska landscape. Soils were present when prehistoric animals flourished and, like those animals, are no longer present or are preserved only as "fossil soils" that have been buried by younger sediments.

IDENTIFYING SOILS

The soil characteristics chart provides information that is helpful in understanding the relationship of one soil to another. Each soil has a set of characteristics by which it can be recognized and distinguished from other soils. The soil profile, the vertical cross section of a soil, consists of several horizontal layers of soil material which differ in recognizable characteristics. The characteristics that are most easily recognized are: (1) number, arrangement, and thickness of the horizons; (2) the color of the soil in each horizon; (3) the texture (loam, silt loam, etc.); (4) the structure (the arrangement of soil particles into granules, blocks, etc.); and (5) the consistence of the soil mass (hard, soft, friable, etc.). Many factors, in addition to those already mentioned, directly or indirectly influence the appearance of the soil profile or the use and management of the soil. The study of a soil includes consideration of the drainage, salt content, alkali content, plant nutrient status, reaction (pH), organic matter content, permeability of the soil material to air and water, and other factors that may be relevant to its use and management.

THE SOIL ASSOCIATIONS

The soil association map, page 4, shows the state

divided into 31 areas. A soil association is a group of defined and named soils occurring in a geographic area. The soils occur in a regular pattern on the landscape and may be similar or quite unlike in soil characteristics. The soil association name consists of one or more of the principal soils of the area.

Most people who use the material in this publication will locate their area of interest on the soil association map, then turn to the landscape diagram of the soil association and become familiar with the soils in the area. The landscape diagrams are arranged in numerical order corresponding to the numbers of the soil association areas. Additional information about each soil will be found in the soil characteristics chart. Each soil is listed in the soil characteristics chart in alphabetical order by name. Some soil names appearing in the published soil surveys are not in use today. A list of these and the present name being used is given on page 59.

SOIL PARENT MATERIALS

The soil parent material map is a much simplified map showing broad areas of similar earth materials. With the aid of this map the reader can visualize a very generalized soil map of the state. Sandy soils will be dominant in an area of sand-earth materials, silty soils dominant in the loess area, and clayey soils dominant in the shale area. Additional information on the soil parent material of each soil is provided in the soil characteristics chart.

Nebraska soils have developed from sediments of many types deposited during several geologic periods by different geologic processes. The unconsolidated sediments range from sand and gravel to clay. The consolidated sediments include sandstone, silstone, limestone, and shale. The oldest sediments are the limestones and shales of Pennsylvanian age and the youngest are the flood-plain sediments along the present drainageways.

CLIMATE

Climatic factors directly and indirectly control soil development. Chemical and biologic processes are active factors in soil development. High temperatures speed, and low temperatures slow or stop these processes. Climate controls the type of vegetation through length of growing season, total precipitation, seasonal distribution of the precipitation, and range of temperature.

Nebraska's climate—relatively warm summers, cold winters, and moderate precipitation that is highly seasonal or periodic—is typical for an area near the center of a large continent located in a temperate zone.

The climate of the state is described as semi-arid in the western part and sub-humid in the eastern part. Greater climatic variation exists west to east across the state than from eastern Nebraska to the Atlantic coast. Usually more than three-fourths of the annual precipitation falls during the growing season, April through September. The prevailing winds are predominantly from the north in winter months and from the south from May until December. Spring winds are the strongest and the direction most variable.

THE GEOLOGIC BEDROCK

The soils and unconsolidated sediments, referred to collectively as the mantlerock, cover the consolidated rocks throughout much of the state. The geologic bedrock map shows the consolidated rocks that would be at the surface of the state if the mantlerock were removed.

The oldest bedrock that is shown on the geologic map is the interbedded limestone, shale, and fine-grained sandstone of Pennsylvanian and Permian age. Exposures are generally limited to the valley-sides of streams in the southeastern part of the state. Sogn, Labette, and Kipson soils have developed from these rocks.

The lower part of the Cretaceous-age rocks consists of sandstones, shales, and clays of the Dakota Group. Rocks of the Dakota Group are shown on the map extending from Jefferson County to Dakota County. Lancaster, Hedville, and Lanham soils have developed in materials weathered from the rocks of the Dakota Group.

The upper Cretaceous deposits are principally shales although beds of chalk, limestone, and sandstone occur within the shales. These rocks outcrop in northern Sioux and Dawes Counties, along the Republican River and its tributaries, along the Niobrara River and its tributaries in eastern Keya Paha, Boyd, Rock, Holt, and Brown Counties, throughout much of Knox and Cedar Counties, and in a broad area extending from Dixon and Dakota Counties to south-central Nebraska. Pierre, Kyle, and Lismas soils develop from the Cretaceous shales in northwestern Nebraska. Reliance and Boyd are soils developed from these shales in northeastern Nebraska.

Bedrock of Tertiary age covers the western two-thirds of the state and is either exposed or is only a short distance below the surface throughout much of the Panhandle region of Nebraska. Pine Ridge, Wildcat Ridge, the south valley-side of Pumpkin Creek, and the rock-supported valley-sides of the Platte River from Keith County to the Wyoming-Nebraska border provide many exposures of these rocks. Rosebud, Creighton, Canyon, and Tassel soils have developed in the materials of the Ogallala, Harrison, and Monroe Creek Formations, and Keota, Epping, Kadoka, Buffington, and Orella are soils developed from the materials of the White River Group.

Unconsolidated sediments of variable thickness, deposited by ice, water, and wind, mantle a consider-

able part of the state. These sediments are of fairly local origin, consisting of bedrock materials that have been reduced to clay, silt, sand, and gravel by weathering, and by the action of wind and water, transported down-gradient, and redeposited. The sands, the loess and the alluvium, therefore, are similar to the bedrock of the state in chemical and mineralogic characteristics. The glacial materials are composed of a high percentage of local materials but contain a small percentage of materials and rocks that were transported into the state.

RELIEF AND TOPOGRAPHIC REGIONS

These maps show the principal land forms within Nebraska. The entire state represents a single major land form—plains—but many of the innumerable minor land forms occur within the state. Hills, canyons, dunes, moraines, valleys, and many other features can be identified on the relief map of Nebraska. The topographic regions map shows areas in which one or more of the land forms dominate the landscape. Dunes dominate the landscape in the sandhills, bluffs and escarpments in the areas of bluffs and escarpments, alluvial plains in the valley area, etc.

Relief influences soil development through control of the moisture status of soils and the rate of natural removal of soil materials. The gradient, shape, direction, and length of slope influence the amount of moisture in the soil. Steep slopes lose an appreciable part of the annual precipitation to runoff. Convex slopes shed water and tend to be drier sites for soil development than concave slopes which lose no water as runoff and often receive water from adjoining areas. Direction of slope influences the exposure to sun (thermal radiation) and to the drying effect of prevailing winds. Length of slope plays a part in natural erosion and the amount of moisture lost to runoff.

Land surfaces seldom remain stable for long periods of time. Erosion is common on slopes and deposition common on concave slopes and in swales. Very gently sloping areas are most likely to be stable and these are the sites where the environment produces the typical or zonal soil of the area.

THE LANDSCAPE DIAGRAMS*

The similarities and differences in soils can often be related to the position of the soil in the landscape. The soil at the top of the hill is seldom like the soil at the foot of the hill. The soil in a depression resembles the soil in other depressions but is quite different from the soils on slopes. Some soils are stone-free, others are stony, gravelly or sandy. If the soil at the top of the hill is stone-free and the soil on the adjacent slope is stony, the same relationship will be true for most of the hilltops and slopes in the area. The landscape diagrams on pages 9–39 illustrate the relationships of soils, parent materials, and landscapes in the soil association areas.

*Sally L. Heald, illustrator.

THE SOIL CHARACTERISTICS CHART

This chart consists of twelve columns listing the soil name and various characteristics, qualities, uses, and interpretations that are associated with the soil. A brief explanation of each column is given to supplement the column heading that appears on the chart.

Soil Series—The soil names used in the published soil surveys are listed alphabetically. Some of these names have been used for only a few years; others have been used on the published maps for many years. The introduction of additional soils has restricted and changed the range of the soil characteristics associated with the various soils. These changes are noted below each of the soil names, and soil surveys published prior to the date given for the introduction of the soil use the former soil name.

Principal Area of Occurrence—The numbers in this column relate to the areas on the soil association map. The text accompanying the landscape diagrams provides additional explanation on the occurrence of the soils.

Physiographic Position, Slope, and Drainage—Upland, terrace, bottomland, etc. are terms indicating the position on the landscape where the soil has developed.

Parent Materials—The names in this column denote the principal earth material in which the soil developed. Some of the terms indicate mode of disposition, some texture (particle size) of the material, a few include color of the material, but in each instance the terms chosen help to define or identify the soil.

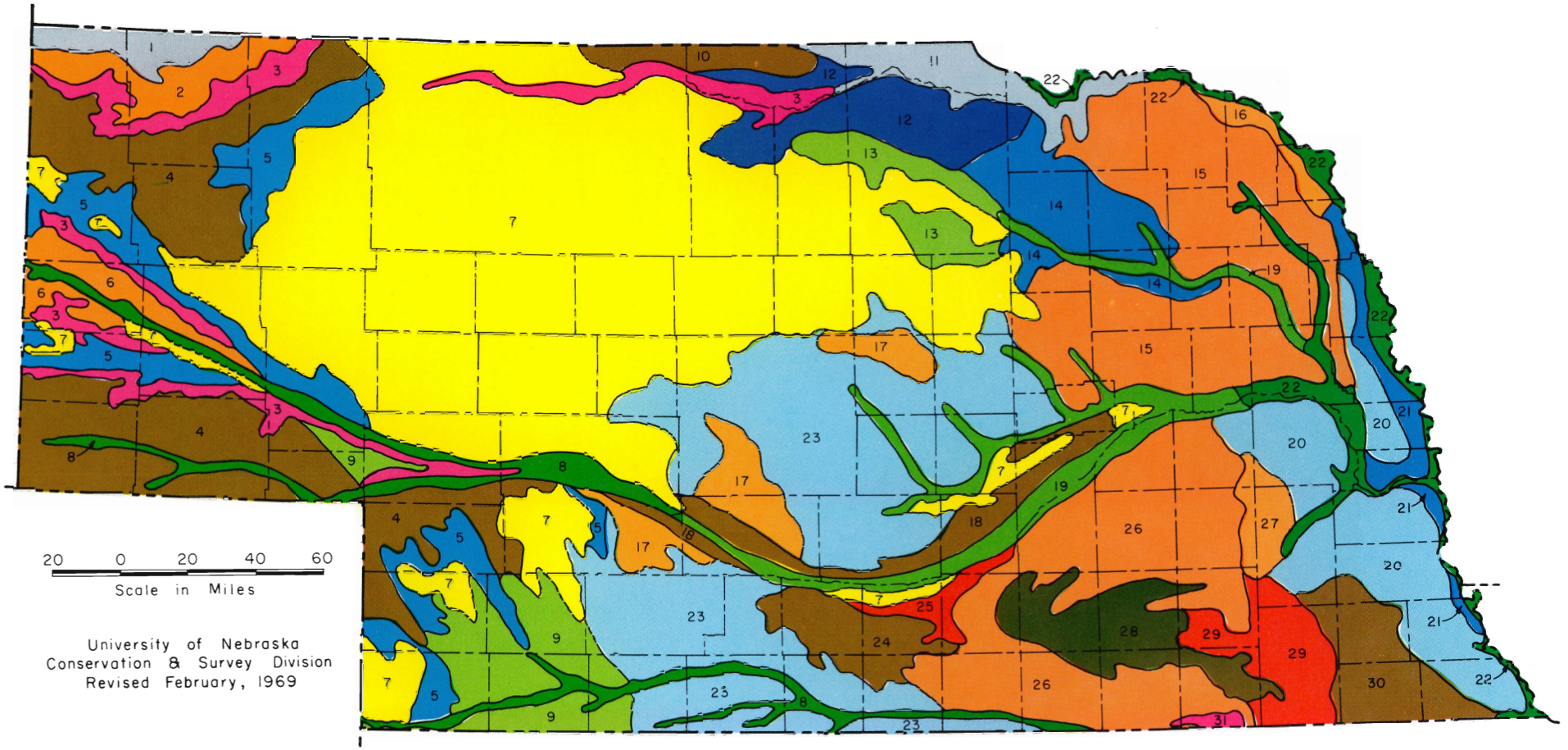
The slope is expressed in percent and is the gradient of the land surface in feet per 100 feet of horizontal distance.

Drainage symbols are shown for the bottomland soils and indicate the influence of the water table on soil drainage. The drainage symbol explanation is shown below the chart.

Depth of Root Zone—Footnote [1] explains this column. The depth of the root zone is a characteristic of the soil that is important to soil-plant-moisture relationships. Moisture storage is limited by the thickness of the loamy materials over coarse sediments or consolidated materials. The soils with less than 20 inches of loamy materials over coarse sediments of consolidated materials have insufficient depth for normal root development of most plants.

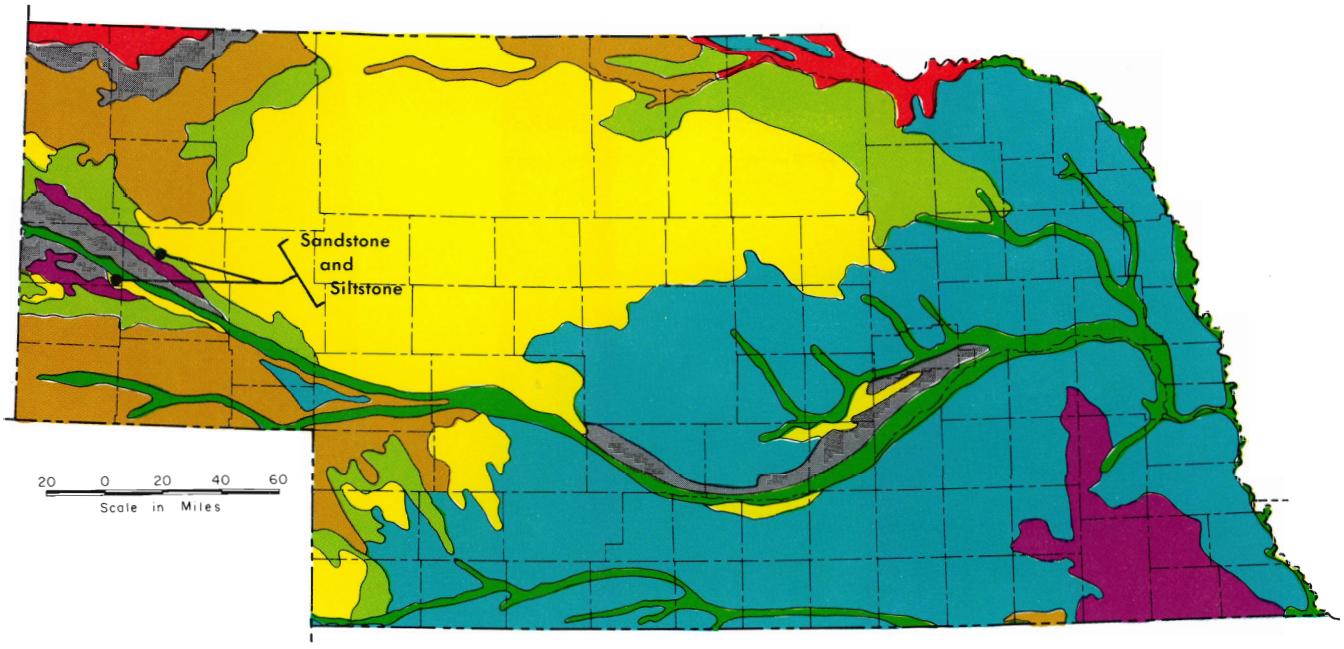
Texture of Surface Soil—The surface soil is the plow layer in cultivated land or the dark-colored surface horizons in unplowed areas. The terms in this column are the soil texture class names as used by the U.S. Department of Agriculture.

(Continued on page 8)



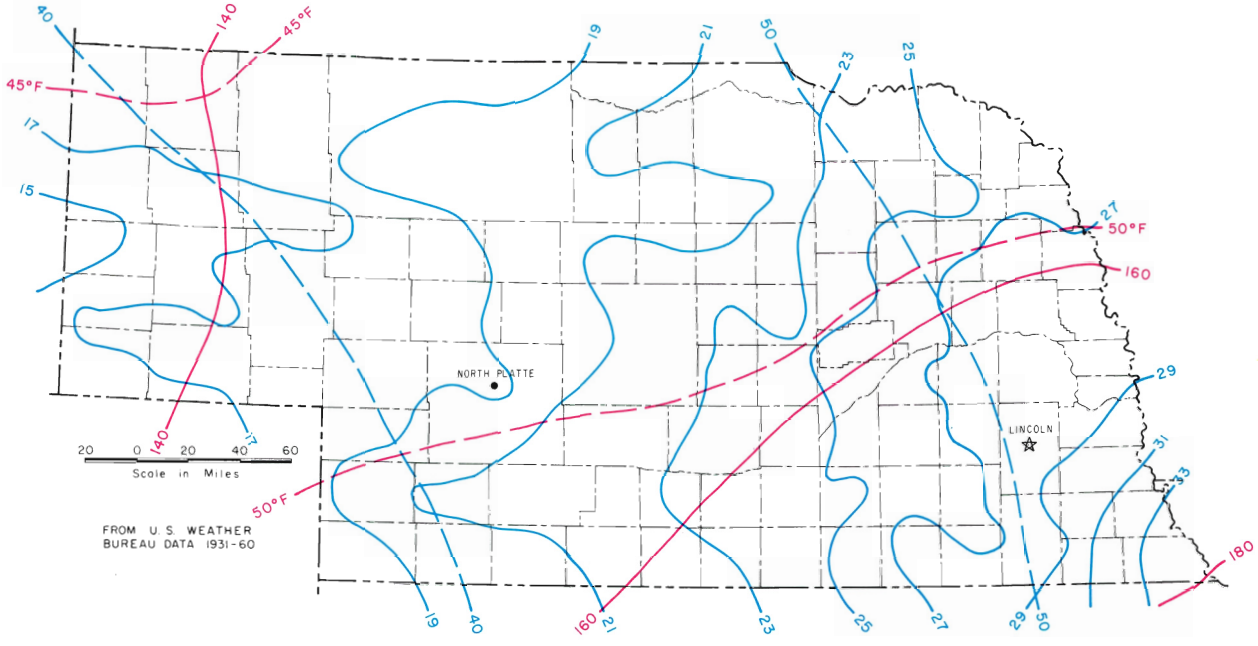
NEBRASKA SOIL ASSOCIATION MAP

1. — Pierre – Samsil
2. — Bridgeport – Keith
3. — Rough broken land
4. — Keith – Rosebud
5. — Anselmo – Keith
6. — Mitchell – Tripp
7. — Valentine – Dunday
8. — McCook – Las
9. — Keith – Colby
10. — Holt – Valentine
11. — Reliance – Boyd
12. — Thurman – Jansen
13. — Loup – Valentine
14. — Thurman – Valentine
15. — Moody – Crofton
16. — Crofton – Nora
17. — Colby – Ulysses
18. — Hall – Wood River
19. — Leshara – Platte
20. — Sharpsburg – Marshall
21. — Marshall – Monona
22. — Luton – Haynie
23. — Holdrege – Colby
24. — Holdrege – Hastings
25. — Kenesaw – Holdrege
26. — Hastings – Crete
27. — Sharpsburg – Shelby
28. — Crete – Fillmore
29. — Crete – Wymore
30. — Wymore – Pawnee
31. — Lancaster – Hedville



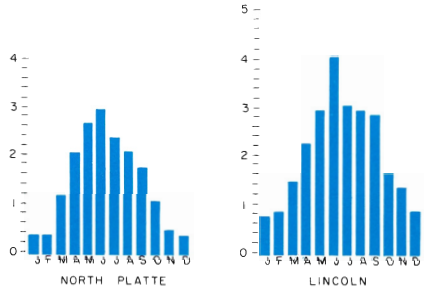
SOIL PARENT MATERIALS

SHALE
SANDSTONE
SAND AND SILT
SAND
ALLUVIUM
LOESS
LOESS AND DRIFT
LOESS AND ALLUVIUM



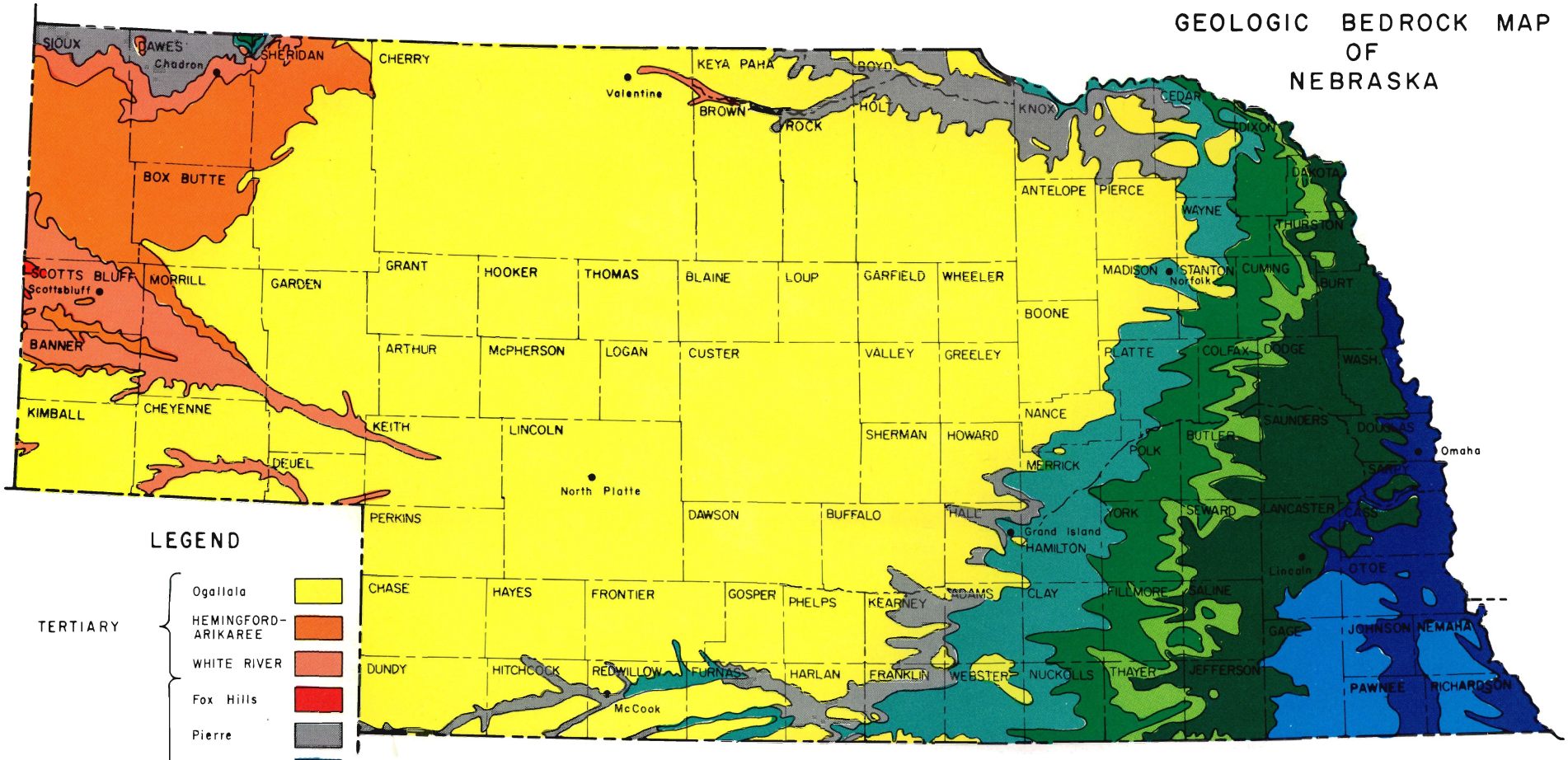
CLIMATIC DATA

MEAN ANNUAL PRECIPITATION IN INCHES
MEAN RELATIVE HUMIDITY, 12 NOON JULY
MEAN LENGTH OF FROST FREE PERIOD, DAYS
MEAN ANNUAL AIR TEMPERATURE °F



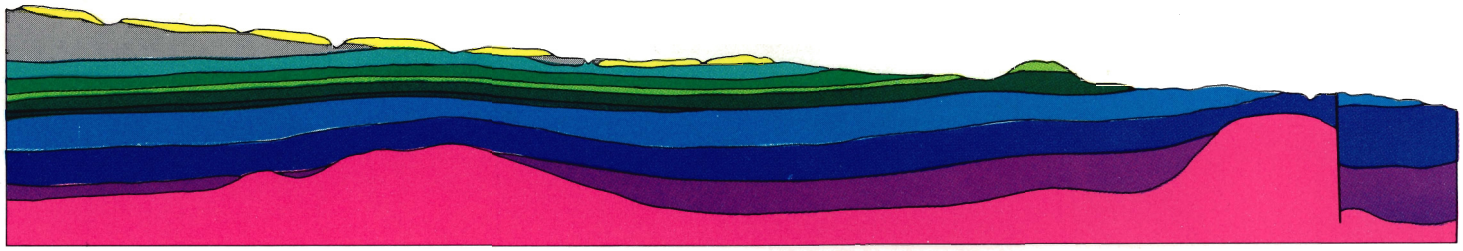
NORMAL MONTHLY TOTAL PRECIPITATION (INCHES)

GEOLOGIC BEDROCK MAP OF NEBRASKA



LEGEND

- TERTIARY
  - Ogallala
  - HEMINGFORD-ARIKAREE
  - WHITE RIVER
- CRETACEOUS
  - Fox Hills
  - Pierre
  - Niobrara
  - Carlile
  - Greenhorn-Graneros
  - DAKOTA
- JURASSIC
- PERMIAN
- PENNSYLVANIAN
- MISSISSIPPIAN, DEVONIAN, SILURIAN, ORDOVICIAN, CAMBRIAN
- PRECAMBRIAN

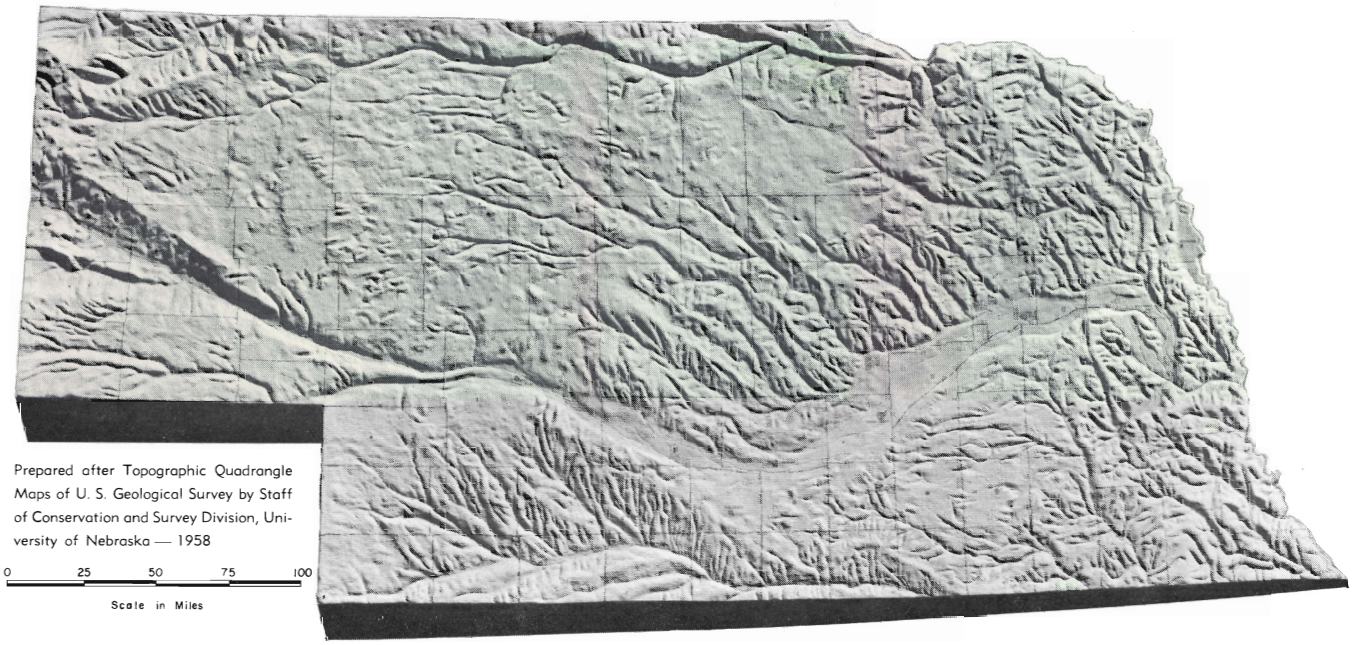


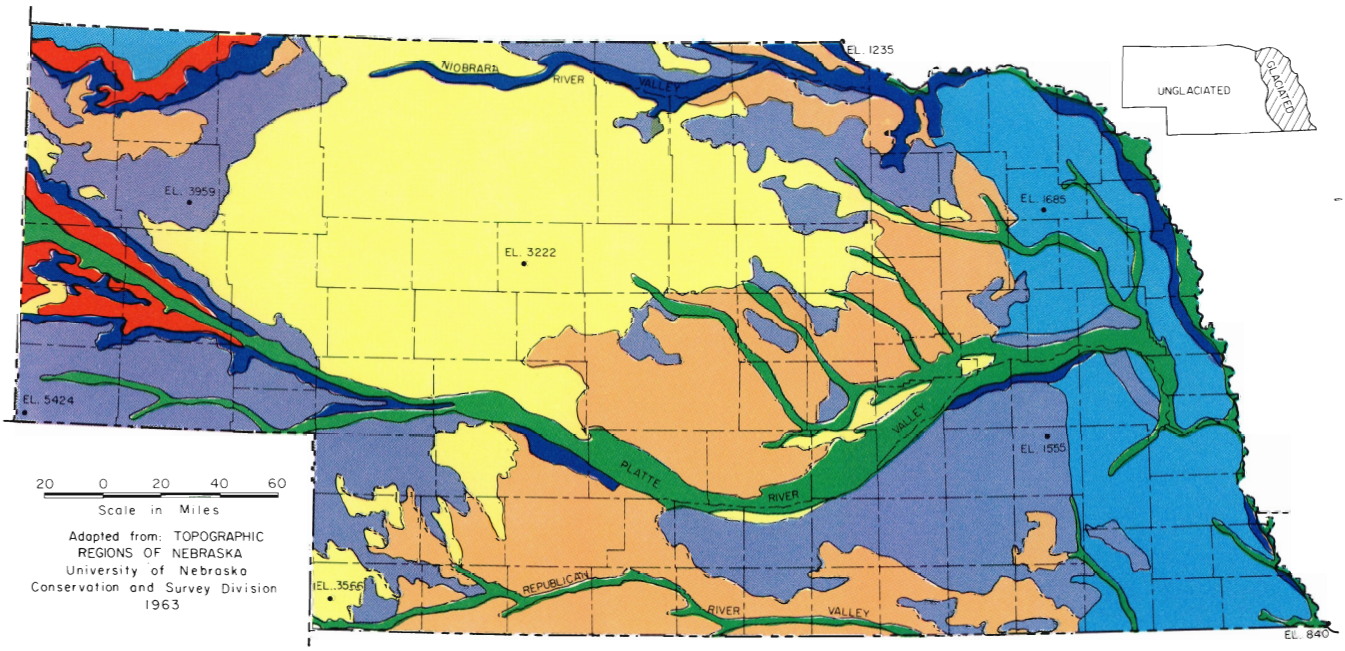
Cross Section Along Southern Nebraska Border

20 0 20 40 60
Scale in Miles

University of Nebraska
Conservation & Survey Division
Nebraska Geological Survey
1969

RELIEF MAP OF NEBRASKA





TOPOGRAPHIC REGIONS OF NEBRASKA

VALLEYS
DISSECTED PLAINS
ROLLING HILLS
VALLEY-SIDE SLOPES
PLAINS
SANDHILLS
BLUFFS & ESCARPMENTS
•EL. ELEVATIONS

(Continued from page 3)

Reaction of the Surface Soil—The reaction of the soil is an evaluation of the acidity or alkalinity of the soil material. The relationship of the term used in this column to the acidity or alkalinity of the soil expressed as pH is shown in footnote [2], below the chart.

Texture of Subsoil—The subsoil is that part of the soil that is below the surface soil in which roots normally grow. The terms used are the soil texture class names as used by the U.S. Department of Agriculture.

Permeability to Air and Water—The terms used in this column are an expression of the rate of movement of air and water through the soil material.

Suitability for Irrigation—The soils are assigned a numerical rating of 1, 2, or 3. The 1 rating is limited to soils with water-holding capacity, permeability, depth of root zone, drainage, and slope characteristics which are favorable to irrigation. The 1 rating applies only to areas of the soil with slopes of less than 3 percent. The 2 rating indicates a soil in which most of the characteristics are favorable to irrigation but one or more of the characteristics will limit crop yields, increase development costs or increase management costs. A 3 rating indicates the soil is poorly suited to the production of cultivated crops under irrigation management.

Some soils occur on nearly level to rolling slopes. If rated 1 on slopes of less than 3 percent gradient the same soil on a more sloping area would be rated 2 or 3 but only a single rating is given for each soil. Hastings soils are an example. The soil characteristics chart indicates that Hastings soils occur on 1 to 11 percent slopes. This should suggest to the reader that although Hastings soils are rated 1 in the chart, not all Hastings soils can meet the slope requirement for a 1 rating, and that Hastings soils on slopes greater than 3 percent are not rated in the chart.

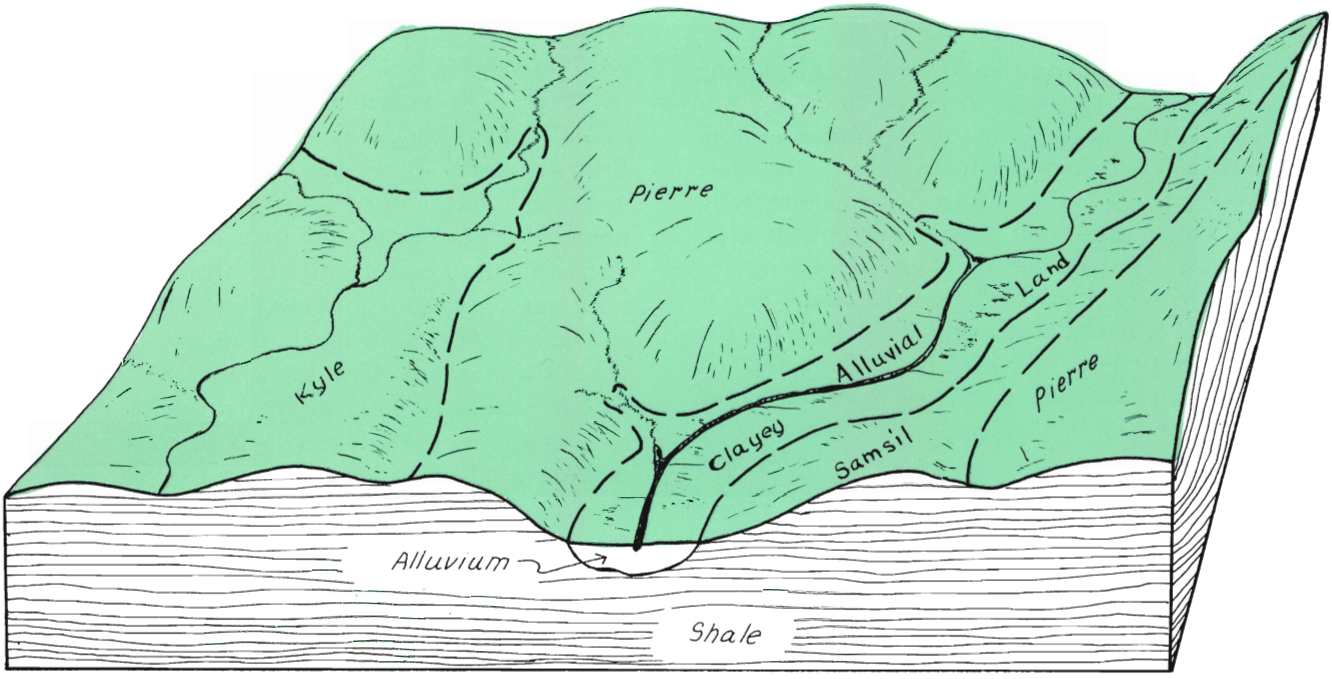
Available Water—The numbers in this column denote the inches of water in the soil available to plants when the soil is wetted to field capacity. Soils with low available water storage can supply water to a rapidly growing crop for a short time, but precipitation or irrigation must replenish the water in the soil frequently to sustain the crop.

Principal Crops—The crops listed in this column are the crops that are usually grown on areas of the soil but other adapted crops are often grown in preference to the crop listed.

Yield Rating—Two subcolumns are shown—IRRIG. (Irrigated Management) and DRY (Dryland Management). If no rating is shown, the crop is not grown or it is poorly adapted to the soil or type of management practices.

The yield ratings are an estimate of the production potential of the soils under good management for the crops shown in the Principal Crops column. A soil producing 35 bushels per acre of corn, under dryland management, is assigned an "L" (low) rating although the soil might produce the highest corn yield of any soil in the area. The ratings "L" (low), "M" (medium) and "H" (high) are related to production of grain and forage in the following table:

Rating	L	M	H
Corn and grain sorghum—bu/ac			
Irrigated	Less than 60	60–110	110+
Dryland	" " 40	40– 80	80+
Wheat—bu/ac			
Dryland	" " 20	20– 30	30+
Alfalfa—T/ac air dry wt.	" " 3	3– 5	5+
Grass—T/ac air dry wt.	" " 1	1– 2	2+



SOIL ASSOCIATION AREA 1
PIERRE-SAMSIL

The landscape consists of rolling hills with smooth slopes and broad swale-like drainageways. There are no trees in the upland areas and very few farm or ranch headquarters. Roads cross the area at infrequent intervals and unimproved trails extend from these to provide access where needed. Water for domestic use and livestock is limited to precipitation caught and stored in cisterns and stock water ponds. Wells within the area yield a very limited quantity of highly mineralized water.

Pierre, Kyle, and Samsil are the upland soils developed in the gray shale of the Pierre Formation. All have clay surface and subsoils but differ in the thickness of the soil material over the relatively unweathered shale. Samsil is a shallow soil over clay shale; Kyle is deep over shale; and Pierre moderately deep.

The soils on the terrace and bottomland positions are weakly developed with moderately dark surface horizons and clay or silty clay subsoils. Most soils are calcareous throughout and some are saline in the lower horizons.

Native grasses are the principal crop in the area and are used for grazing. The grazing season is limited by the availability of water in the stock water ponds. Wheat is grown on cultivated areas but the acreage is small. Neither the soils, the slopes, nor the water supply are favorable for developing irrigation.

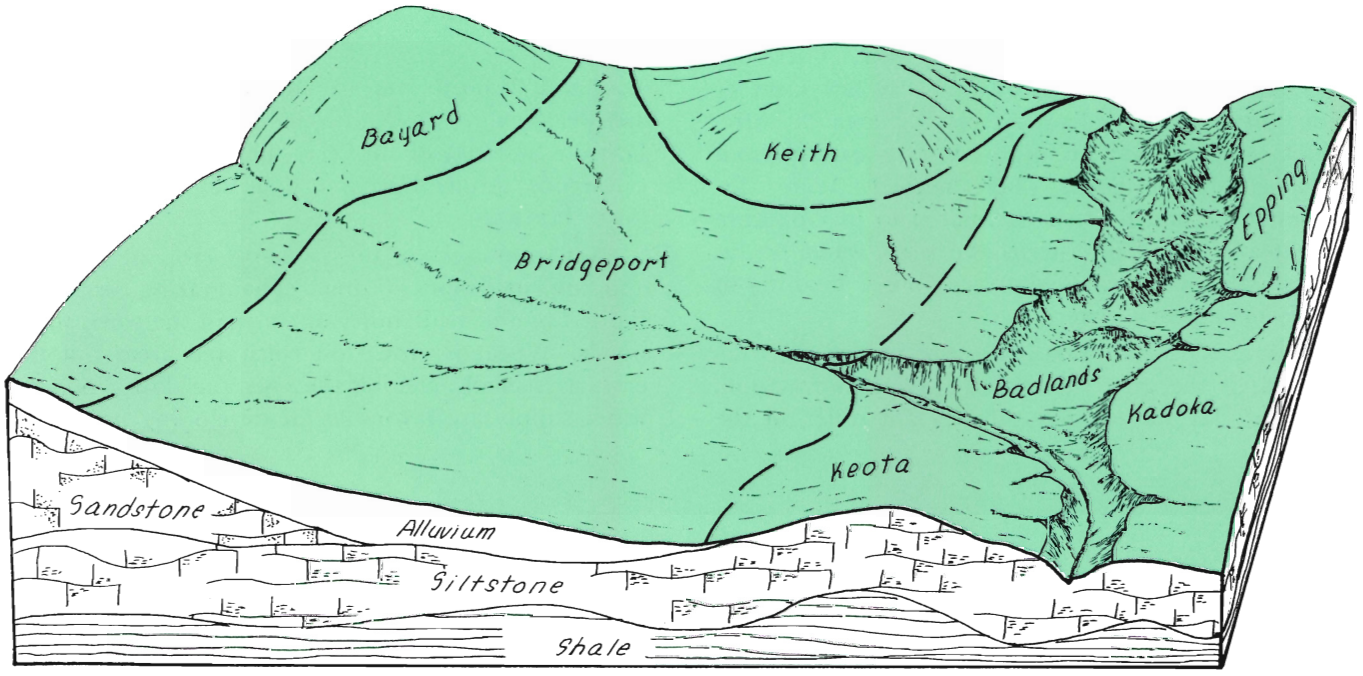
SOIL ASSOCIATION AREA 2
BRIDGEPORT-KEITH

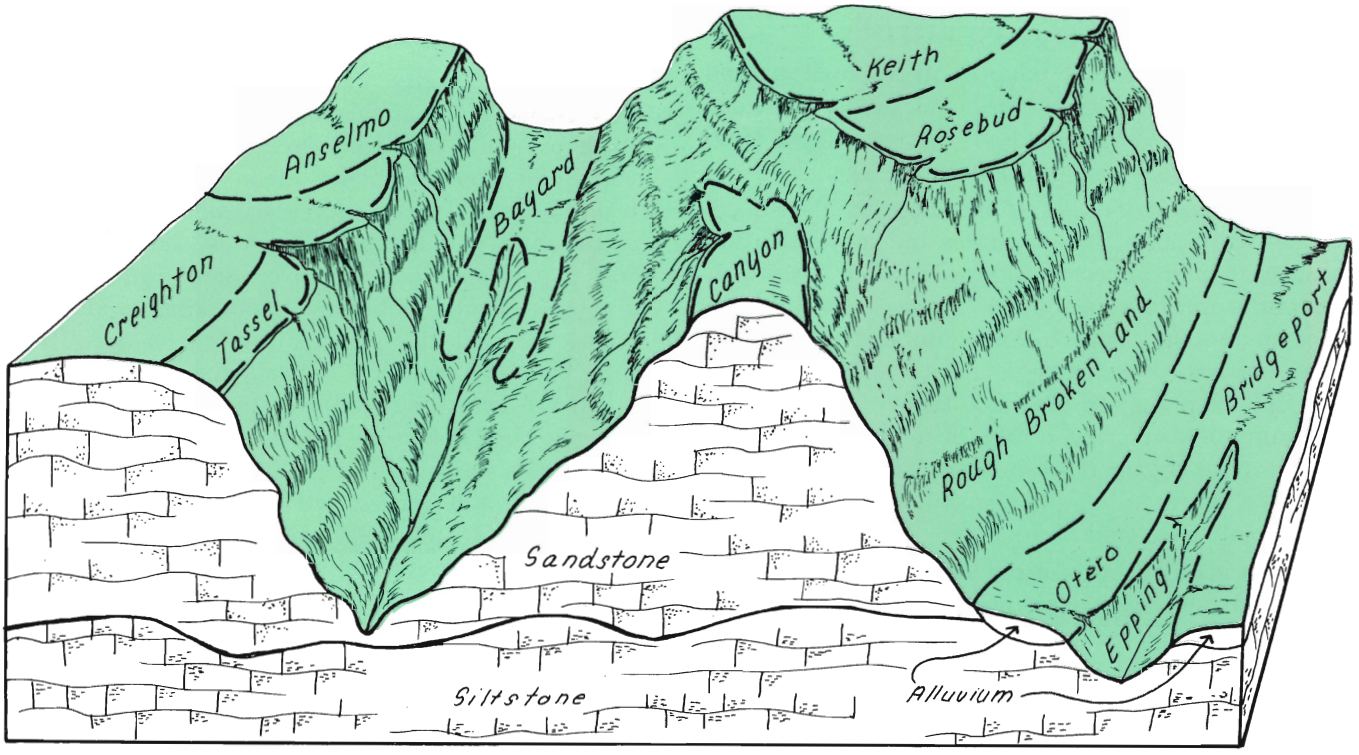
The soils of this association developed on long slopes that sweep downward from the foot of steep escarpments, becoming flatter as the distance from the escarpment increases. Bedrock, principally Brule siltstone, lies beneath the unconsolidated slope wash, loess, and eolian sands that mantle much of the area. Sandstone of Tertiary age outcrops on the escarpments, and erosional material from the sandstone is the principal material from which the soils on the footslope position have developed. Drainageways are narrow and well defined on the slopes nearest the escarpments and end in alluvial fans on the gently sloping stream terraces or continue across the terraces to a major stream.

Bayard and Otero soils have sandy loam subsoils and developed on footslope positions. Both are weakly developed soils with the Otero soil having a slightly lighter colored and thinner surface horizon than the Bayard soil. Bridgeport soils have developed on similar slopes and have silt loam or loam subsoils. Keith and Keith-like soils developed from loess, and Anselmo, Valentine, and Dwyer soils have loamy sand or sand subsoils and thin surface horizons. Dwyer soils are calcareous from the surface or near the surface throughout the profile but Valentine is leached of lime carbonate. Anselmo has a sandy loam subsoil as do Bayard and Otero but grades into eolian sand below the subsoil and both the surface and the subsoil horizons are leached of lime carbonate.

Mitchell, Keota, and Epping have silt loam or loam subsoils and developed in materials derived from the Brule siltstone. These soils differ chiefly in the thickness of the unconsolidated material overlying the siltstone. The siltstone is more than 40 inches below the surface in the Mitchell soils, 20–40 inches below the surface in Keota soils, and less than 20 inches, usually less than 10 inches, in the Epping soils. All are calcareous from the surface downward. Buffington and Kadoka developed from materials containing slightly more clay and have silty clay loam subsoils. The Badlands areas are sites where erosion has prevented the development of soils. The siltstone has been carved by erosion into miniature buttes and escarpments with sparse or no vegetation on the eroding slopes. The Badlands areas are not extensive but are a prominent landform in the area of occurrence.

Cultivated crops are grown on a considerable part of this area with the areas of steep slopes and shallow soils remaining in grass that is used for grazing. The principal cultivated crop under dryland management is wheat and under irrigated management corn, sugar beets and dry beans are grown. Trees are not native to the area and very few have been introduced.





SOIL ASSOCIATION AREA 3
ROUGH BROKEN LAND

These are the scenic areas of western Nebraska. The rock outcrops on steep and, in places, nearly vertical slopes, and the numerous ridges, buttes and canyons, each with its individual topographic peculiarity, are in sharp contrast to the rolling grass-covered plains.

Canyon and Tassel soils have developed where 10 to 20 inches of unconsolidated earth material mantles the sandstone. Tassel soils developed in sandy loam and loamy sand materials, and they contain more sand than the Canyon soils. Bayard, Otero, and Bridgeport soils have developed in materials washed from the slopes onto the footslopes. Bayard and Otero have sandy loam subsoils and Bridgeport soils have loam, very fine sandy loam, or silt loam subsoils. Otero soils have lighter colored surface horizons than Bayard soils.

Grass is the dominant vegetation in these areas although pine and cedar trees are a conspicuous part of the landscape. Beef cattle graze the grassed areas and the pine trees furnish some post timber.

SOIL ASSOCIATION AREA 4
KEITH-ROSEBUD

These soils have developed on a broad upland plain in materials derived from calcareous sandstone of Tertiary or early Pleistocene age, and loess, loess-like silt, and eolian sand of Pleistocene age.

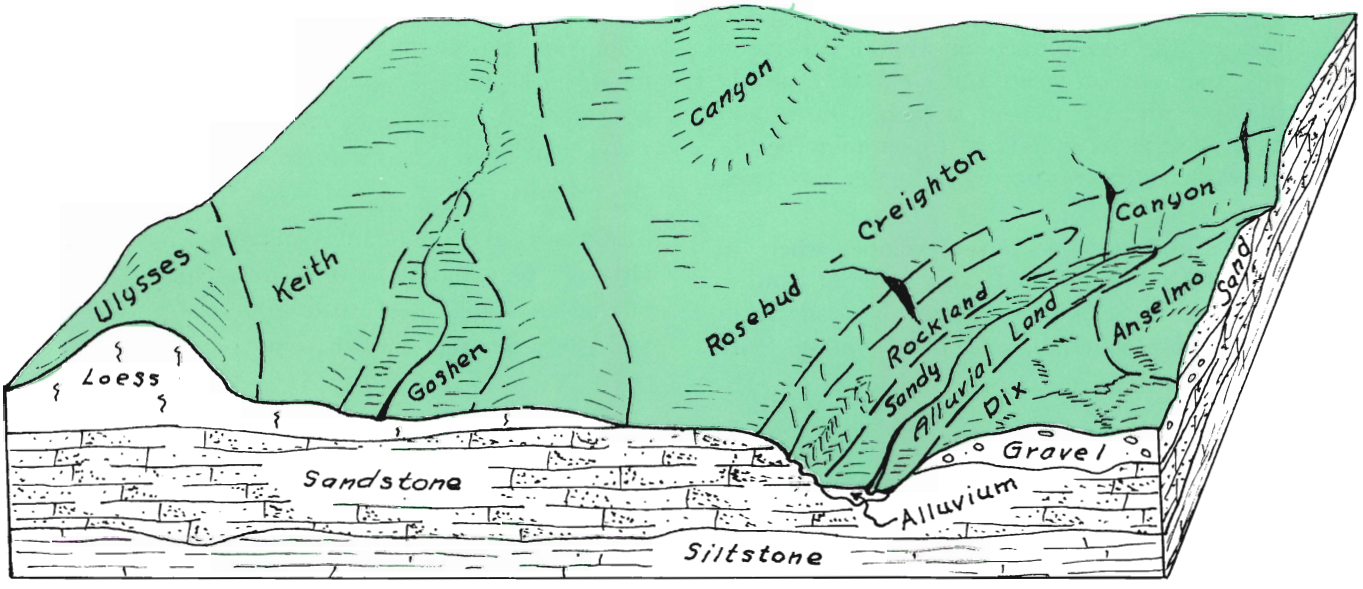
The surface drainage is incompletely developed, consisting of many shallow drains and swales that are somewhat interconnected and drain into a basin with no outlet, or into steepsided drainageways that are incised into the bedrock. Small isolated buttes with level tops and rounded knolls rise 20 to 50 feet above the upland plain. In places, a layer of rock that is resistant to weathering results in a nearly flat landform several square miles in size. The general landform is a gently rolling plain with low rounded knolls and broad swales and basins.

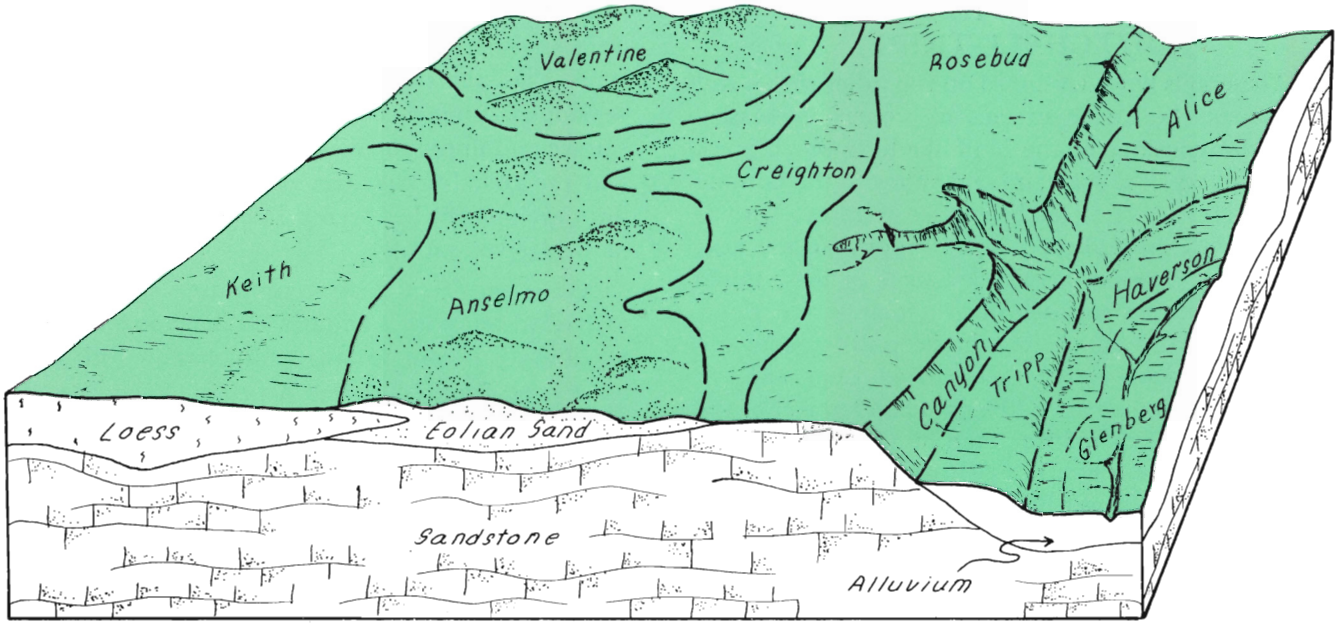
Loess mantles much of the area but mixing of the loess and underlying rock materials by rodents and insects has altered the loess that is less than 40 inches in thickness to the extent that it is similar to the materials derived from the bedrock. Rosebud, Creighton, Canyon, and Tassel soils have developed in the materials derived from the bedrock.

Keith, Richfield, Dawes, Ulysses, and Colby soils have developed where the loess thickness exceeds 40 inches. Keith, Richfield, and Dawes have developed on the nearly level and sloping areas. Ulysses soils have developed on the rolling slopes and Colby soils have developed on the steep slopes. Goshen soils developed on footslopes and in broad basins.

Anselmo, Dunday, Valentine, and Dwyer soils have developed where eolian sand is more than 40 inches thick over the bedrock. Creighton soils developed where the sand thickness is 20 to 40 inches over the bedrock, and Tassel soil developed where the thickness of the sand over the bedrock is less than 20 inches. Soil parent materials of gravelly-sandy alluvium, in some places quite cobbly, are somewhat localized in occurrence and the principal soils developed from these materials are Dix, Chappell, and Altvan. Altvan soils have loam or clay loam subsoils that grade to gravelly sand below 40 inches. Chappell soils have sandy loam subsoils that grade to gravelly sand between 20 and 40 inches, and Dix soils have less than 20 inches of loamy soil material over gravelly sand, gravel, or cobbly gravel.

Throughout the Keith-Rosebud association the soils on steep slopes and the soils with sand or gravel subsoils are best suited for native grasses used for rangeland. Wheat is the principal cultivated crop and moderate to high yields of wheat are obtained under summer fallow management. Keith, Richfield, Goshen, Rosebud, and Creighton soils are well suited to irrigation management, but irrigation is not widespread, being limited by the availability of water. The principal crops produced under irrigation are corn, drybeans, alfalfa, and forage sorghum.





SOIL ASSOCIATION AREA 5
ANSELMO-KEITH

These are transition areas of sandy soils and soils developed in loess or in residual materials derived from bedrock. There has been much mixing and sorting of the materials by wind and many of the soils that are present are atypical of the various soil series used to characterize the soils. Usually the landscape is hummocky or undulating with evidence of much reworking of the material by the wind. A silt dune may be only a short distance from a sand dune, or a dune-like landform may be part eolian sand and part silt. The soils on flats or swales may be developed in loess, eolian sand, or in residuum from bedrock.

The drainage pattern is poorly defined and incomplete. Most of the precipitation enters the soil and the small amount of runoff collects in swales or on low-lying flats where it soon enters the soil or evaporates.

Anselmo soils are the principal soils in these areas. Valentine and Dunday soils are the associated soils that developed in very sandy materials. Creighton, Rosebud, or Canyon soils have developed where the bedrock is near the surface. Keith and Ulysses soils or variants of these soils have developed in loess and loess-like materials. The acreage of bottomland soils in these areas is small and only occasionally is there an area of wet soils due to the watertable being near the surface. Ovina, Loup or Gannett are the sandy and very sandy soils that developed in the areas having a shallow watertable. Where streams from adjacent areas cross the Anselmo-Keith areas Tripp, Alice, Chappell, and Cheyenne are the principal soils on terrace positions. Haverson, Glenberg, and Las are the principal soils on the bottomland sites.

Sorghum, corn, rye, and alfalfa are the principal cultivated crops. Native grasses grow on the non-cultivated areas and are used for grazing. Roads are infrequent and poorly maintained. Trees are not native to these areas but some shelterbelts and windbreaks have been planted and survive.

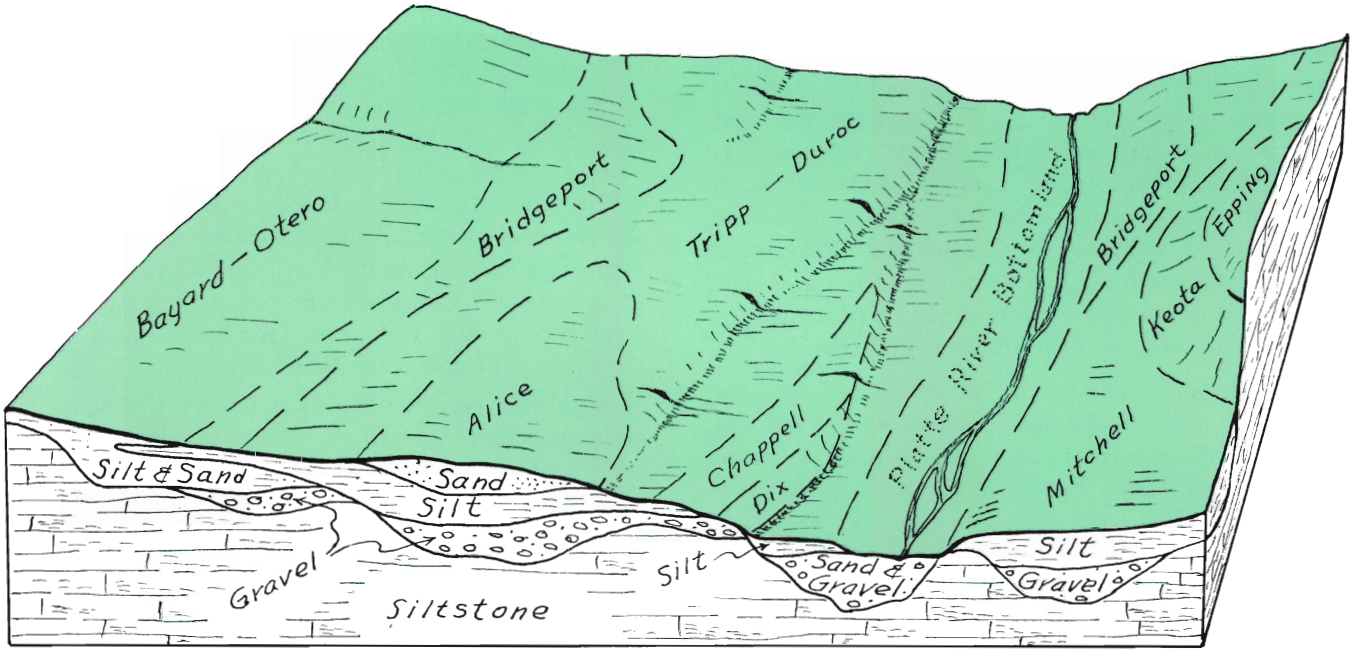
SOIL ASSOCIATION AREA 6
MITCHELL-TRIPP

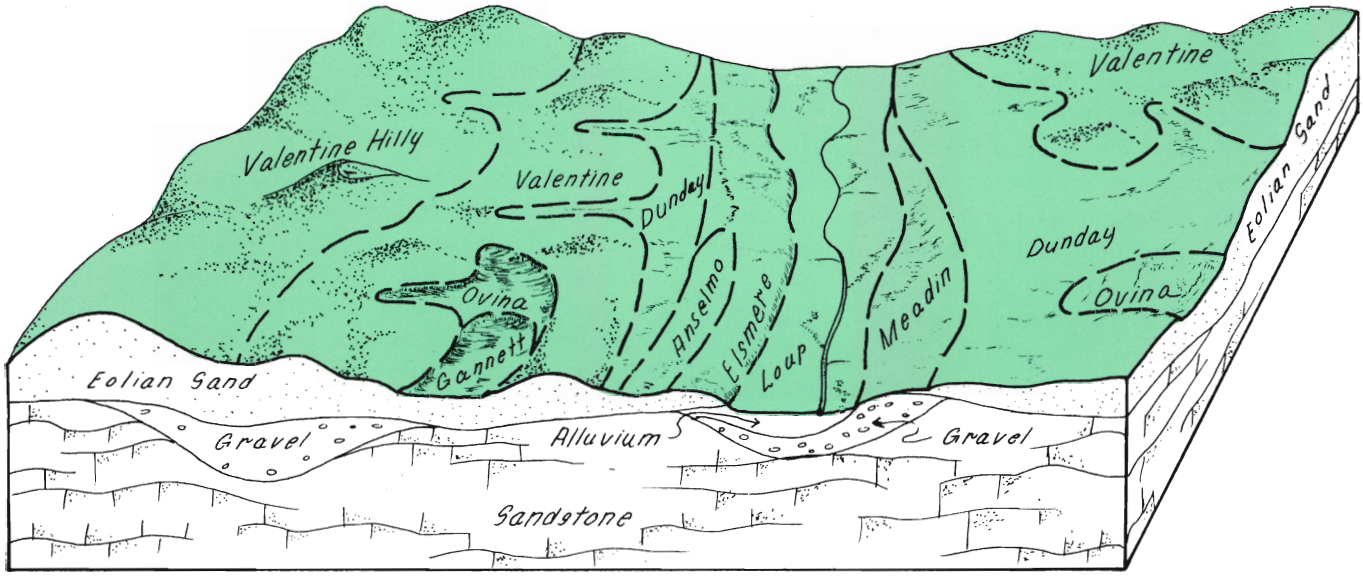
These soils have developed on the valley slopes and terraces of the major streams of western Nebraska. From the footslope of the bluff-like hills which mark the boundary of the upland and valley to the bottomlands there is a series of bench-like terraces. Each is marked by a short abrupt slope dropping to the next lower level. Erosion has beveled some of these slopes and blended the benches into a long gentle slope. Earth materials washed from the steep valley sides and adjacent uplands have been carried onto and, in places, across the terraces. The sand and gravel of the terrace fills is exposed on some of the slopes which mark the edge of the terraces. Brule siltstone is at the surface in many places throughout the area.

The principal soils developed on the gently sloping terrace levels are Alice, Duroc, and Tripp; on the long sloping areas, Bridgeport and Bayard; on areas where the Brule siltstone outcrops, Mitchell and Keota; and on the gravelly areas, Chappell and Dix. Alice and Bayard are soils with sandy loam subsoils. Tripp, Bridgeport, Mitchell, and Keota have silt loam or loam subsoils and Chappell and Dix soils consist of loamy materials over gravel and coarse sand. Alice and Tripp soils have developed on sites which are more stable than the slopes where Bayard and Bridgeport developed. Lime carbonate has been leached from the surface and upper subsoil in the Alice and Tripp soils and the color or the structure or both suggest that soil development has been greater than in the Bayard or Bridgeport soils.

Other soils in this association are: Otero, similar to Bayard but with a thinner surface horizon; Janise, a saline-alkali soil; Epping soils, shallow soils developed over Brule siltstone; Anselmo, Valentine, and Dwyer soils that have developed in eolian sands; and Cheyenne soils developed in mixed alluvium with loam and clay subsoils and gravelly substratum at 20 to 40 inches beneath the surface.

The principal cultivated crop grown under dryland management is wheat. Irrigation is widespread and corn, sugar beets, drybeans, potatoes, and alfalfa are grown. The noncultivated areas are in native grass and used for grazing. Trees were not native to the area and most of the trees which have been planted are in farmstead windbreaks.





SOIL ASSOCIATION AREA 7
VALENTINE-DUNDAY

This group of soils developed in the sandhills area of Nebraska. The landscape is a monotonous succession of dunes and swales with some narrow elongated dry valleys, scattered shallow lakes and infrequent streams. The dunes are stabilized by grass vegetation and the soils have dark-colored surface horizons. The height of the dunes ranges from a few feet to more than 200 feet with the high dunes having hilly side slopes and the low dunes having smooth gentle slopes. The high dunes frequently form long ridges which extend for several miles and parallel similar ridges. Between the ridges there are long narrow valleys that do not have a stream channel but often have small watertable lakes with wetlands between the lakes.

The soils absorb precipitation rapidly and there is essentially no runoff. A considerable amount of the precipitation passes through the soil and substratum to the watertable and shallow groundwater lakes. Soils with the watertable within the root zone of the grasses occur throughout the area.

Valentine soils have thin dark-colored surface horizons and sand or loamy sand subsoils. Valentine soils are so extensive in this soil association that they are often the only soils present in an area of several square miles although the slopes may range from slightly undulating to hilly. Dunday soils have developed in some of the well drained swales and on gentle slopes. Elsmere soils are similar to Dunday soils but are somewhat poorly drained, and Loup soils are the poorly drained soils.

Anselmo, Ortello, Ovina, and Gannett soils contain more silt and clay than Valentine soils. Anselmo and Ortello soils are well drained with sandy loam subsoils, Ovina somewhat poorly drained with sandy loam subsoil, and Gannett soils are poorly drained with sandy clay loam, sandy loam or loam subsoil. The soils developed on gravelly stream terraces are Meadin, O'Neill, Simeon, Chappell, and Cheyenne. Silty soils on well drained terrace positions are Tripp and Hord soils. Other soils of the association are those developed in the Tertiary-age sandstone—Rosebud, Canyon and Creighton—but these are of minor extent and local occurrence.

The cultivated acreage is small, localized along the stream valleys and on the less sandy soils. The areas of somewhat poorly drained and poorly drained soils are used for hayland and the rolling hills and dry valleys are grazing land.

SOIL ASSOCIATION AREA 8
McCOOK-LAS

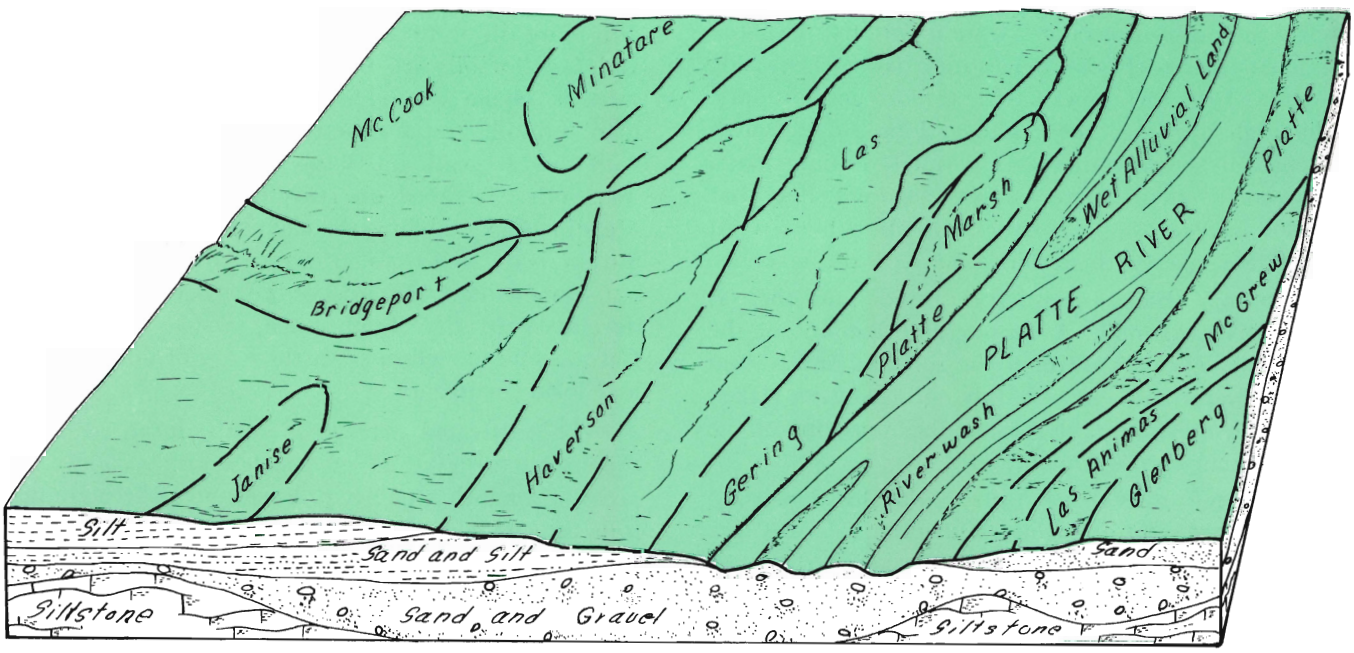
This group of soils developed on the bottomlands of the larger streams in western Nebraska, principally the Platte River. The streams have shallow channels with low banks and numerous wetland areas along the channels. Flooding of the bottomlands by overbank flow is infrequent and of short duration. The surface drainage is slow but in most cases adequate. The watertable is relatively shallow and it is the principal cause of wetness and the source of the salts present in saline or alkaline soils. Seepage from higher lying irrigated areas is responsible for wetness in some areas.

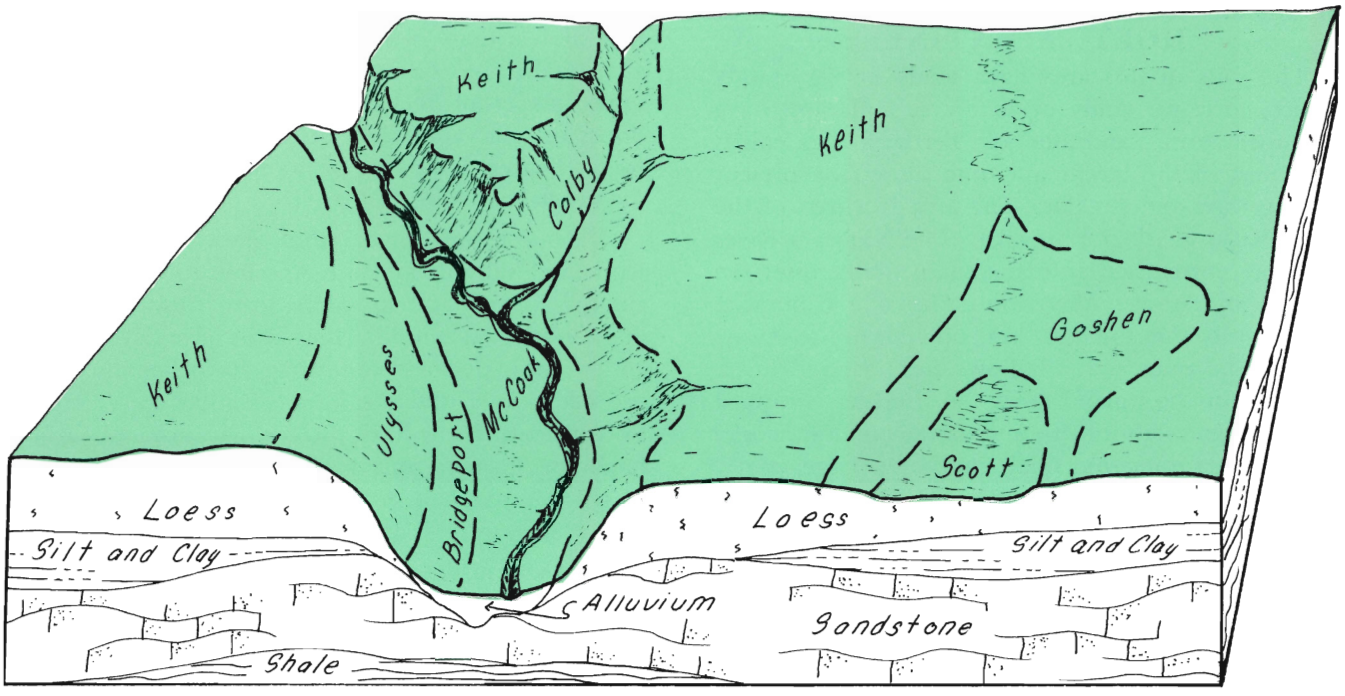
Minatare soils are strongly alkaline soils with clayey subsoils and dark-colored surface soils. McCook, Haverson, Janise, Las, and Gering soils have loam, silt loam or very fine sandy loam subsoils. McCook soils have darker colored surface horizons than Haverson soils. Janise soils have light-colored surface horizons and strongly alkaline surface and subsoils. Las and Gering soils are somewhat poorly drained. Gering differs from Las in thickness of the loamy materials over the coarse-textured alluvium—Las 40 inches or more, Gering 20–40 inches.

Glenberg, Las Animas, and McGrew soils have sandy loam subsoils. Glenberg is well drained, Las Animas and McGrew somewhat poorly drained. The depth to coarse alluvium is greater than 40 inches in Las Animas soils and 20 to 40 inches in McGrew soils.

Platte soils are shallow poorly drained soils with dark-colored surface horizons that grade to sand and coarse sand between 10 and 20 inches below the surface. Wet alluvial land is poorly drained, slightly to strongly saline with a fair to good cover of salt-tolerant grasses. Marsh areas are very poorly drained with aquatic vegetation and some coarse grasses and are too wet to be of value for grazing or hayland. Riverwash areas consist of frequently flooded sandbars and former stream channels which are frequently flooded. Vegetation, if present, is annual weeds or willow and cottonwood seedlings.

The valley sides are usually bluff-like and much of the flood plain alluvium consists of local materials from the valley sides, terrace edges, and the adjacent uplands. The soils differ in texture of the subsoils, depth to the watertable, thickness of the loamy materials overlying the coarse alluvium, and the accumulation of saline or alkali salts but for the most part the differences are not striking. The soils are calcareous in the surface and subsoil horizons.





SOIL ASSOCIATION AREA 9
KEITH-COLBY

The soils of this association developed from loess under grassland vegetation on a broad, partially dissected plain. Long canyon-like drainageways extend from the major streams to near the divides leaving flattopped remnants of the plain between the drainageways. Numerous undrained swales and small undrained depressions are present on the remnants of the plain but only occasionally is there sufficient runoff to cause ponding in the depressions. Many of the upland swales drain into the canyon-like drainageways and flash flooding is frequent in these narrow drainageways.

Keith, Richfield, and Kuma soils have developed on the nearly level and gentle upland slopes, Ulysses soils on rolling slopes, and Colby soils on the steep slopes. Bridgeport soils are the principal soils developed on the footslope positions, canyon floors, and on alluvial fans. Goshen soils have developed in upland swales, basins, and drainageways from dark-colored slope wash sediments.

Richfield soils have more clayey subsoils than Keith and Kuma soils. Kuma soils differ from Keith soils in having dark-colored surface horizons which are more than 20 inches thick. Ulysses soils are intermediate to Keith and Colby soils in thickness of horizons, depth to which lime carbonate is leached, and clay content of the subsoil. Goshen soils have darker colored subsoils than the associated soils.

The soils on the bottomlands have developed in silty and sandy alluvium. McCook, Haverson, and Las have silt loam and loam subsoils; Glenberg, sandy loam subsoils; Bankard and Las Animas have loamy sand subsoils; and Barney and Platte are shallow soils with less than 20 inches of loamy soil material over the gravelly substrata.

Hord, Duroc, and Tripp are the principal soils on the terrace positions and Bridgeport is the predominant soil developed on alluvial fans.

Wheat is the principal cultivated crop grown on the upland and terrace positions. Feed grains and alfalfa are grown on the bottomland soils and corn and grain sorghum are the principal irrigated crops. About 45 percent of the area is in native grass and is grazed, principally by beef cattle. Trees are not native to the area but cottonwood, elm, and willow are common along the permanently flowing streams.

SOIL ASSOCIATION AREA 10
HOLT-VALENTINE

The soils in this area have sandy or very sandy surface horizons, sandy or loamy subsoils and have developed from sandstone of Tertiary age, eolian sand, and in the recent alluvium along the present drainageways and streams. The area is a part of the High Plains physiographic area. The Niobrara River is deeply entrenched into the plain and crosses the area in an east-west direction. The side tributaries extend into the uplands but upland drainageways are, for the most part, shallow and poorly defined. Throughout the upland areas the wind has whipped the sandy materials into an undulating and hummocky relief leaving numerous small, and a few large, nearly level basin-like areas. The valley sides along the major streams are steep with the slopes broken by frequent outcrops of the sandstone bedrock. Weakly consolidated silt and clay of Miocene age, Brule Formation, outcrops on the lower valley sides in the eastern part of the area.

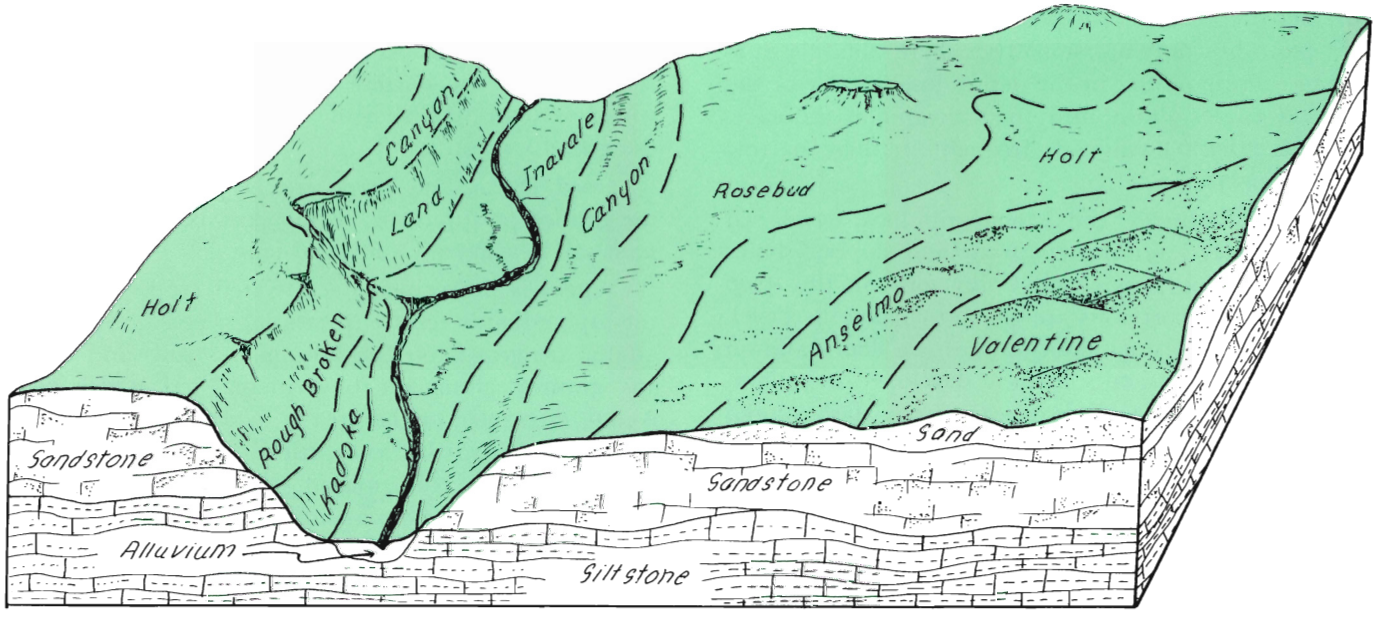
The principal upland soils are Holt, Rosebud, and Canyon developed from the Tertiary-age sandstone with Anselmo and Valentine soils developed from eolian sands being of lesser extent but scattered throughout the area.

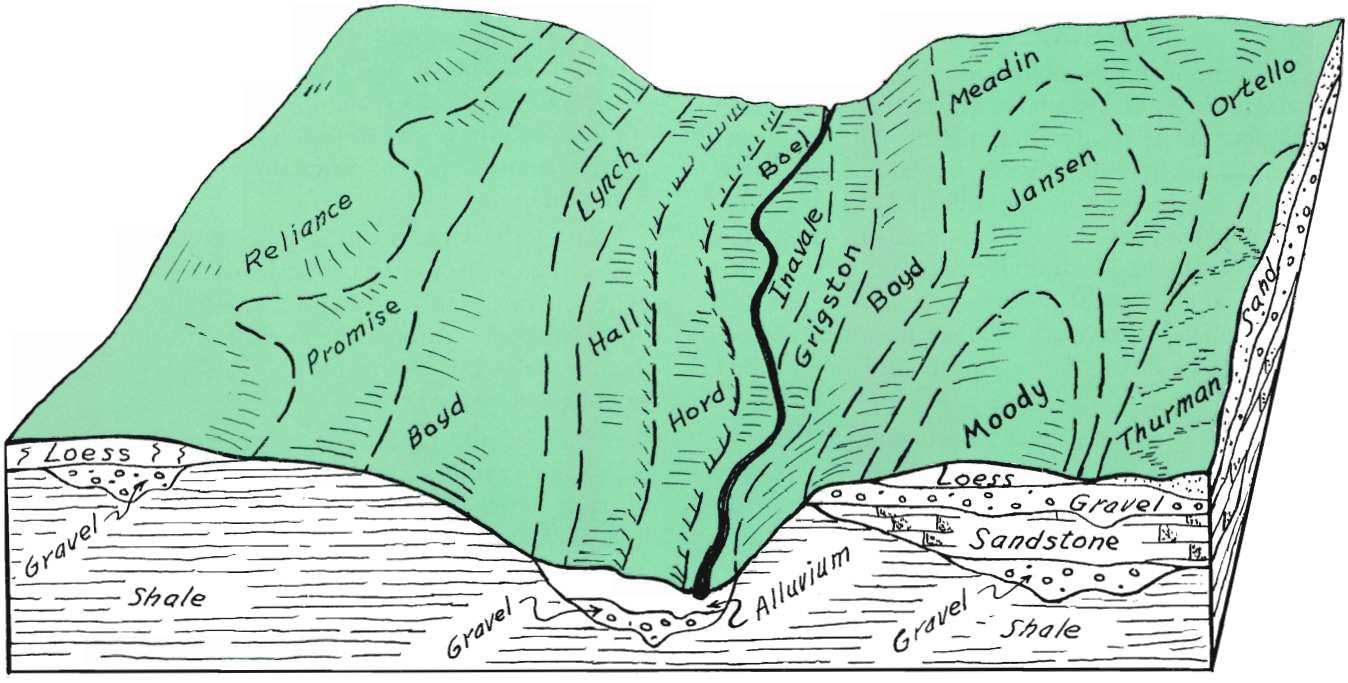
Holt soils have dark-colored sandy surface horizons and sandy loam subsoils; Rosebud soils, loam or silt loam subsoils; and both soils grade into partly weathered sandstone 20 to 40 inches below the surface. Canyon soils are shallow soils with the underlying rock at less than 20 inches beneath the surface and are usually on rolling and steep slopes or on the upper slopes of rock-cored knolls. The very steep slopes on the valley sides of the larger streams are a rough broken land type with numerous outcrops of the sandstone bedrock.

Valentine soils have a thin, dark surface horizon with sand subsoils and the Anselmo soils have dark-colored loamy sand or sandy loam surface horizons and sandy loam subsoils. Both soils have developed in eolian sands that are more than 40 inches thick over the bedrock. Dunday soils are similar to Valentine soils in texture but have thicker, dark-colored surface horizons. Elsmere soils are somewhat poorly drained with loamy sand or sand subsoil and Ovina soils are somewhat poorly drained with sandy loam subsoils.

The soils of the bottomlands are, for the most part, sandy and very sandy soils. Inavale, Cass, Sarpy, and Loup are the principal soils. Cass soils are well drained with sandy loam subsoils; Inavale and Sarpy soils have loamy sand subsoils; and Loup soils are poorly drained with sand or loamy sand subsoils. The bottomlands occur in small elongated strips bordering the larger streams and they are cuultivated where the size of the area and drainage conditions permit.

Most of the area is in native grass and used for grazing. The cultivated crops are corn, wheat, and forage sorghum. Trees are limited to the valley sides and bottomlands.





SOIL ASSOCIATION AREA 11
RELIANCE- BOYD

This association area is a part of the High Plains physiographic area that has been deeply dissected by the Niobrara River and its tributaries and by minor tributaries of the Missouri River. The divides between the drainageways are nearly level to rolling and the valley sides are steeply sloping.

Loess and loess-like material are present on some of the smoother slopes and Reliance and Moody soils have developed in these materials. Other divides are capped by gravelly-sandy materials and a thin mantle of loess. Jansen soils have developed where the loess is 20 to 40 inches thick over the gravelly-sandy material and Meadin soils have developed in the gravelly-sandy material. Ortello or Thurman soils have developed in sandy materials that have been reworked by wind. In the western part of the area, Holt soils have developed from sandstone of Tertiary age.

Pierre shale lies beneath the sandstone and unconsolidated materials mantling the divides and is exposed throughout much of the eastern part of the area. Promise and Boyd soils have developed from the dark-colored shales and Lynch is a tentative soil name for the soils developed from light-colored shale of the Pierre Formation. Niobrara chalk rock is the oldest geologic material exposed in the area and is present on nearly vertical bluffs along the Missouri River.

The valleys are deeply entrenched with a narrow strip of bottomland on either side of the stream channel and there are narrow discontinuous areas of terrace remnants between the bottomland and the steep valley sides. Hall is the moderately clayey soil on the terrace position; Hord contains less clay and more silt; and Blendon and Ortello are the soils with sandy loam subsoils. All are well drained with dark-colored surface soils.

Grigston is the silty soil on the well drained and moderately well drained bottomland positions; Boel soils have sandy loam subsoils; Inavale soils have loamy sand subsoils. The somewhat poorly drained bottomland soils are Wann and Alda with sandy loam subsoils, Leshara with silt loam or loam subsoil, and Lamo with silty clay loam subsoil.

About 60 percent of the area is in native grass and used for grazing. Approximately one-half of the grassed areas are on steeply sloping land bordering the larger drainageways. The remainder of the grassed area is on rolling slopes, very sandy or gravelly soils, and small areas adjacent to farmsteads. Cultivated crops are grown throughout the area on both uplands and valley soils including the clayey soils. Corn, grain sorghum, and oats are the principal cultivated crops. A very small acreage is irrigated.

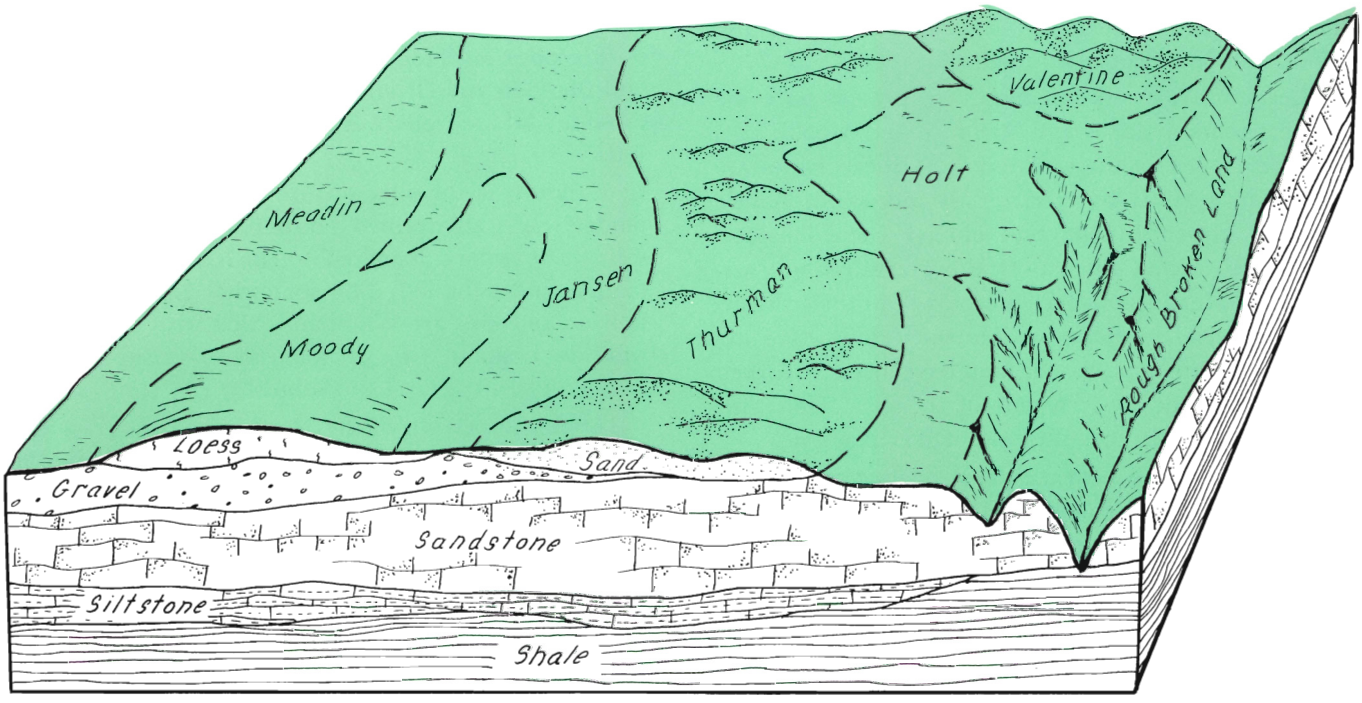
SOIL ASSOCIATION AREA 12
THURMAN-JANSEN

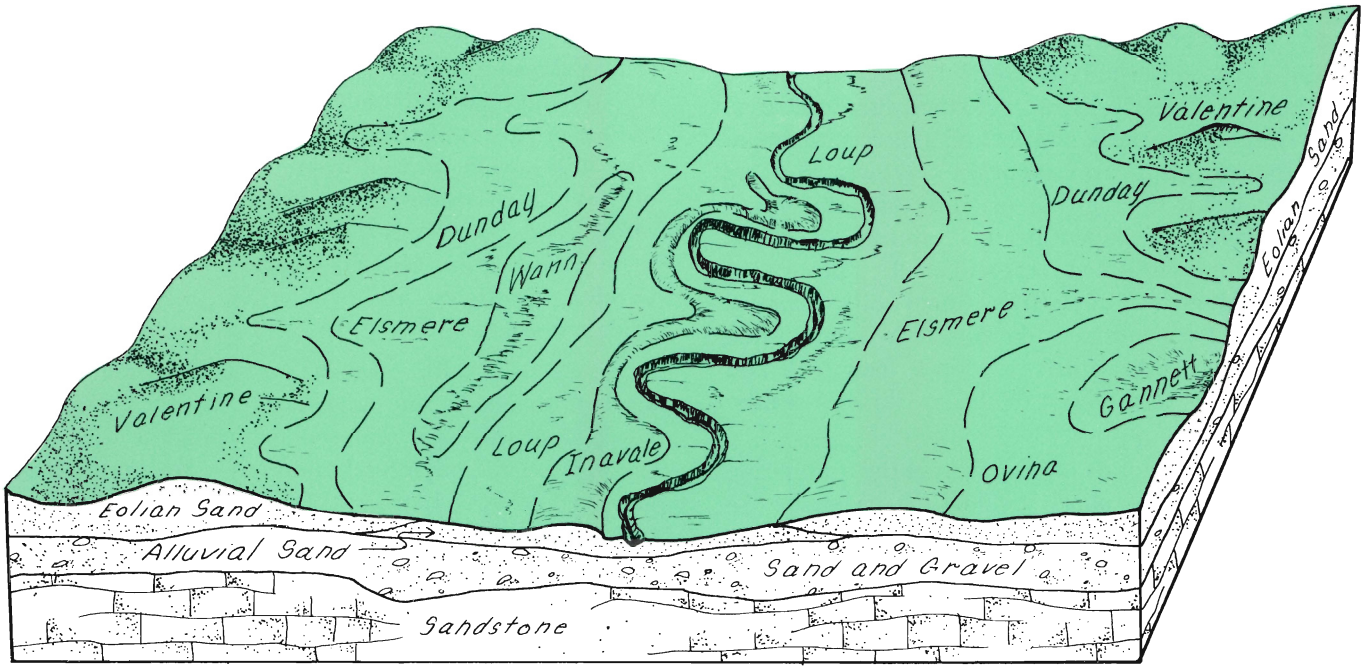
The soils of this area have, for the most part, sandy surface horizons and sandy or gravelly subsoils. They developed on an undulating plain which has been incised at infrequent intervals by canyon-like drainageways. The bedrock is sandstone of Tertiary age and soils have developed in this material on the slopes adjacent to the major drainageways and at some sites in the uplands. Part of the area is a series of old high terraces which are covered by sandy or gravelly water-laid sediments resting at varying depths on the bedrock.

The sandy materials have been whipped by the wind into low rolling hummocks but locally there are nearly level areas and these are gravelly rather than sandy. Loess and loess-like material mantle the gravelly-sandy material in parts of the area. Holdrege, Hord, and Moody soils developed where the loess mantle is more than 40 inches thick. The dark-colored surface horizons of Hord soils are more than 20 inches thick; in Moody and Holdrege, less than 20 inches thick. Holdrege soils have grayish-brown-colored subsoils and Moody soils brown-colored subsoils. The depth to lime carbonate is greater in Moody soils than in Holdrege soils. Thurman, Valentine, and Dunday soils have developed in the deep sandy materials. Meadin soils have developed in gravelly-sandy materials where the loess mantle is thin or absent, and Jansen soils have developed where the loess mantle ranges from 20 to 40 inches thick over the gravelly-sandy material.

All of the soils in the area developed under grass vegetation and the surface horizons are dark-colored. The soils with sandy and gravelly textures allow water to move freely through the subsoil and the lime carbonate is leached to greater depths than in the more silty and clayey soils.

The agricultural use is general farming with emphasis on beef cattle to make use of the considerable acreage of grassland. The areas of Valentine soils, the steep and broken slopes along the larger drainageways, and the shallow soils over gravel, Meadin soils, are in native grasses used for grazing. Until recent years cultivated crops were grown with varying success under dryland management. The development of irrigation has increased and stabilized agricultural production in the area. Corn is the principal cultivated crop grown under dryland management and on the irrigated farms.





SOIL ASSOCIATION AREA 13
LOUP-VALENTINE

This is a broad, flat, low-lying area known locally as "the hay flats." The relief over large areas does not exceed a few feet except where isolated outliers of the sandhills rise 20 to 50 feet above the surrounding "flats." The watertable on the flat areas is seldom more than 4 to 6 feet below the land surface in the summer and fall and, during the spring, rises to near the surface, frequently forming shallow lakes in the low-lying sites. As soon as the plants start growth, usually in April, the watertable gradually drops and by midsummer the soil is no longer waterlogged and a luxuriant growth of native grasses is thriving under subirrigated conditions.

The area has the general appearance of a sandy bottomland. There are a few small, low-gradient, permanently flowing streams. Surface drainage is very slow and most of the precipitation enters the soil. Marshes and shallow lakes are characteristic features of the landscape but the total acreage of these is not large.

The soils on the broad flats are similar to the sandy, wet lands in the sandhills. Loup, Gannett, Elsmere, Ovina, Wann, and Inavale are the principal soils. Valentine and Dunday are the principal soils in the areas where the sands have been blown into dune-like hills. There are very few silty or clayey soils in this area but throughout the area there are frequently silty and sometimes rather clayey materials at 2 to 4 feet below the surface. These usually occur in a relatively thin layer, less than 2 feet in thickness, in what appears to have been the drainageways and swales in a former landsurface.

Loup and Gannett are poorly drained soils. Elsmere, Ovina, and Wann soils are somewhat poorly drained, and Inavale soils are well drained. Marsh areas have water at or near the surface throughout the year. Loup and Elsmere soils have sand or loamy sand subsoils; Inavale, loamy sand subsoils; Wann and Ovina, sandy loam subsoils; and Gannett, sandy clay loam or sandy loam subsoil. Wann soils developed in alluvial materials and contain coarse sand grains and gravel while Ovina soils developed in eolian sand.

Nearly all of this area is in permanent vegetation. Rushes and sedges dominate the wet sites, and the native grasses, which are cut for hay or grazed, are predominant on the drier sites. Bluegrass was introduced into the area from feed supplies brought in by settlers and under some management practices becomes predominant and the yield of hay is considerably reduced. Cottonwood and willow were brought in by settlers and continue to grow and spread throughout the area.

SOIL ASSOCIATION AREA 14
THURMAN-VALENTINE

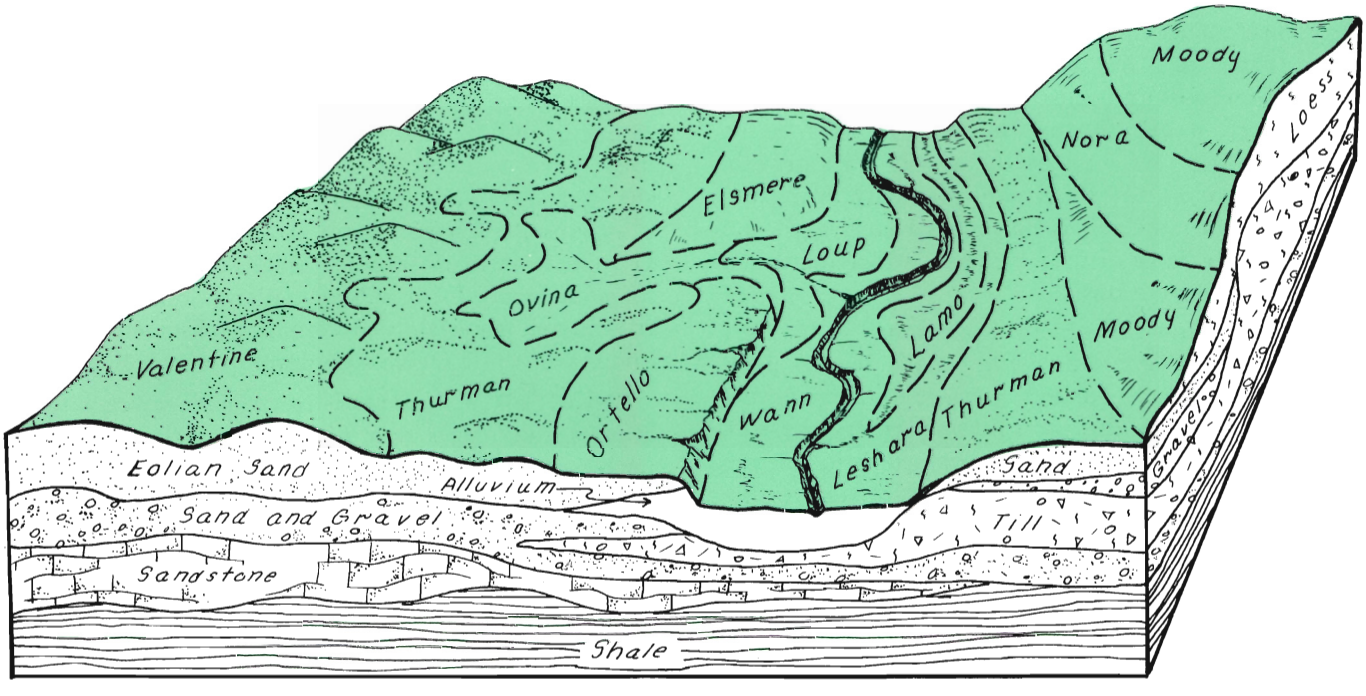
This is a border area between the sandhills to the west and the loess hills of the Moody-Crofton area. Soils common to the sandhills and those common to the Moody-Crofton area occur in this area and are intermingled with a group of soils that are transitional, having developed from a mixture of eolian sand and silt or stratified loess and sand. Throughout much of the area of these transitional soils, the sand mantles the loess and loess-like silts. The sand mantle may be a few inches thick or several feet thick and may be similar to the sand of the sandhills or a mixture of sand and silt.

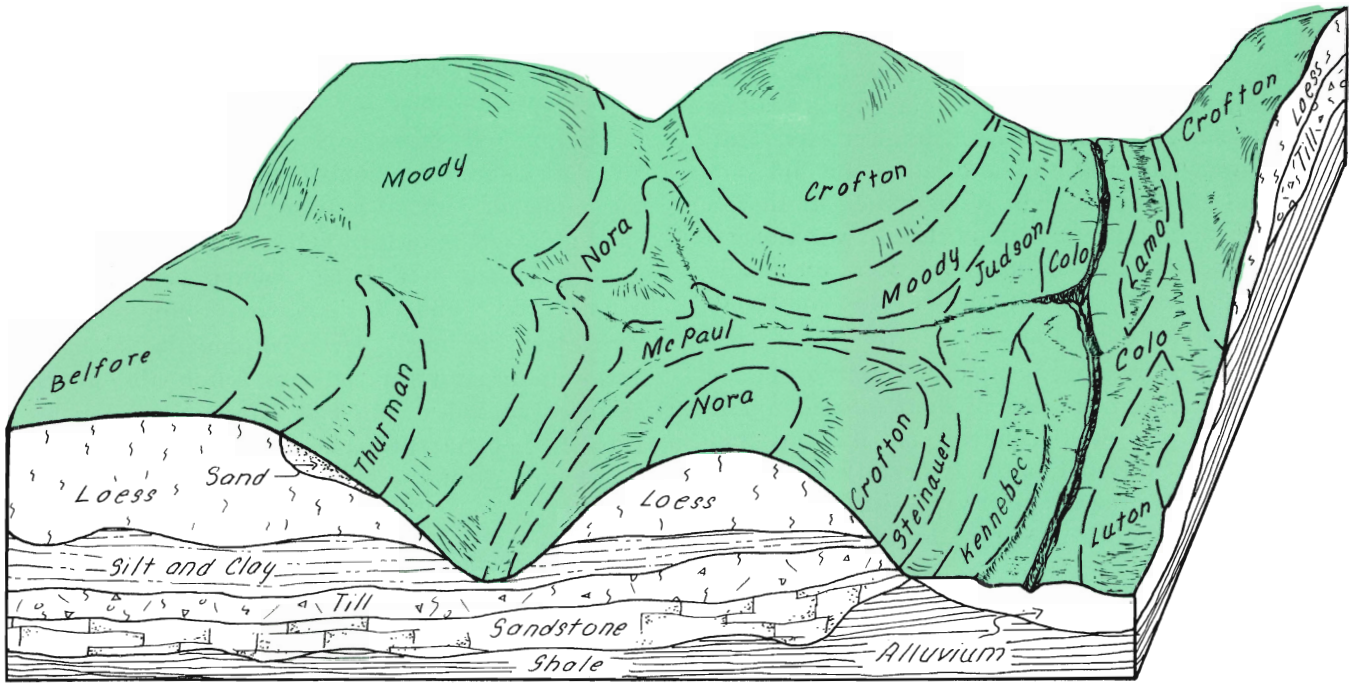
The areas of sandy soils have gently undulating slopes with shallow, poorly defined drainageways. In contrast are the areas of silty soils with long rolling slopes and well defined drainageways.

Moody, Nora, and Crofton soils have developed in loess where little or no sand has been deposited on the loess or mixed with the loess. Thurman, Ortello, and Loretto soils have developed in the areas where there is mixing of the sand and loess. Thurman soils have loamy sand subsoils; Ortello, sandy loam subsoils; and Loretto, loam subsoils. Thurman and Ortello soils become more sandy at increasing depths but Loretto soils grade into loess or loess-like silt below the subsoil. Valentine and Dunday soils have developed in eolian sands. Materials of glacial origin outcrop in the eastern parts of the area and Burchard and Steinauer soils have developed from clayey till. The glacial outwash materials have been sorted by wind and water into gravelly and sandy deposits; soils developed from them range from Meadin, shallow over gravel, to Ortello, Thurman, and Valentine, soils developed in eolian sands.

The soils developed on the bottomlands reflect the kind of materials on the adjacent uplands. Where sand is the principal material mantling the uplands, the soils on the adjacent bottomlands are Loup, Inavale, and Wann. Lamo, Leshara, and Hobbs are the principal soils developed on the bottomlands in the area of loess-mantled uplands.

Corn, spring small grains, and alfalfa are the principal cultivated crops. The sandy soils are subject to wind erosion when cultivated and many shelterbelt plantings have been established in this formerly treeless grassland area. Native grasses grow on the untilled areas of both the uplands and bottomlands and they are grazed.





SOIL ASSOCIATION AREA 15
MOODY-CROFTON

Rolling hills, long slopes and broad, low-gradient stream valleys are characteristics associated with this area. Soils developed in Wisconsinan-age loess dominate the landscape throughout the area and only locally are there areas of soils developed from other materials and these usually occur as outcrops on steep slopes or in a narrow strip across the slope.

Moody and Nora soils are the principal soils and are present on more than 50 percent of the area. Belfore soils have developed on the nearly level ridgetops, broad divides, and old high terrace surfaces. Fillmore soils are present in the shallow upland depressions and Crofton soils are the weakly developed soils on the steep slopes and on narrow, rounded ridge tops. These soils developed under grass vegetation and all had the dark-colored surface horizons characteristic of grassland soils. Runoff is rapid on the rolling and steep hills and the cultivated slopes have lost part or all of this dark surface layer and the brown colored subsoil is now a principal part of the plow layer.

Belfore soils have brown silty clay subsoils, 40 percent or more clay, and are leached of lime carbonate to more than 50 inches. Fillmore soils developed in the occasionally ponded shallow upland depressions, and they have dark grayish-brown silty clay subsoils. Moody soils have less clay in the subsoil than the Belfore soils, typically 35 percent, with a range of 30 to 39 percent and the lime carbonate is leached to more than 40 inches beneath the surface. Nora soils are not as clayey as the Moody soils. The clay content of the subsoil is between 25 and 30 percent and lime carbonate, occurring as soft or hard concretions, is leached below 20 inches but nearly always present at less than 40 inches. The subsoil of Crofton soils contains no more clay than does the surface horizon, frequently less, and lime carbonate is present at less than 20 inches and often at the surface.

Burchard and Steinauer are the principal soils developed from glacial till. They are somewhat less clayey than the Steinauer and Burchard soils developed in southeastern Nebraska, the subsoils being clay loam rather than clay. A group of sandy upland soils occurs locally in the northern part of this area. They are sands which have been wind reworked from glacial outwash materials and are shown on the published soil maps as Valentine, Thurman, and Ortello soils.

Judson soils have developed on footslopes. Colo, Lamo, Leshara, Wabash, and Luton soils have developed on nearly level bottomlands. McPaul soils have developed along the upland drainageways where light-colored sediments from eroding slopes have been deposited.

Cultivated crops are grown on the rolling and hilly upland slopes and on the bottomlands. Corn is the principal crop grown on both upland and bottomland soils. The areas of native grasses are limited to the very sandy soils and soils on steep slopes.

SOIL ASSOCIATION AREA 16
CROFTON-NORA

The soils of this area have developed from loess on rolling and steep slopes and from alluvium along small stream valleys and upland drainageways. Scattered throughout this soil association are areas of other soil parent materials, often too small in size to be of significance but nevertheless present and identifiable. Usually these materials occur on middle and lower slopes as outcrops of shale, limestone, sandstone, till, and sand and gravel.

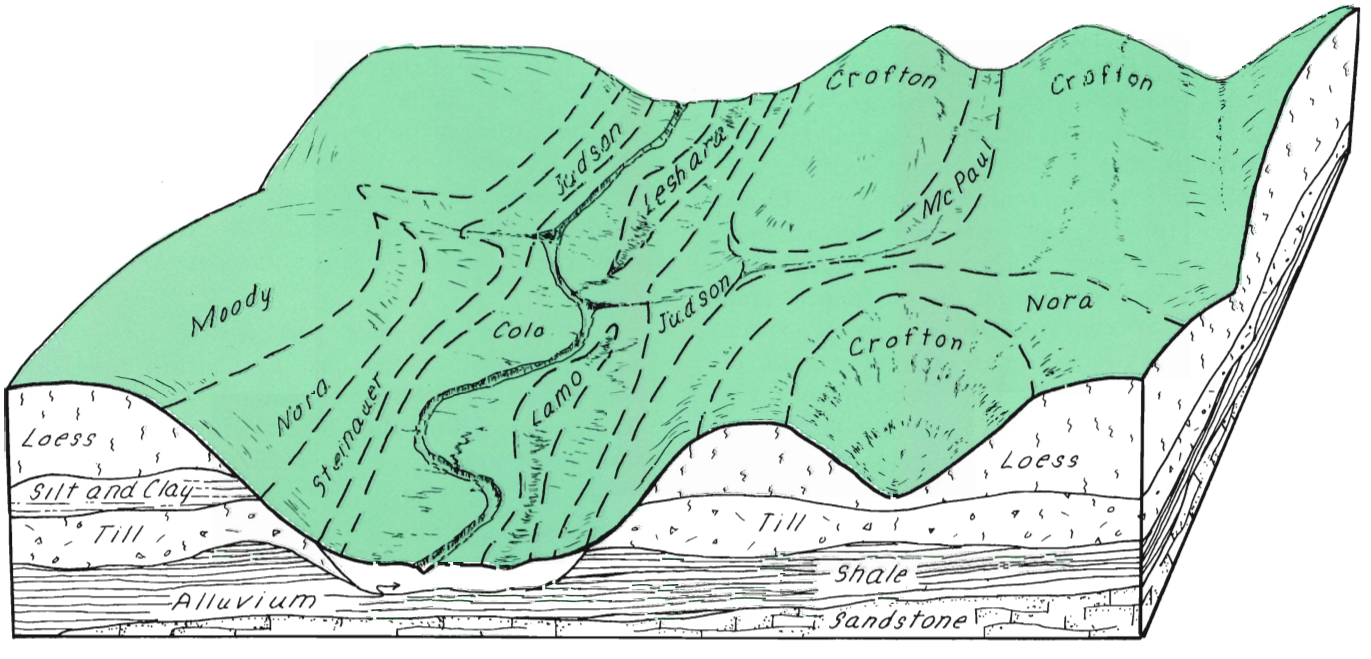
The surface drainage is rapid and overflow of the bottomlands is frequent, but of short duration. The drainageways are well defined and soil material washed from cultivated slopes is deposited on footslopes and along the drainageways with some being carried from the area onto the Missouri River valley lands.

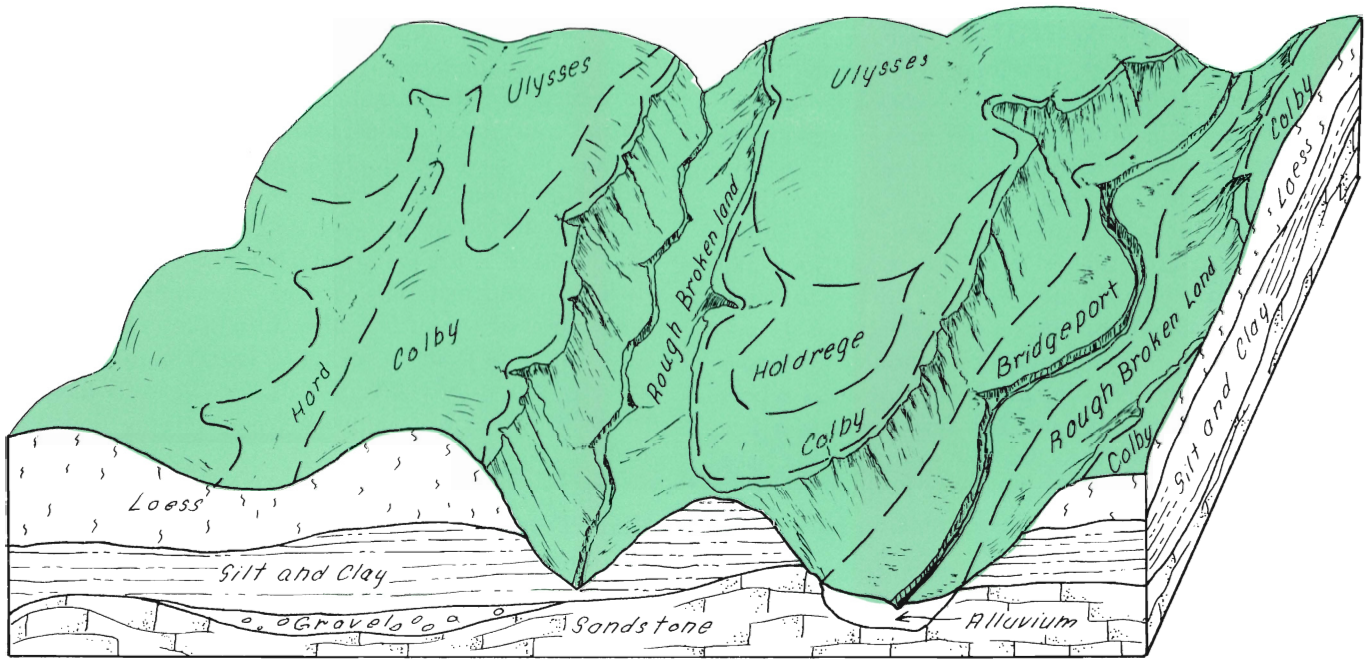
Crofton and Nora soils are the principal upland soils. They have developed in loess of Wisconsinan age under grass vegetation. The Crofton soils are present on the narrow ridgetops and steep slopes. Soil development is slight and lime carbonate is present at less than 20 inches, usually less than 10 inches. Nora soils have developed on rolling slopes and rounded ridgetops. Lime carbonate has been leached below 20 inches, usually to less than 40 inches, and the subsoil contains slightly more clay than the subsoil of Crofton soils. Moody soils have developed on the gently sloping ridgetops and broader divides. Moody soils are leached of lime carbonate to below 40 inches, have more clay in the subsoil, usually about 35 percent, and have more compact and less permeable subsoils than Nora soils.

Judson soils have developed on footslopes where the dark-colored sediments from the side slopes have accumulated. McPaul soils are present along the upland drainageways where light-colored sediments have been deposited over darker colored and older alluvium. Colo, Lamo, Leshara, and Luton soils have developed on nearly level bottomlands along the major drainageways and streams. Luton soils have clay-textured subsoils; Colo and Lamo, silty clay loam subsoils; Leshara, silt loam subsoil. All are somewhat poorly drained but not too wet for growing cultivated crops.

Small areas of soils developed from materials of glacial origin are present in the area. Burchard and Steinauer soils have developed in till, Ortello and Thurman in sandy materials reworked by wind from the glacial outwash materials. Bedrock of Cretaceous age outcrops on some of the steeply sloping hills and bluffs which border the Missouri River valleylands.

Cultivated crops are grown on the gentle slopes and rolling hills. The steep slopes are in permanent vegetation, grass, shrubs, and trees. Corn is the principal cultivated crop on both the upland and valley soils. The areas in permanent vegetation are grazed and a few trees are harvested for wood products.





SOIL ASSOCIATION AREA 17
COLBY-ULYSSES

These soils have developed on a dissected loess-mantled plain from unconsolidated sediments of Pleistocene age. The canyon-like drainageways extend to all parts of the area. The landscape consists of narrow divide remnants, steeply sloping and cat-stepped side slopes, and narrow, flat or U-shaped valley floors with a narrow, high-gradient drywash channel cut into the valley floor. Occasionally the Tertiary-age bedrock is exposed as an outcrop on a lower slope or in an eroding water channel.

Loess of Peoria and Bignell ages mantles the divide remnants and Ulysses, Colby, Holdrege, and Hord soils have developed in these materials. Bridgeport soils have developed in the alluvium along the drainageways. The complex of soils and land types on the steep broken slopes are grouped into a single land type, rough broken land.

The deep dissection and frequent exposures of a section of the earth materials on unvegetated and nearly vertical slopes have encouraged studies of the Palesols (soils on former land surfaces that have been preserved) and earth materials. The type localities of both the Brady soil and the Gilman Canyon Formation are located in the Colby-Ulysses area south of the Platte River. The Brady soil is a soil that developed in the Peoria loess and was covered and protected by the Bignell loess. Carbon 14 dating of the humic horizon of the Brady soil is 9750 years BP (before present). The humic horizon of the soil developed at the top of the Gilman Canyon Formation has a carbon 14 date of 28,000 years BP in the upper part and 32,000 years in the lower part. This humic horizon was formerly considered to be the upper part of the Sangamon soil and was thought to correlate with the materials of Illinoian age which are much older than these dates.

These dates do not tell us how long the soils of central Nebraska have been developing but they do put limits on the maximum time available for soil development. At the Brady type locality the modern soil is Holdrege silt loam. Twelve feet of Bignell loess was deposited over the Brady soil and the modern soil developed in no more than 9750 years. Holdrege soils are considered to be representative of soil development in central Nebraska. Some soils show more development and others show less development but these differences in development can usually be related to the site factors and the local environment. If Holdrege soils can develop in less than 10,000 years, it is probable that most of the Nebraska soils are no older than this and some are much younger.

Wheat and forage sorghums are the principal cultivated crops but less than 10 percent of the area is cultivated. The areas that are not cultivated are in native grasses and used for grazing.

SOIL ASSOCIATION AREA 18
HALL-WOOD RIVER

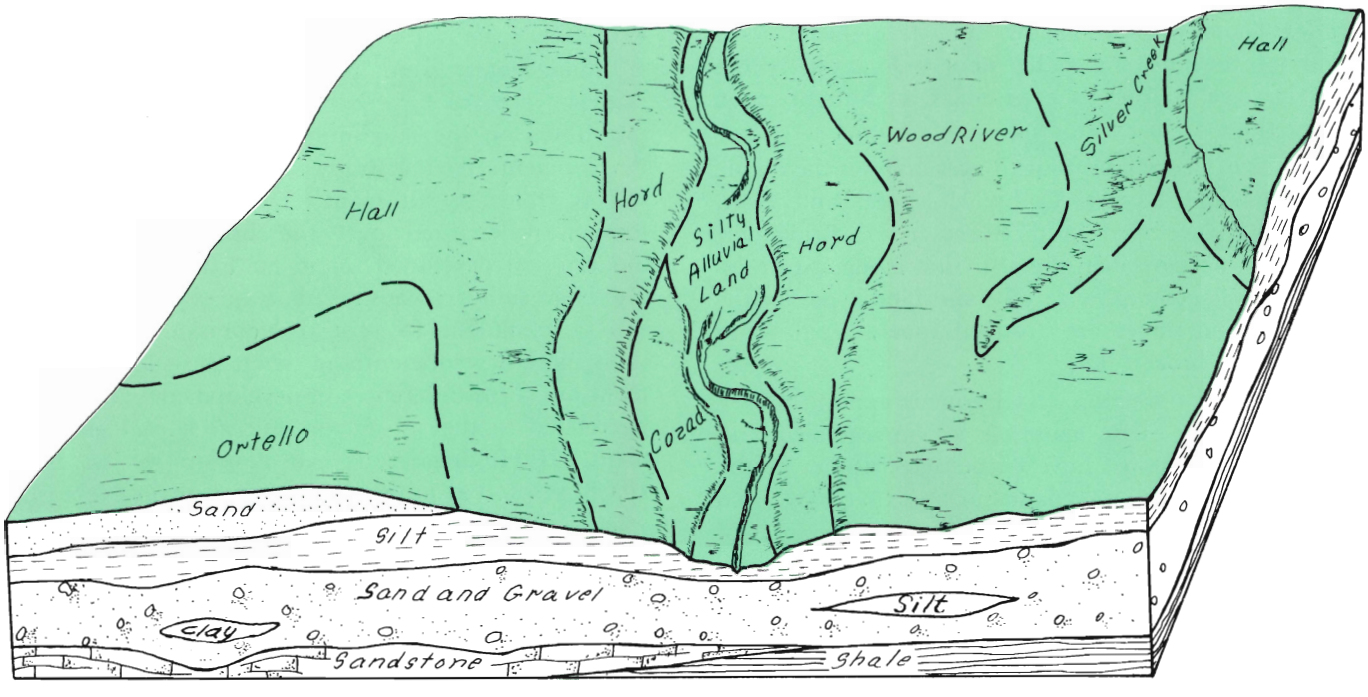
This group of soils developed on broad, nearly level stream terraces in central Nebraska. Smaller areas of these soils occur on similar sites along most of the larger streams in soil association areas 23, 26, and 29. The landscape consists of from one to three bench-like alluvial plains with short, steep slopes sloping up to each higher level. Loess and loess-like silt mantle much of the area with the thickest accumulation of loess being on the oldest and highest terrace level. Areas of eolian sands on undulating slopes occur locally and occasionally there are areas where coarse sand or gravelly sand is a few inches to a few feet beneath the surface. Shallow drainageways have developed on the terrace plain and frequently there is a narrow strip of one of the bottomland soils in the drainageway.

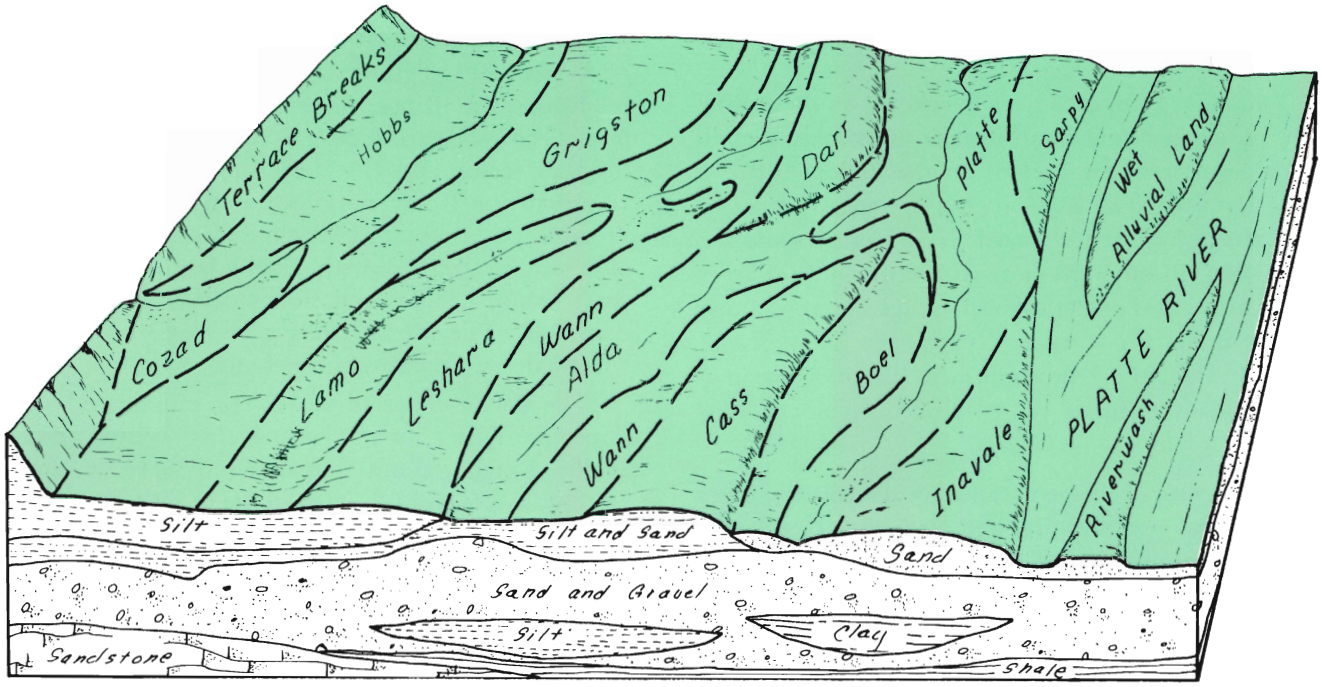
Hall and Hord are the principal soils on the highest terrace level. At the valley edge and along the streams issuing from the uplands are soils developed in sediments washed from the upland slopes. Hobbs soils have developed in the dark-colored sediments and Cozad soils have developed in light-colored sediments.

Wood River soils are dominant on the intermediate terrace level. They are moderately well drained soils with slowly permeable subsoils. Associated soils are Silver Creek which is somewhat poorly drained, Hord and Hall which are well drained, and small areas of soils moderately affected by alkalinity which have been designated as slick-spots, slick-spots complex, Exline soils, and various similar names. Hobbs and Cozad soils have developed in the recently deposited sediments in and along the drainageways which carry runoff water from the uplands. Ortello soils have developed in sandy loam materials and Thurman soils in loamy sand materials. In the areas where gravelly sands are near the surface Meadin soils are the shallow soils, with less than 20 inches of loamy material over gravelly sand, and O'Neill soils are the soils having 20 to 40 inches of loamy material over the gravelly sand.

The principal soils on the lowest terrace level are Hord, Ortello, O'Neill, and Meadin. The soils on this topographic level have developed in alluvium derived principally from the Platte River and coarse sand grains and gravel are common even in silt and clay strata.

Corn, alfalfa, and soybeans are the principal crops grown in this soil association area. Most of the area is in cropland and nearly all of the cropland is irrigated. Areas remaining in native grasses are limited to sites which are frequently flooded, poorly drained, very shallow soils over gravel, or soils strongly affected by saline and alkali salts.





SOIL ASSOCIATION AREA 19
LESHARA-PLATTE

This group of soils developed on the bottomlands of the larger streams in central Nebraska, principally the Platte, Republican, and Loup rivers. The streams have wide, shallow channels with low banks, numerous sand bars, and many small islands. The channels cross and recross around the islands and sand bars and there are broad areas of bottomland which are only a few feet above the level of the water in the stream channel.

Adjacent to the channels the soils have developed in sandy materials and the areas farthest from the channel tend to be soils developed in silty materials which have washed onto the floodplain from the loess-mantled uplands.

Cozad, Hobbs, Grigston, and Leshara soils have dark-colored surface horizons and silt loam subsoils. Cozad, Hobbs, and Grigston are well drained and Leshara soils are somewhat poorly drained. Cozad soils have light-colored subsoils. Hobbs, Grigston, and Leshara have darker colored subsoils than Cozad and in Hobbs the lime has been leached from the subsoil. The subsoils of Grigston, Cozad, and Leshara are calcareous. Lamo soils are dark colored, somewhat poorly drained with calcareous, silty clay loam subsoils.

Cass, Wann, Carr, Darr, and Alda soils have sandy loam subsoils. Cass, Carr, and Darr are well drained or moderately well drained. Alda and Wann are somewhat poorly drained. Cass, Carr, and Wann developed in loamy materials more than 40 inches thick over sand or sand and gravel; Darr and Alda in 20 to 40 inches of loamy material over coarse sediments. Cass is the only soil in this group in which the lime carbonate has been leached below the subsoil.

Inavale and Sarpy soils have loamy sand subsoils, light-colored surface horizons and good drainage. Boel and Platte have dark-colored surface horizons. Boel is somewhat poorly drained with sand subsoil; Platte, poorly drained with coarse sand and gravel below the surface horizons.

There are areas along the streams where soil development is frequently interrupted by overflow and deposition of new materials or scour and shifting of the surface. These areas are grouped into land types and named to indicate the significant characteristics of the area; examples being, wet alluvial land, sandy alluvial land, riverwash.

Native grasses and trees grow on the Boel and Platte soils and the areas are grazed. Corn, grain sorghums, and alfalfa are the principal crops on the other soils.

SOIL ASSOCIATION AREA 20
SHARPSBURG-MARSHALL

The soils of this area have developed on the rolling hills of eastern and southeastern Nebraska. Small, nearly level areas are present on the divides between major streams. The loess mantle becomes thinner as the distance from the Missouri River increases and the underlying till outcrops more frequently and in larger areas. Limestone of Pennsylvanian age outcrops along some of the larger streams. Next above is the glacial material; then the reddish brown Illinoian age material, and over this is the gray or buff-colored Wisconsinan age loess.

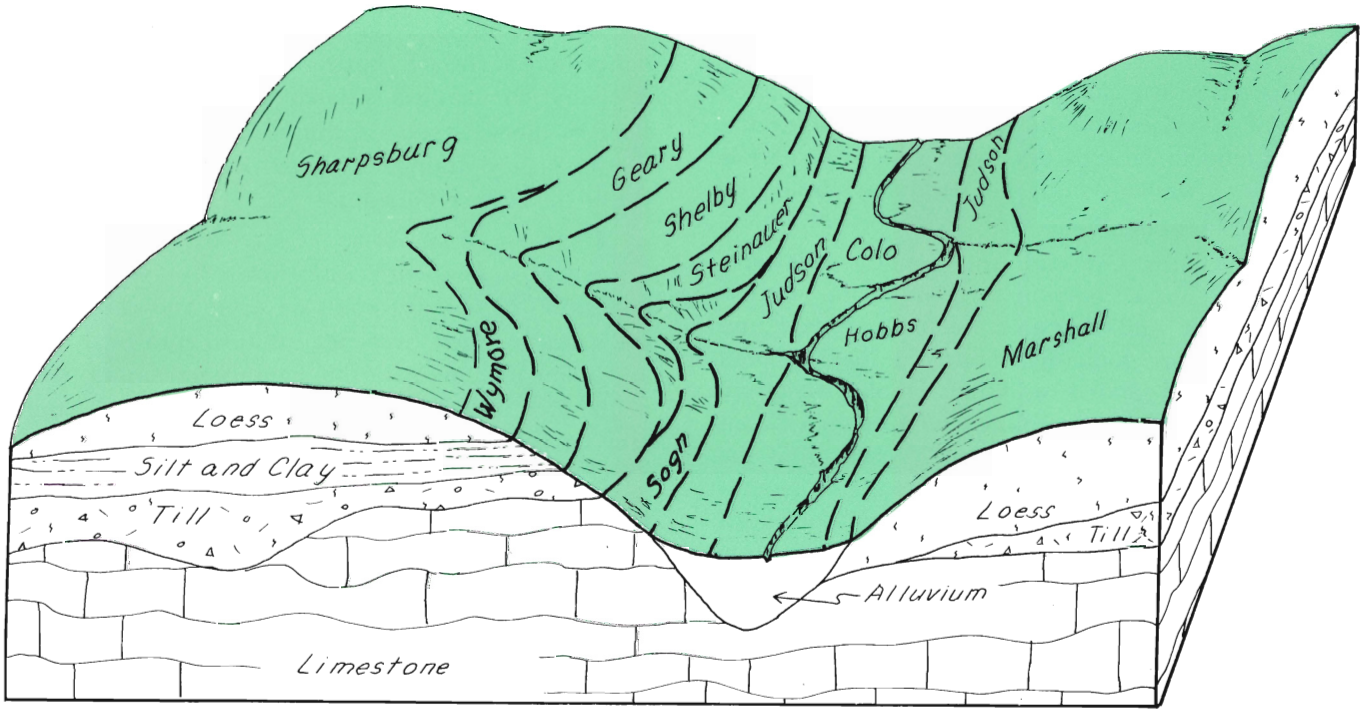
The surface drainage is rapid on the rolling slopes and the drainageways are well defined. The larger streams developed broad flood plains with fine textured soils but sediments washed from the cultivated slopes have been deposited over many of these old soil surfaces. Ditching and straightening of the stream channels have resulted in wide and deep water channels which remove flood water rapidly but the surface drainage is slow and farming operations are frequently delayed due to wetness.

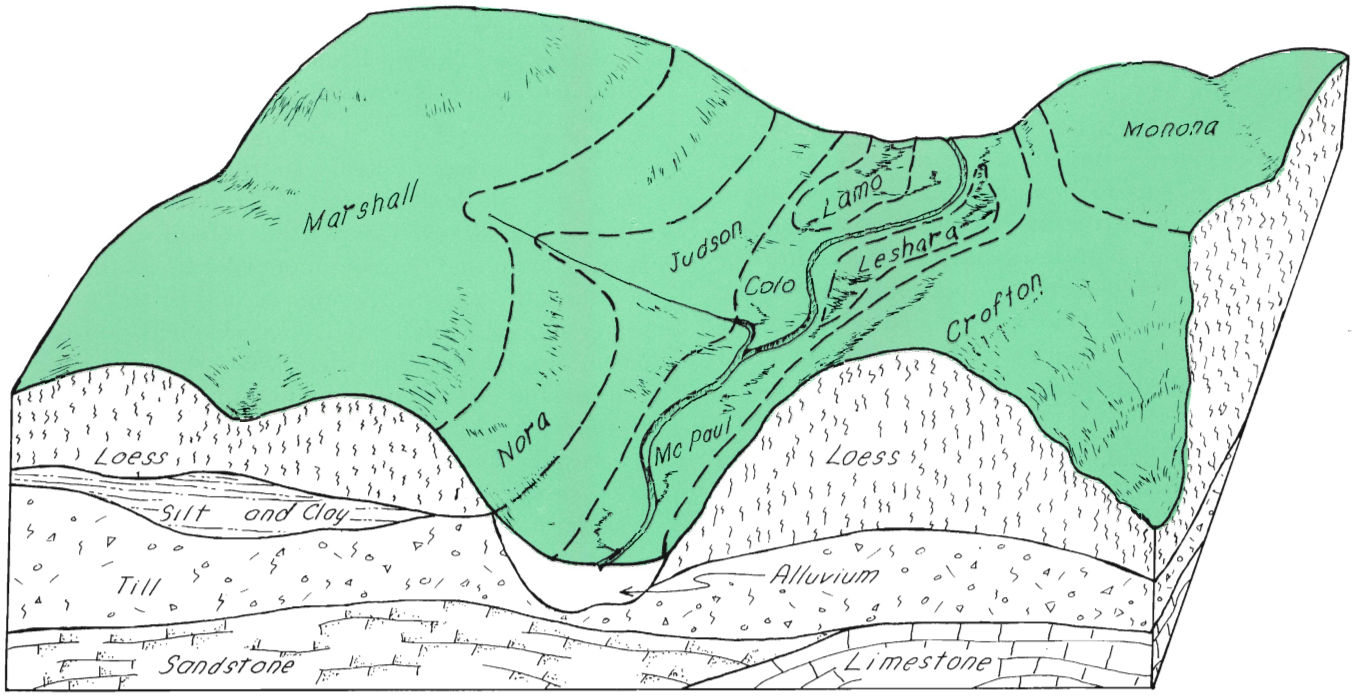
Sharpsburg, Marshall, and Wymore soils, listed in the order of their extent, have developed on the loess-mantled divides and slopes. The texture and color of the subsoils are reliable characteristics for differentiating these soils. The Wymore subsoil color is dark grayish-brown, texture is silty clay with 42–48 percent clay; Sharpsburg, brown or grayish-brown silty clay loam with 35–41 percent clay; Marshall, brown silty clay loam, 30–35 percent clay.

Geary and Longford soils have developed where the reddish-brown Illinoian age materials are at the surface. Geary soils are similar to Sharpsburg soils except for their color and Longford subsoils contain more clay than the Geary subsoils, having about the same range in clay content as Wymore soils. Adair soils are also reddish colored with clay subsoils but contain coarse sand, pebbles and stones derived from glacial materials. The Morrill soils have clay loam subsoils with many sand grains and pebbles.

The glacial materials outcrop on middle and lower slope positions, usually on steeply rolling slopes. Shelby, Burchard, and Steinauer soils have developed on these slopes and are listed in the order of the degree of soil development. Judson soils have developed on the footslopes and the dark surface color extends to more than 20 inches from the surface. Colo, Lamo, Leshara and Wabash soils are present on the bottomlands. The subsoil of Wabash soils is silty clay; Colo and Lamo, silty clay loam; and Leshara, silt loam. All are somewhat poorly drained. Hobbs and Judson soils are the dominant soils in the small upland drainageways.

Cultivated crops are grown on the gentle slopes and rolling hills. The steep slopes are in permanent vegetation, usually a mixture of native grasses and bluegrass. Grain sorghum, corn, and wheat are the principal cultivated crops on both upland and bottomlands. The grassland areas and the areas of grass and scattered trees on the frequently flooded bottomlands are grazed.





SOIL ASSOCIATION AREA 21
MARSHALL-MONONA

The soils of this area have developed in loess on rolling and steep slopes and in alluvium along upland drainageways. Scattered throughout this soil association are areas of other soil parent materials, often too small in size to be of significance but nevertheless present and identifiable. Usually these materials are present on middle and lower slope positions, occurring as outcrops of reddish-brown silt and clay, till, sandstone, or limestone.

Marshall, Monona, Nora, and Crofton are the principal upland soils. The subsoil of the Marshall soils is a silty clay loam, with the clay content ranging between 30 and 35 percent and the lime carbonate has been leached below 60 inches. The subsoil texture of the Monona, Nora, and Crofton soils is silt loam and silty clay loam with a clay content of 24 to 30 percent. The depth of leaching of the lime carbonate is a characteristic which can be used to recognize the various soils in this group. Monona soils are lime-free to a depth of from 40 to 60 inches; Nora soils, 20 to 40 inches; and Crofton soils contain lime carbonate at about 10 inches with the range being from the surface to 20 inches. In addition, the dark-colored surface layer is usually less than 8 inches thick in Crofton soils and ranges between 8 and 20 inches in Monona and Nora soils.

Hobbs and McPaul soils have developed in the small upland drains and Judson soils on the footslopes. Hobbs and McPaul soils are present on nearly level slopes adjacent to the water channel and are occasionally to frequently overflowed. McPaul soils contain lime carbonate in the surface and subsoil horizons. Hobbs soils are free of lime to depths greater than 40 inches and are darker in color than the McPaul soils. Judson soils are free of lime to 50 inches or more and the dark color of the surface continues below 20 inches, often to 40 inches or more.

Colo, Lamo, Leshara, and Hobbs soils have developed on nearly level bottomlands. All have dark-colored surface horizons, slow surface drainage, and are infrequently overflowed. Colo and Lamo have silty clay loam subsoils; Hobbs and Leshara, silt loam subsoils; and Colo and Hobbs are lime-free to 40 inches or more. Lamo and Leshara contain lime carbonate in the subsoil and occasionally in the surface horizons. Luton is the clay-textured associate of these soils.

Geary soils have developed in reddish-brown silt and clay. Burchard and Steinauer soils developed on sites where glacial materials outcrop. Lancaster and Hedville soils developed in sandstone of Dakota age and Sogn soils are the shallow soils developed from limestone and chalky shale.

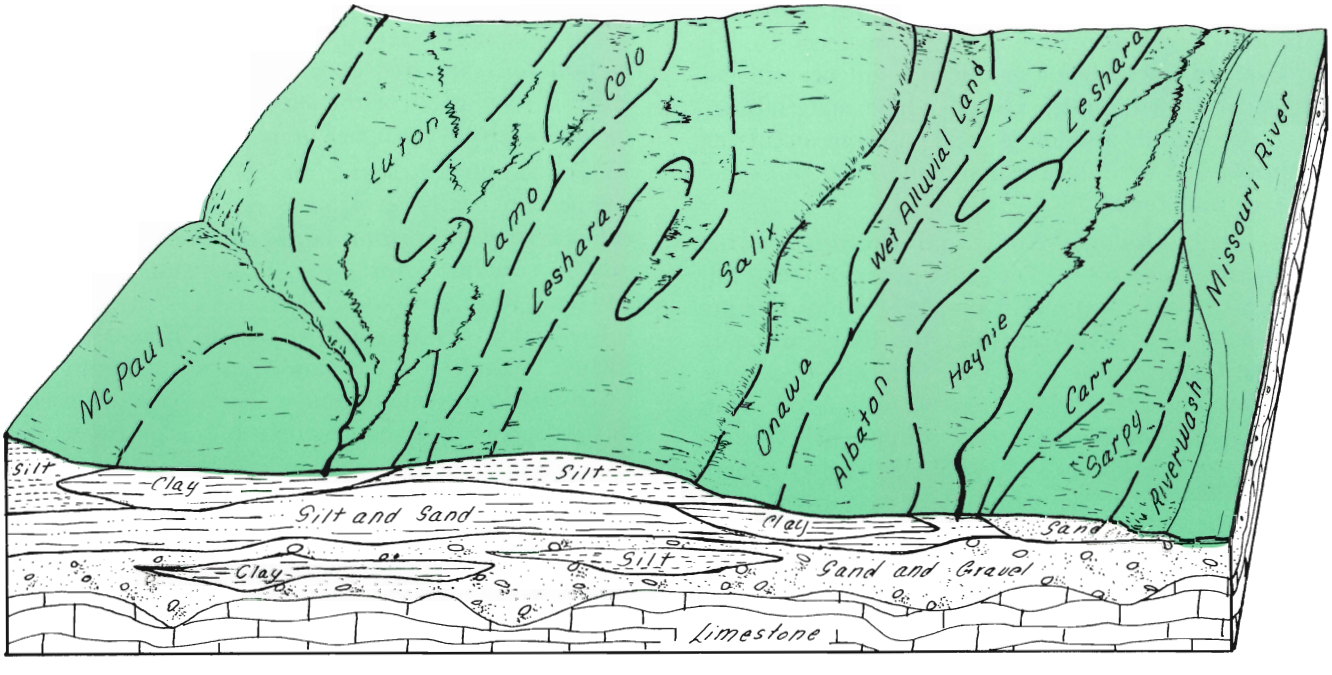
Cultivated crops are grown on the gentle slopes and rolling hills. The steep slopes are in permanent vegetation, grass, shrubs and trees. Corn is the principal cultivated crop on both the upland and valley soils. The areas in permanent vegetation are grazed.

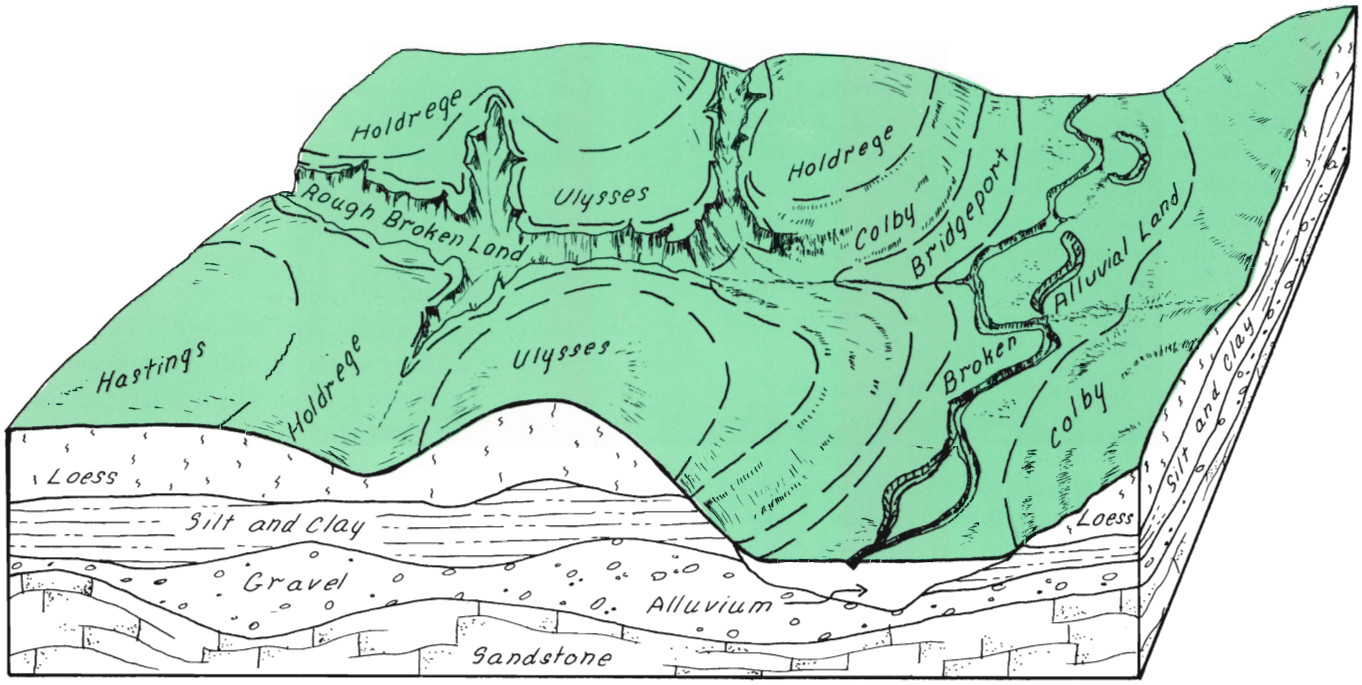
SOIL ASSOCIATION AREA 22
LUTON-HAYNIE

This group of soils developed in alluvial sediments on the Missouri River bottomlands. Two topographic levels are evident throughout the area. The higher level is not subject to overflow from the river and is 10 to 15 feet above the frequently overflowed lower level. The soils on both levels have developed in river alluvium with the soils on the upper level developing on a relatively stable land surface in silty and clayey materials and those on the lower level being subjected to overflow and deposition of sand, silt or clay sediments.

The soils developed on the higher topographic level are Luton soils which have clay subsoils; Colo and Lamo, silty clay loam subsoils; and Salix, McPaul, and Leshara, silt loam subsoils. All of these soils, except the McPaul, are on nearly level slopes and have very slow surface drainage. Luton soils are somewhat poorly drained because of the very low permeability of the subsoil. Colo, Lamo, and Leshara soils are somewhat poorly drained due to a shallow watertable.

The soils developed on the lower level are Albaton, clay-texture subsoil; Haynie, stratified very fine sandy loam and silt loam subsoil; Carr, fine sandy loam subsoil; and Sarpy, loamy sand subsoil. Numerous areas of scour and deposition are evident on this level but the surface is nearly level except for short, steep slopes along old high-water flood channels and hummocks of sand, gravel or silt. Surface drainage is slow and there are some undrained marsh areas. Upstream and local flood control work has reduced the overflow hazard and much of the formerly overflowed land has been cleared of brush and trees, the hummocks of sand leveled, the swales filled or drained, and cultivated crops are grown. Corn and soybeans are the principal cultivated crops. The uncultivated areas are in trees, grass, and annual weeds.





SOIL ASSOCIATION AREA 23
HOLDREGE-COLBY

This is a dissected plains area. North of the Platte River the landscape is steeply rolling and hilly with irregular-shaped tabular remnants left to mark the level of the former plain. The southern part of the area, Republican River drainage, has been altered to a succession of north-south flat-topped divides that are separated by narrow and deeply entrenched drainageways. The nearly level and gently sloping divides are usually less than a mile in width and from 50 to 100 feet above the drainageways. The valley-side slopes are rolling or steep and the steep slopes are often broken by "catstep" erosion. Throughout most of the area the bedrock is many feet below the surface, the exceptions being along the Republican River, principally on the valley side south of the river where shales of Cretaceous age outcrop, and throughout the area there are scattered outcrops of sandstone of Tertiary age.

Within the uplands are soils developed in brown or reddish-brown loess of Illinoian age, Nuckolls and Penny soils; and in Illinoian-age sand and gravel, Jansen and Meadin soils. Valentine and Dunday soils have developed in eolian sand and Anselmo and Kenesaw soils have developed where the loess and sand materials are mixed or stratified. Anselmo has a sandy loam subsoil and grades downward to sand. Kenesaw has a loam or silt loam subsoil with thin lenses of sand in the surface and subsoil and grades gradually to the underlying loess. Wakeen, Kipp, and Kipson soils developed from interbedded limestone and limy shale in southcentral Nebraska, south of the Republican River.

Loess of Peorian and Bignell ages is the dominant material from which the soils on the uplands have developed. Hastings, Holdrege, and Hord are the principal soils on the level and gently sloping uplands and Fillmore and Scott soils developed in the upland depressions. Holdrege soils are present on the rolling slopes along with Ulysses soils which are lighter colored with lime carbonate at shallower depths than in Holdrege soils. Colby soils are dominant on the hilly and steep slopes.

The soils developed from alluvium are numerous and varied. The alluvium laid down by the larger streams and rivers contains some coarse materials but along the smaller streams and along the upland drainageways the alluvium is predominantly silty. Hobbs is the most extensive soil on the bottomlands. Leshara and Lamo occur throughout the area on somewhat poorly drained sites. Cass, Wann, and Carr are sandy soils on bottomland sites, and Inavale, Sarpy, and Platte are the very sandy soils.

Wheat and grain sorghums are the principal crops grown on both upland and bottomland soils. Slopes with a gradient greater than 8 percent are usually in native grasses and are used for grazing.

SOIL ASSOCIATION AREA 24
HOLDREGE-HASTINGS

This association area is a westward extension of the Hastings-Crete association. It is an area of low relief with nearly level and gentle slopes, shallow, poorly defined, low-gradient drainageways, and numerous closed drainage basins with the drainage discharging onto low-lying flats or into depressions. Physiographically, it is a tabular divide with the north-flowing drainage moving to the Platte River and the southern drainage to the Republican River.

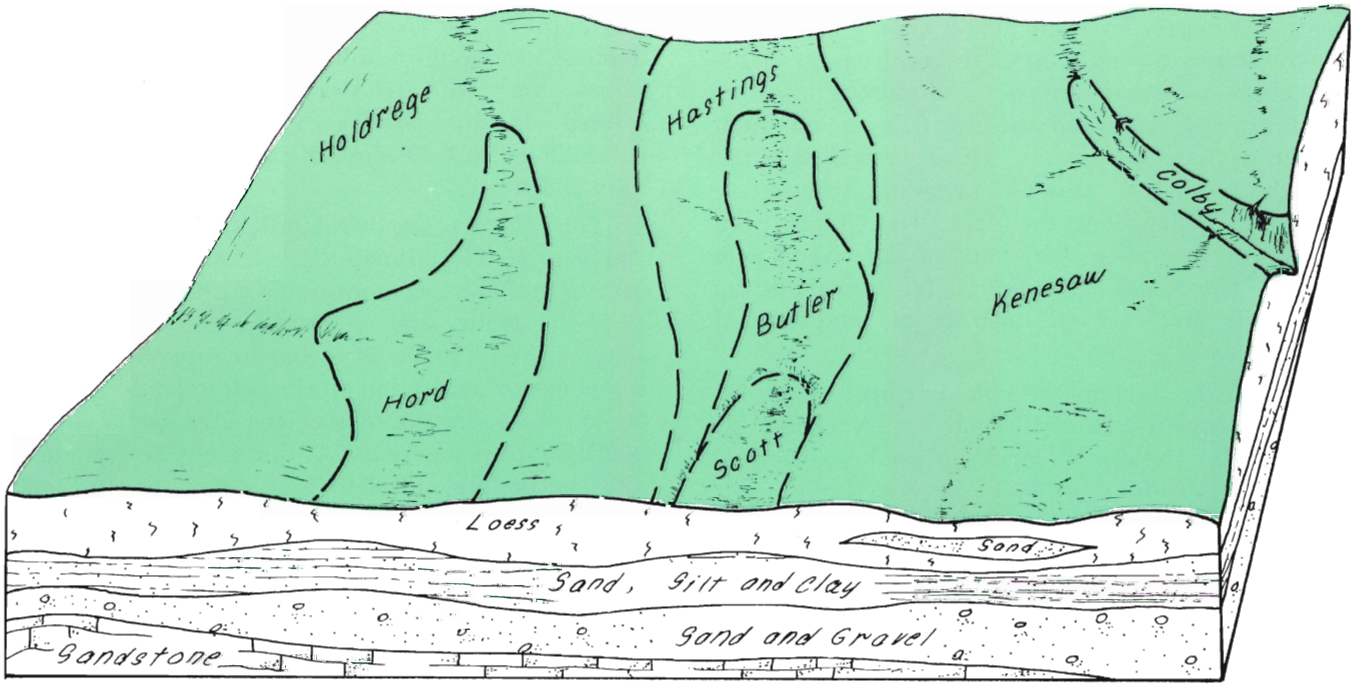
Holdrege, Hord, Hastings, and Kenesaw soils are the principal upland soils. Holdrege and Hord are similar soils, both having dark-colored surface horizons and silty clay loam subsoils. The dark-colored horizons in Hord soils are more than 20 inches thick; in Holdrege, less than 20 inches. Hastings soils have surface horizons similar to Holdrege soils but more clayey subsoils. Crete and Fillmore soils are not extensive in this association. Butler soils have developed on some of the low-lying flats in the closed drainage basins, and Scott soils are present in the undrained depressions.

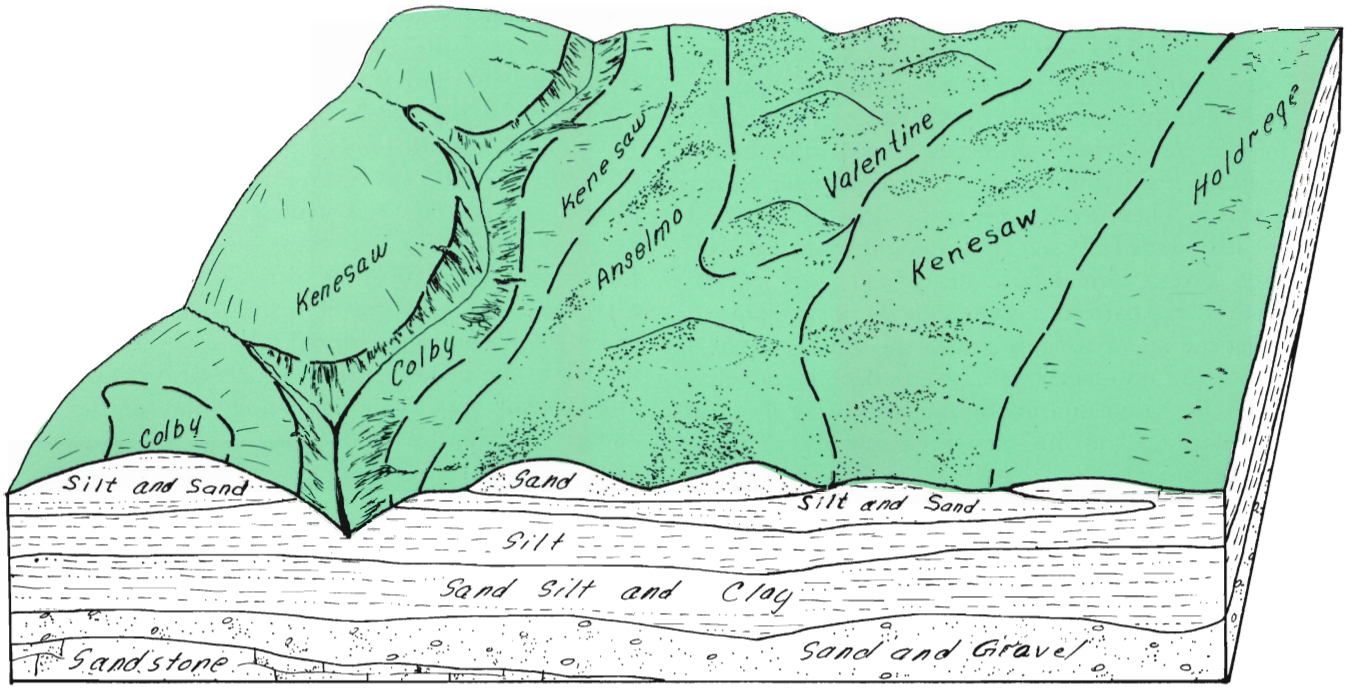
Kenesaw soils are lighter colored and have less clayey subsoils than Holdrege soils. They occur in an area where the land surface is younger and less stable than the areas where Holdrege soils have developed. Colby soils are the associated soils with weak soil development, and Rusco soils are the associated soils that developed on lowlying flats or depressions and have silty clay loam subsoils.

Hobbs soils developed on the alluvial materials along the larger drainageways. The soils on the small discontinuous areas of stream terraces are Hord, and the lighter colored and recently deposited soils on footslopes or fans of upland drainageway are Bridgeport soils.

It was mentioned earlier that this is a western extension of the Hastings-Crete soil association. Many of the upland soils are common to both areas but the positions in the landscape on which they have developed reflect the drier climate of this area. Hastings soils developed on the gentle and rolling slopes in the Hastings-Crete area but here they developed only on flat areas where runoff of the precipitation is slow or on sites receiving some additional water as run-in from adjacent areas. Butler soils are in swales and depressions and Fillmore soils, which developed on similar sites in the Hastings-Crete area, are almost nonexistent in this area.

Corn and grain sorghum are the principal irrigated crops. Wheat and grain sorghum are the cultivated crops grown under dryland management. The areas that are not cultivated are in native grasses and are grazed. Trees are limited to planted windbreaks and shelterbelts with cottonwood and willow growing wild on wet sites.





SOIL ASSOCIATION AREA 25
KENESAW-HOLDREGE

The landscape of this association contrasts sharply with the adjacent loess-mantled plains. Here the slopes are hummocky with a few low-lying level areas and no internal drainage system. The precipitation is quickly absorbed by the soils. Occasionally there is some runoff from the slopes to the low-lying flats but ponding is of short duration.

This is the area of transition of the soils developed from eolian sand and soils developed from loess. The loess and eolian sand have been shifted and mixed by wind. Anselmo soils developed in material that is principally sand with some silt, and the Kenesaw soils developed in material that is principally silt with some sand or lenses of sand. There are also areas of eolian sand with typical sandhill soils and topography, but the dunes seldom rise more than 20 to 40 feet above the swales. Valentine soils have developed on the rolling slopes of the dunes and Anselmo soils in the swales. The area extends to the terrace level of the Platte River and here the Anselmo soils have developed in sandy material that contains a small percent of gravel. Locally there are areas of Meadin soils that are shallow sandy soils with gravelly substrata.

Holdrege soils have developed on remnants of the loess plain that have not been wind-reworked and Colby soils are the associated weakly developed soils on the sloping areas along drainageways, on rounded ridgetops, and on sites where erosion has thinned or removed most of the upper horizons from a Kenesaw or Holdrege soil.

Typical bottomland sites are seldom present in this soil association but Hobbs soils have developed where the alluvial sediments are silty and Cass or Inavale soils where the alluvial sediments are sandy.

Corn and grain sorghum are the principal cultivated crops. The very sandy soils, shallow soils over gravel, and other unplowed areas are in native grasses and used for grazing.

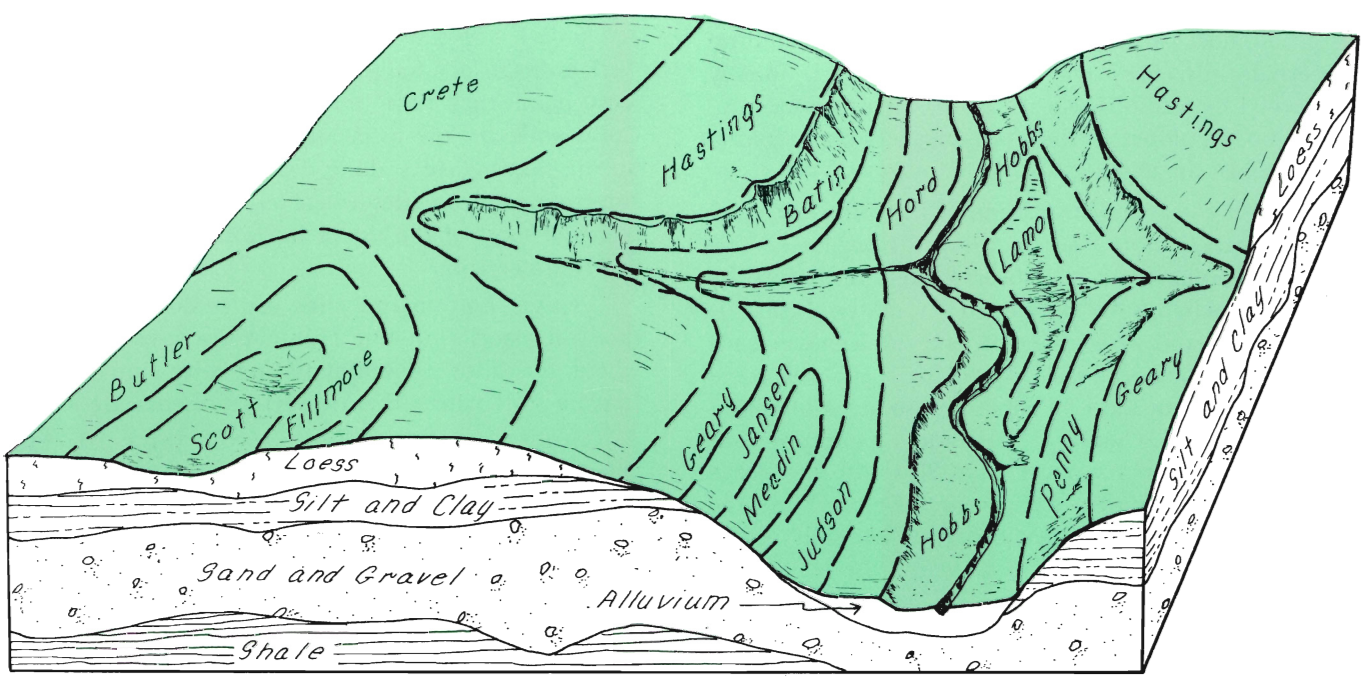
SOIL ASSOCIATION AREA 26
HASTINGS-CRETE

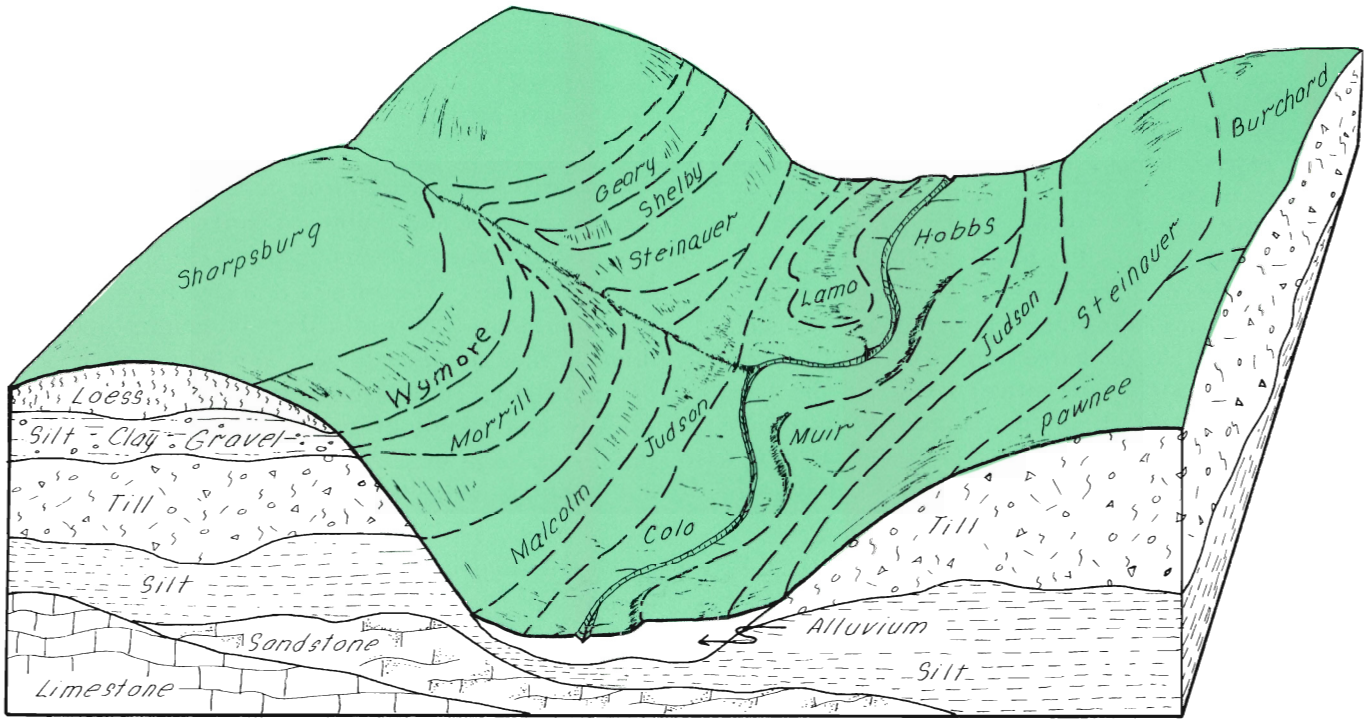
This group of soils occurs in east-central Nebraska on level to rolling upland slopes. During the early and middle part of the Pleistocene period thick beds of gravel, sand, silt, and clay were deposited over most of the area. These were mantled by silty and clayey alluvial sediments followed by Loveland loess, Peoria loess and a very thin deposit of Bignell loess. The present drainage pattern has cut into the loess mantle and along the major streams and in the southern part of the area the drainageways have cut deeply enough to expose the Loveland loess, the silty and clayey alluvial materials, and in a few areas the gravel and sand.

Crete and Hastings are the principal soils in this association. They developed on the nearly level and gently sloping uplands. Butler soils developed on the level areas, and Fillmore soils in slight swales where excess water from precipitation occasionally ponds for a short time. Scott soils developed in the undrained depressions and are covered with water during part of the growing season. Batin soils developed on the steep slopes adjacent to the drainageways. They are similar to Hastings soils but have thinner surface and subsoil horizons than the typical Hastings soils.

Geary and Penny soils have developed in the reddish-brown silts and clayey silts of Illinoian age. Geary soils are similar to the Hastings soils and Penny similar to Batin except for color of the subsoils. Jansen and Meadin soils developed at the upland sites where sand and gravel are near the surface. Meadin is a shallow soil with less than 20 inches of loamy material over the coarse sand and gravel, and Jansen soils have 20 to 40 inches of loamy materials over the sand and gravel substratum. The loamy materials in both soils are reddish-brown in color and similar to the materials from which Geary and Penny soils develop but differ in having some of the sand and gravel from the substratum mixed with the loamy materials.

Judson soils are the dark-colored soils on the foot slopes. Hord soils developed on the stream terraces, also Hall and Detroit soils, and small areas of Ortello soils. Hobbs soils are the well drained soils on the bottomlands. Lamo and Leshara are somewhat poorly drained soils. Cass and Wann are the sandy soils developed on the bottomlands and are limited to the localities having sandy or gravelly soils in the adjacent uplands. The frequently flooded strip along the drainageways is a land type usually given the name of "silty alluvial land".





SOIL ASSOCIATION AREA 27
SHARPSBURG-SHELBY

Soils developed from glacial materials dominate the landscape in this soil association. Narrow, rounded ridgetops and short side slopes with numerous small, well defined, tree-lined upland drainageways set this area apart from the nearly level plains to the west and the long rolling hills to the east.

Sharpsburg and Wymore soils are restricted to the loess-mantled ridgetops. Geary soils when present are on the upper side slopes with Pawnee, Shelby, Burchard, and Steinauer soils dominating the side slopes and, in some areas, continuing over the ridgetops. Adair and Morrill soils are intermingled with the Geary and Pawnee soils. Malcolm soils, developed from Fullerton-age silts, and Lancaster and Hedville soils, developed from Dakota-age sandstone, are present on the lower slopes in localized areas.

Adair, Morrill, and Geary soils have reddish-brown subsoils. Pawnee, Shelby, Burchard, and Steinauer have grayish-brown and yellowish-brown subsoils. Adair and Pawnee soils have clay subsoils. Morrill, Shelby, Burchard, and Steinauer have clay loam subsoils. Morrill, and Shelby are similar except for the color of the subsoil and are lime-free to 50 inches or more. Soil development has not been sufficient in Burchard and Steinauer soils to remove the lime carbonate from the subsoils. Lime carbonate is present below 20 to 40 inches in the Burchard soil and at depths of less than 20 inches in the Steinauer soils. The Pawnee, Adair, Morrill, Shelby, Burchard, and Steinauer soil profiles all contain numerous sand grains, small pebbles, and a few stones and boulders. Morrill soils contain more sand and pebbles than the others and fewer stones.

Malcolm soils have brown silty clay loam subsoils. They are very similar in appearance to Marshall soils but occur topographically below the soils developed in till. Judson soils are present on the footslopes but, unlike the Judson soils in the areas of thick loess, here the surface horizons may contain sand grains and pebbles.

Colo, Lamo, and Hobbs are the principal soils on the bottomlands and all are occasionally overflowed. Muir soils are present on the low terrace positions. They are well drained, seldom overflowed, have dark-colored silty clay loam surface and subsoil horizons which grade to silt or stratified silt and sand below 36 inches.

Cultivated crops are grown on the gentle and rolling slopes. The steeply rolling and rolling slopes are in native grasses and are grazed. Trees are present in the frequently flooded areas on the bottomlands and along the steep-sided drainageways in the uplands. Sorghum and wheat are the principal grain crops. Alfalfa and brome grass are the usual hay and tame grass crops.

SOIL ASSOCIATION AREA 28
CRETE-FILLMORE

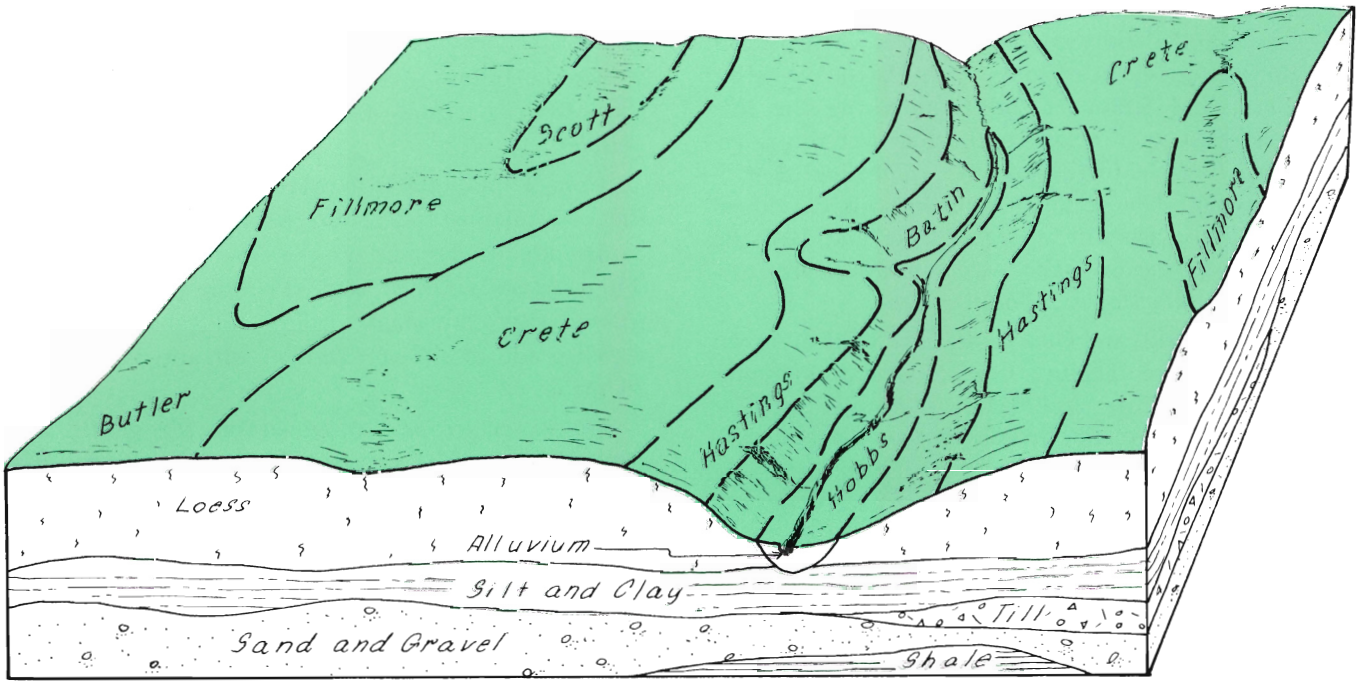
This group of soils developed on broad, nearly level uplands in east-central Nebraska. The drainage system extends to most of the area but the drainageways are often low-gradient swales with poorly defined water channels. Some small and a few large areas, several square miles in extent, have no connection with the drainage system. They have internal drainage systems consisting of low-gradient, swale-like drainageways that discharge onto low-lying flat areas that are alternately intermittent lakes and dry flats. The well defined drainageways are shallowly entrenched with short, steep side slopes and a narrow strip of frequently flooded alluvial fill on either side of the water channel.

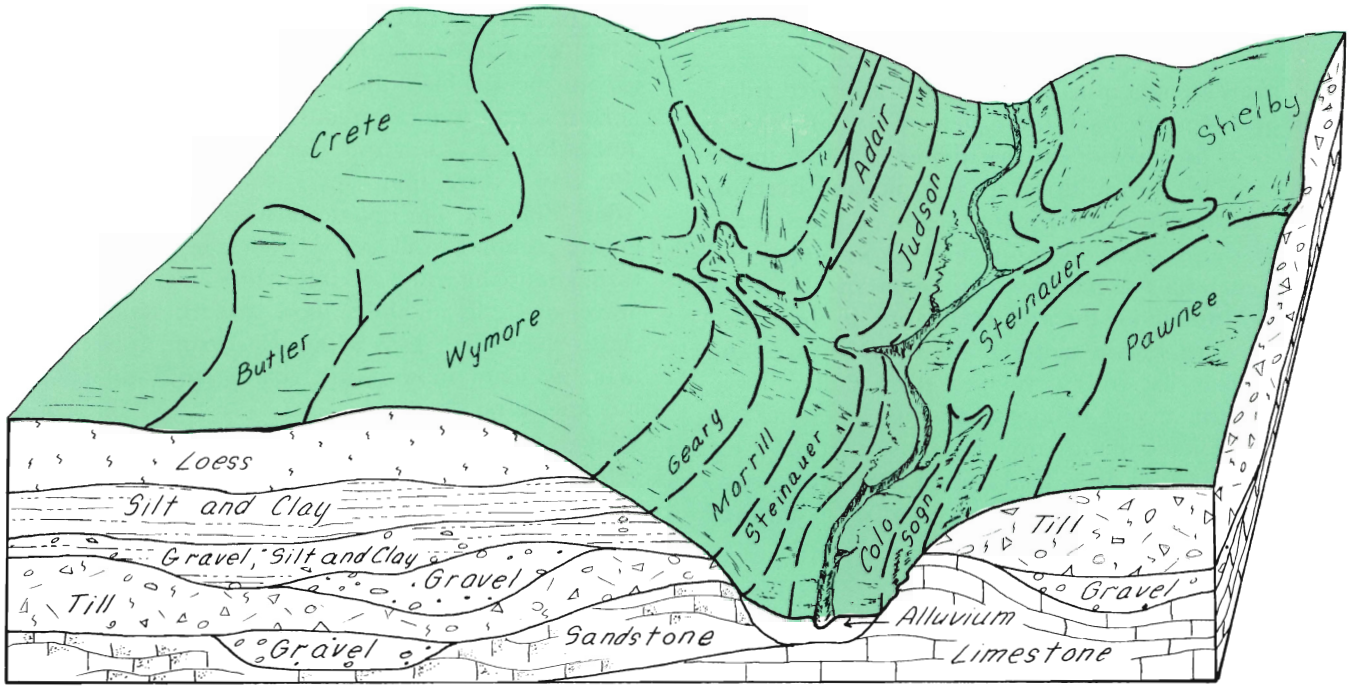
Surface drainage has been a dominant factor in the development of the upland soils in the area. It is an area of low relief and the gentle swell and swale topography provides sites which are well drained to poorly drained. Hastings soils are predominant on the well drained sites and these are on the gentle and rolling slopes. Crete soils are the most extensive soils in the area. They have developed on the very gentle slopes where surface drainage is slow and precipitation that is not readily taken into the soil moves slowly off of the site. Butler, Fillmore, and Scott soils have developed on sites with restricted surface drainage; Butler soils on the sites that have very slow surface drainage but only occasionally are ponded; Fillmore soils on the sites that are ponded frequently but only for a short time; and Scott soils on the sites where water stands for a part of each growing season and for long periods of time in years of above-normal precipitation.

Butler, Fillmore, and Scott soils have slowly permeable subsoils and improved surface drainage is required for obtaining moderate to high yields of cultivated crops. The surface drainage has been improved on some sites by ditching and grading and the drained sites are much more productive than the undrained sites, although the soil profile characteristics remain essentially unchanged. With adequate surface drainage these soils are irrigated successfully but have the same limitations as other slowly permeable soils.

The bottomland soils and the soils on the stream terraces are of small extent. Hobbs is the principal soil in the upland drainageways. The very frequently flooded strip adjacent to the water channel is a land type consisting of recently deposited sediments of silt loam texture. The soils on the stream terraces are Hord soils with some areas of Hall and Detroit soils.

Grain sorghum and corn are the principal irrigated crops. Some alfalfa is grown. Wheat and grain sorghum are the principal cultivated crops grown under dryland management. Most of this area is in cultivated crops but some unplowed areas remain and these are in native grasses and used for grazing.





SOIL ASSOCIATION AREA 29
CRETE-WYMORE

The soils of this association have developed from materials of many geologic periods but the age of the present landscape is relatively recent and soils developed from Cretaceous or Permian-age materials are probably no older in time of development than the soils from Kansan-age till or Illinoian-age silt and clay. The present landscape is one of rolling hills, flat-topped divides, several large stream valleys including the Blue River valley, and many small upland drainageways that extend to all parts of the uplands.

Loess of Wisconsinan age mantles the divides, rolling hills, and stream terraces. Wymore soils are the most extensive soil developed from the loess material on nearly level to rolling uplands. Butler soils have developed on upland flats, and Fillmore and Scott soils are present in the upland swales and depressions. Crete soils have developed from Wisconsinan-age loess on nearly level and gently sloping stream terraces throughout the county and on upland flats in the western part of this area.

Down-slope from the Wymore soils are the soils developed in reddish-brown silt, clay, and sandy gravel. Geary soils have developed in clayey silts; Morrill soils in loamy materials containing many coarse sand grains and pebbles; and Adair or Mayberry soils in clayey till-like materials. Associated with the Morrill soils are small areas of Jansen soils with gravelly substrata, and soils with deep sandy profiles that are of significance locally but as yet unnamed.

Glacial materials outcrop on the slopes throughout most of the area and Pawnee, Shelby, Burchard, and Steinauer soils have developed in the clay and clay loam till. The Pawnee, Burchard, and Steinauer soils are an expression of varying degrees of soil development with Pawnee having the strongest development and Steinauer the weakest development. Shelby and Pawnee soils are similar in the degree of development but the Shelby soils have developed at sites where the till is not as high in clay as the sites where Pawnee soils developed. The subsoil of the Shelby soils is clay loam and the subsoil of the Pawnee soils is clay. Burchard and Steinauer soils have subsoil textures of either clay or clay loam, depending on the clay content of the parent till.

Pre-Pleistocene materials outcrop in the southern part of this area. Lancaster and Hedville soils have developed from sandstone of Dakota age; Sogn and Labette or Benfield soils from limestone; Kipp and Kipson from interbedded limestone and limy shale; Lanham and Kipson soils from shale.

Throughout the area Judson soils are the principal soils on the footslopes. Bottomland soils are Hobbs, Colo, Leshara, Lamo, and Cass. Crete and Muir soils have developed on the terrace levels of the present streams.

Wheat, grain sorghum, and corn are the principal cultivated crops. Grasslands are present on the hilly and steep slopes throughout the uplands and are grazed. Trees grow along the drainageways and on the steep, stony slopes.

SOIL ASSOCIATION AREA 30
WYMORE-PAWNEE

This is an area of rolling hills with rounded ridgetops and well defined drainageways. Small, nearly level areas are present on the divides between major streams. The surface drainage is rapid and overflow of the bottomlands is frequent. Loess of Peorian age mantles the divides, ridgetops, and upper slopes and glacial materials are exposed on most of the lower slopes. Throughout the area there are soils developed in the reddish-brown materials of Illinoian age, and locally, there are soils developed from Fullerton-age silt and Permian and Pennsylvanian-age limestone and shale. Throughout the area the landscape consists of small areas of soils developed from materials of several geologic periods, giving rise to a complex pattern of soils.

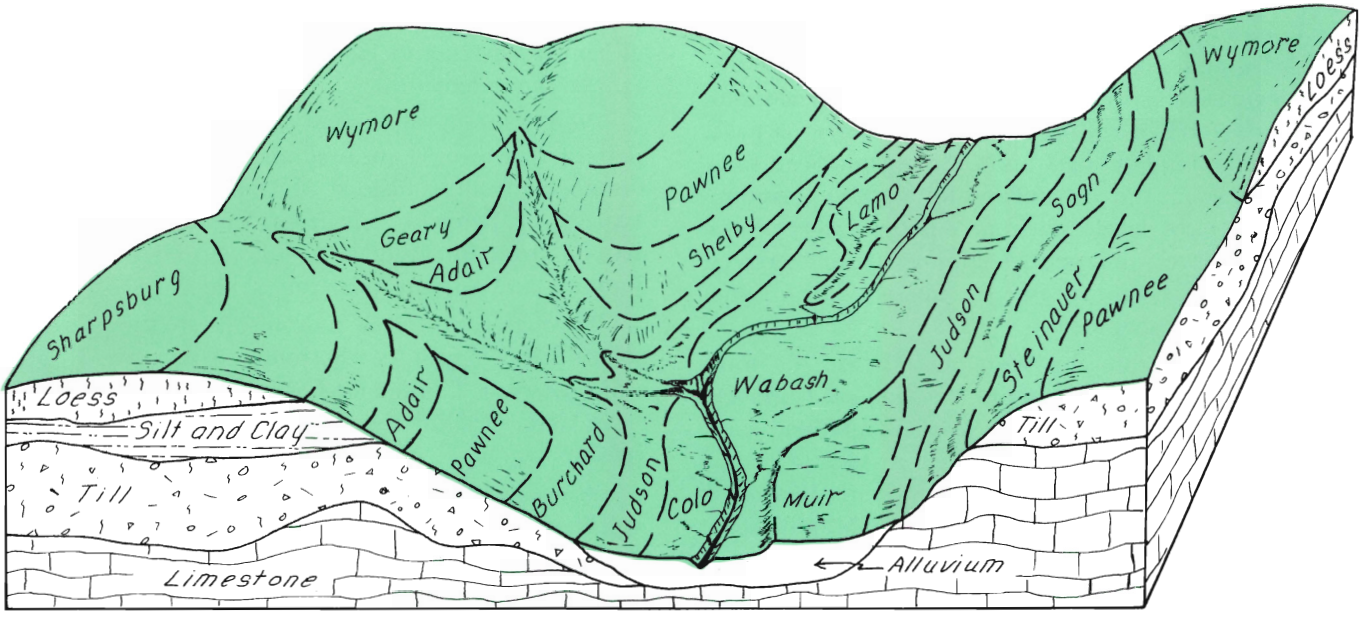
Wymore and Sharpsburg soils have developed in the loess with Wymore soils being the more extensive. Wymore soils have a dark-colored surface horizon, 8 to 20 inches thick, and dark grayish-brown silty clay subsoils which grade gradually to gray loess with many large prominent yellowish-brown and dark-brown iron stains and iron concretions. A few hard lime concretions may be present below 40 inches but the loess below the subsoil is usually noncalcareous. Sharpsburg soils have brown silty clay loam subsoils which grade gradually to pale-brown or grayish-brown noncalcareous loess.

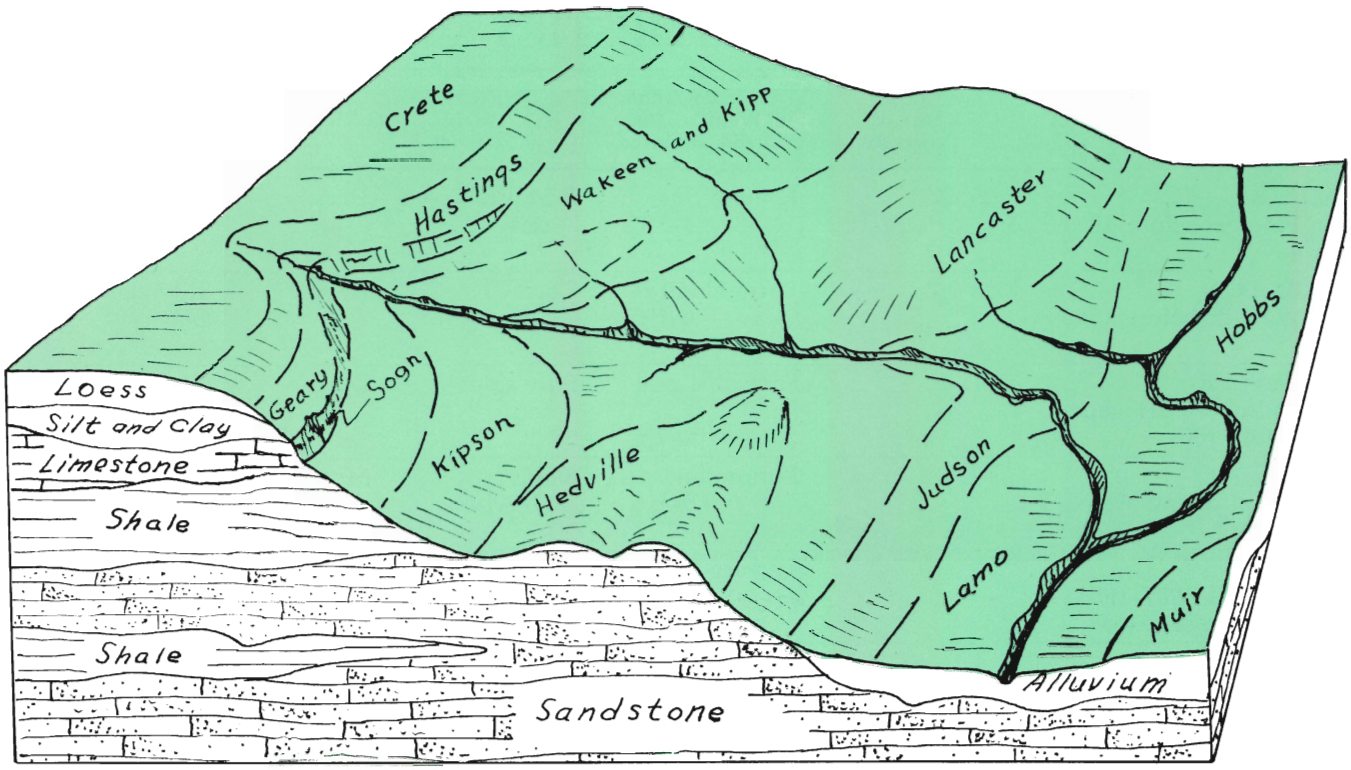
Longford, Geary, Adair, and Morrill soils are the soils developed in reddish-brown materials of Illinoian age. Longford and Geary have developed in loess or loess-like material that is relatively free of coarse sand grains and pebbles. Both have dark-colored surface horizons and noncalcareous reddish-brown subsoils and substrata. Longford has a more clayey subsoil, silty clay texture, than Geary, silty clay loam texture. Adair differs from Longford in having many sand grains, pebbles, and some stones of glacial origin throughout the soil and, frequently, a layer of coarse gravel or stones in the subsoil. Morrill soils are less clayey than Adair soils with a clay loam, gravelly clay loam, or loam subsoil with coarse sand and pebbles but few or no stones.

Several minor and as yet unnamed soils have developed from the silt and fine sand of Fullerton age materials. Malcolm, one of this group of soils, has developed in silty loess-like material and is similar to the Marshall soil. Pawnee, Shelby, Burchard, and Steinauer soils have developed in glacial till. This group of soils has grayish-brown and yellowish-brown subsoils which grade into unleached till.

Sogn soils are the shallow soils developed from limestone. The surface horizon contains many limestone fragments, varying amounts of larger pieces of limestone, and the unconsolidated material is less than 20 inches thick over the limestone bedrock.

Cultivated crops are grown on the gentle slopes, rolling hills and bottomlands. The steeply rolling slopes have not been plowed and are in native grasses used for grazing. Wheat, grain sorghum, and corn are the principal cultivated crops.





SOIL ASSOCIATION AREA 31
LANCASTER-HEDVILLE

The soils of this area have developed on hilly slopes from sandstone, limestone, and calcareous shale and on footslopes and bottomlands from materials washed from the sloping uplands. The slopes are smooth with few rock outcrops.

The soils developed in sandstone are Hedville, a shallow weakly developed soil less than 20 inches thick over sandstone, and Lancaster, a soil with sandy clay loam or clay loam subsoil grading to sandstone below 40 inches.

Kipson, Kipp, and Wakeen soils developed in interbedded limestone and calcareous shale. Kipson soils are shallow, weakly developed clayey soils with less than 20 inches of unconsolidated material over bedrock. Kipp and Wakeen soils have a thicker layer of unconsolidated material over the bedrock than Kipson soils and Wakeen soils are not as clayey as Kipp and Kipson soils. Loess of Illinoian and Wisconsinan ages mantled the area and is often evident in the surface and upper subsoil horizons of the soils. Reddish colors in the soils are suggestive of loess of Illinoian age and loamy materials with grayish-brown colors and few or no sand grains or rock chips suggest the materials to be Peorian-age loess.

Judson soils are the principal soils on the footslope positions and Hobbs, Lamo, and Leshara soils have developed on the bottomland sites. Judson and Hobbs are well drained soils. Lamo and Leshara soils are somewhat poorly drained but not too wet to be cultivated. Runoff is rapid on the sloping lands and most of the streams overtop their banks several times each year. The frequently flooded strip is usually wooded and silting and scour occurs during each flood. These areas are designated a landtype of the appropriate texture—silty alluvial soils, clayey alluvial soils, etc.

The upland slopes are, for the most part, too steep to be cultivated and are in native grasses used for grazing. Cultivated fields are usually small and are located on ridgetops, on footslopes, and on bottomlands. Feed grains and alfalfa are grown on the bottomland soils and sorghum and wheat on the upland soils. Trees grow along the drainageways in open stands and along the fence rows and in the grassed areas as single trees or groups of trees.

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone [1]	Texture of Surface Soil
ADAIR Pawnee before 1959	29, 30	Upland 3–10%	Reddish-brown clay	Deep	Silty clay loam Clay loam
ALBATON Wabash before 1960	22	Bottomland f[1] 0–1%	Clayey alluvium	Deep	Silty clay Clay
ALCESTER Judson or Bridgeport before 1965	11, 16	Footslope and fans 1–7%	Silty slope wash	Deep	Silt loam Silty clay loam
ALDA Wann before 1966	19	Bottomland [w2] 0–1%	Sandy alluvium	Moderately deep	Loam Sandy loam
ALICE Parshall 1957–1965 Tripp before 1957	6	Terrace 1–3%	Sandy alluvium	Deep	Loamy sand Sandy loam
ALTVAN Rosebud before 1957	4	High terrace and upland 1–9%	Alluvium and loess	Deep	Silt loam Loam
ANSELMO	5, 7	Uplands 1–9%	Eolian sand and silt	Deep	Sandy loam Loamy sand
BANKARD Sarpy before 1959 Banks 1959–1965	8	Bottomland 0–1% [w]	Sandy alluvium	Deep	Loamy sand Sandy loam
BARNEY Sarpy or Riverwash before 1957	19, 22	Bottomland 0–1% [w3]	Sandy alluvium	Shallow	Sandy loam Loamy sand
BATIN Hastings before 1967	23, 26	Upland 7–15%	Loess	Deep	Silty clay loam
BAYARD Bridgeport before 1952	2, 6	Footslope 1–7%	Sandy slope wash	Deep	Sandy loam Loamy sand
BELFORE Marshall or Moody before 1955	15	Upland 0–3%	Loess	Deep	Silty clay loam
BOEL Sarpy before 1966	19	Bottomland 0–1% [w2]	Sandy alluvium	Deep	Loam Sandy loam
BOELUS Marshall or Moody before 1967	14, 18	Terrace and upland 1–12%	Sand over loess	Deep	Loamy sand
BOYD	11	Upland 3–7%	Shale	Moderately deep	Silty clay Silty clay loam
BRIDGEPORT	2, 4, 6, 9	Footslope 1–7%	Silty slope wash	Deep	Silt loam

f[1] occasionally overflowed
w well drained
w1 moderately well drained
w2 somewhat poorly drained
w3 poorly drained

[1] Very shallow 1–10 inches
Shallow 10–20 inches
Moderately deep 20–40 inches
Deep—more than 40 inches

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil [2]	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. [3]	Available Water [4]	Principal Crops	Yield Rating [5] Irrig.	Yield Rating [5] Dry
Medium acid	Clay	Very slow	3	4.9	Sorghum	—	M
					Grass	—	H
Medium acid	Clay	Very slow	2	4.6	Soybeans	H	M
					Corn	H	M
Mildly alkaline	Silt loam	Moderate	1	6.3	Corn	H	M
					Alfalfa	H	M
Mildly alkaline	Sandy loam	Moderately rapid	2	4.1	Corn	M	M
					Grass	—	H
Neutral and mildly alkaline	Sandy loam	Moderately rapid	1	5.0	Corn	M	L
					Alfalfa	M	L
Neutral	Loam Clay loam	Moderate	1	6.1	Wheat	—	M
					Grass	—	L
Slightly acid to mildly alkaline	Sandy loam	Moderately rapid	1	4.4	Corn	M	L
					Grass	—	M
Neutral	Loamy sand	Rapid	3	2.7	Grass	—	M
					Corn	L	L
Neutral to mod. alkaline	Sand and gravel	Rapid	3	1.8	Grass	—	M
Neutral	Silty clay loam	Moderately slow	3	6.3	Grass	—	M
					Wheat	—	L
Mildly alkaline	Sandy loam	Moderately rapid	1	5.0	Grass	—	L
					Alfalfa	M	L
Medium acid	Silty clay	Slow	1	5.7	Corn	H	M
					Alfalfa	H	M
Neutral and mildly alkaline	Fine sand	Rapid	3	3.2	Grass	—	H
					Corn	M	L
Neutral	Silt loam	Moderate	2	5.4	Corn	M	M
					Alfalfa	M	M
Mildly alkaline	Clay	Very slow	3	4.6	Grass	—	M
					Sorghum	—	M
Mildly alkaline	Silt loam Loam	Moderate	1	6.3	Corn	H	L
					Grass	—	M

[2] Strongly acid pH 5.1–5.5
Medium acid pH 5.6–6.0
Slightly acid pH 6.1–6.5
Neutral pH 6.6–7.3
Mildly alkaline pH 7.4–7.8
Moderately alkaline pH 7.9–8.4
Strongly alkaline pH 8.5–9.0

[3] 1. Well suited on slopes under 3 percent
2. Moderately suitable
3. Poorly suited
See text page 8

[4] Inches of water available to plants in 3 feet of soil at field capacity.

[5] See text page 8

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
BUFFINGTON Orella before 1960	2, 6	Footslope 1–7%	Clayey slope wash	Deep	Silt loam Silty clay loam
BURCHARD Carrington or Shelby before 1938	27, 29, 30	Upland 5–18%	Clayey till	Deep	Clay loam Silty clay loam
BUTLER	26, 28	Upland 0–1	Loess	Deep	Silt loam
CANYON	3, 4	Upland 8–30%+	Sandstone	Shallow and very shallow	Loam Sandy loam
CARR Cass before 1961	8, 19, 22	Bottomland f1 0–1 w	Sandy alluvium	Deep	Sandy loam Loam
CASS	19, 22	Bottomland 0–1 w	Sandy alluvium	Deep	Sandy loam Loam
CHAPPELL Rosebud before 1959	4, 6	Footslope 2–7%	Loamy alluvium over sand & gravel	Moderately deep	Sandy loam Loam
CHEYENNE	4	Terrace 0–2%	Loamy alluvium over sand & gravel	Moderately deep	Loam
COLBY	9, 17, 23	Upland 8–30%+	Loess	Deep	Silt loam
COLO Wabash before 1953	20, 22, 29, 30	Bottomland 0–1% f1 w2	Silty alluvium	Deep	Silty clay loam
COZAD Hall before 1967	18	Terrace 0–2%	Silty alluvium	Deep	Silt loam
CREIGHTON Rosebud before 1957 Vebar 1957–1965	4, 5	Upland 1–8%	Sandstone	Deep	Loam V-fine sandy loam
CRETE	26, 28, 29	Upland 1–4%	Loess	Deep	Silt loam Silty clay loam
CROFTON	15, 16	Upland 3–30%+	Loess	Deep	Silt loam
DARR Cass before 1966	19	Bottomland 0–1% w	Sandy alluvium	Moderately deep	Sandy loam
DAWES	4	Upland 0–2	Loess	Deep	Silt loam Loam
DETROIT Hall or Wood River before 1965	23, 26	Terrace 0–3	Loess and alluvium	Deep	Silty clay loam
DIX Gravelly land type before 1957	4	Upland 5–30%	Sand & silt over gravel	Shallow	Loam Gravelly loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil 2	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. 3	Available Water 4	Principal Crops	Yield Rating 5 Irrig.	Yield Rating 5 Dry
Mildly to moderately alkaline	Silty clay loam	Moderately slow	2	6.3	Corn Grass	M —	— L
Medium acid to neutral	Clay loam	Moderately slow	3	5.9	Alfalfa Grass	— —	M H
Medium acid	Silty clay	Very slow	2	5.6	Sorghum Wheat	M —	M H
Mildly and mod. alkaline	Sandstone	Moderate	3	2.0	Grass	—	L
Mildly and mod. alkaline	Sandy loam	Moderately rapid	2	4.8	Corn Alfalfa	M H	M M
Slightly acid	Sandy loam	Moderately rapid	1	5.0	Corn Alfalfa	H H	M M
Neutral	Sandy loam	Moderately rapid	2	4.0	Wheat Corn	— M	M —
Neutral	Loam Clay loam	Moderate	2	5.1	Wheat Corn	— M	M —
Neutral to mod. alkaline	Silt loam	Moderate	3	6.0	Grass	—	L
Neutral to slightly acid	Silty clay loam	Moderately slow	2	6.3	Corn Wheat	H —	M H
Neutral to mildly alkaline	Silt loam Loam	Moderate	1	6.0	Corn Alfalfa	H H	M M
Neutral	Loam V. fine sandy loam	Moderate	1	6.0	Grass Wheat	— —	M M
Medium acid	Silty clay	Slow	1	5.7	Wheat Sorghum	— H	H M
Neutral and mod. alkaline	Silt loam	Moderate	3	6.3	Grass	—	M
Medium to slightly acid	Sandy loam	Moderately rapid	2	4.0	Corn Grass	M —	M H
Neutral	Silty clay	Slow	2	6.0	Wheat Sorghum	— M	H L
Slightly acid	Silty clay	Slow	1	5.9	Corn Wheat	H —	M H
Neutral	Gravel	Rapid	3	1.6	Grass	—	L

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
DUNDAY Valentine before 1957	5, 7	Sandhill dry valley 0–3%	Sand	Deep	Loamy sand
DUROC Tripp before 1965	4, 6, 9	Terrace & Upland 0–3%	Loess and alluvium	Deep	Silt loam Loam
DWYER Valentine before 1957	5, 6, 7	Upland 3–30%	Sand	Deep	Fine sand Loamy sand
ELSMERE Cass, Valentine or Thurman before 1950	7, 13	Sandhill Valley 0–3%	Sand	Deep	Loamy sand
EPPING	2, 6	Upland 3–17%	Siltstone	Shallow	Silt loam
FILLMORE	26, 28	Upland 0–1%	Loess	Deep	Silt loam
GANNETT	7	Upland swale 0–1% w3	Sand	Moderately deep	Fine sand Loamy fine sand
GEARY Nuckolls or Carrington before 1959	26, 29	Upland 3–12%	Reddish-brown clayey silt	Deep	Silty clay loam
GERING Laurel before 1959 Las 1959–1965	8	Bottomland 0–1% w2	Loamy alluvium	Moderately deep	Loam
GIBBON Lamoure before 1965	19	Bottomland 0–1% w2	Silty alluvium	Deep	Silty clay loam Silt loam
GLENBERG Laurel before 1957 Glendive 1957–1966	8	Bottomland 0–1% w	Sandy alluvium	Deep	Sandy loam Loam
GOSHEN	4, 9	Upland swales 0–2%	Loess	Deep	Silt loam
GRIGSTON Lamoure before 1957 Volin 1957–1965	8, 19	Low terrace 0–2%	Silty alluvium	Deep	Silt loam
HALL	18, 26, 29	Terrace 0–2%	Loess and alluvium	Deep	Silt loam
HARNEY Hastings before 1965	23	Upland 3–10%	Loess	Deep	Silt loam
HASTINGS	26, 28	Upland 1–11%	Loess	Deep	Silt loam
HAVERSON Laurel before 1960 Havre 1960–1965	8	Bottomland 0–1% w	Silty alluvium	Deep	Loam Sandy loam
HAYNIE Wabash or Plattsmouth before 1960	22	Bottomland 0–1% w	Loamy alluvium	Deep	Silt loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil 2	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. 3	Available Water 4	Principal Crops	Yield Rating 5 Irrig.	Yield Rating 5 Dry
Slightly acid and neutral	Sand	Rapid	3	1.6	Grass	—	M
					Alfalfa	M	L
Neutral to mildly alkaline	Loam	Moderate	1	6.3	Alfalfa	H	L
	Silt loam				Wheat	—	H
Mildly alkaline	Sand	Rapid	3	1.2	Grass	—	L
Mildly alkaline	Loamy sand Sand	Rapid	3	1.8	Grass	—	M
Mildly alkaline	Siltstone	Moderate	3	2.0	Grass	—	L
Medium acid	Silty clay	Very slow	2	5.5	Sorghum	M	L
					Grass	—	M
Neutral and mildly alkaline	Sandy loam	Moderately rapid	3	3.7	Grass	—	H
Medium acid	Silty clay loam	Moderately slow	3	6.2	Sorghum	—	M
					Wheat	—	M
Moderately alkaline	Loam	Medium	2	4.5	Grass	—	H
					Alfalfa	M	M
Mildly alkaline	Silt loam	Moderately slow	2	6.3	Corn	M	M
					Alfalfa	M	M
Neutral	Sandy loam	Moderately rapid	1	4.9	Corn	H	L
					Alfalfa	H	M
Neutral and slightly acid	Silty clay loam	Moderate	1	6.3	Wheat	—	H
					Corn	H	L
Neutral	Silt loam	Moderate	1	6.3	Sorghum	H	M
					Wheat	—	M
Slightly and medium acid	Silty clay loam	Moderately slow	1	6.3	Sorghum	H	M
					Alfalfa	H	M
Neutral and slightly acid	Silty clay loam	Moderately slow	1	6.3	Sorghum	H	L
					Wheat	—	H
Slightly and medium acid	Silty clay loam	Moderately slow	1	6.3	Sorghum	H	M
					Wheat	—	H
Neutral	Loam	Medium	1	6.1	Corn	H	L
					Grass	—	M
Neutral and mildly alkaline	Stratified Silt loam & Sandy loam	Medium	1	5.9	Corn	H	M
					Soybeans	H	M

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
HEDVILLE Lancaster before 1952	29, 31	Upland 7–30%+	Sandstone	Shallow	Loam Sandy loam
HOBBS Wabash before 1957	20, 26, 29	Bottomland 0–1% f1	Silty alluvium	Deep	Silt loam
HOLDREGE	23, 24	Upland 0–10%	Loess	Deep	Silt loam
HOLT	10	Upland 1–6%	Sandstone	Moderately deep	Sandy loam Loamy sand
HORD Hall before 1957	18, 23, 24	Terrace and Upland 0–2%	Loess and alluvium	Deep	Silt loam Loam
INAVALE Sarpy before 1965	19	Bottomland 0–2%	Sandy alluvium	Deep	Loamy sand Fine sand
JANISE Minatare before 1968	6, 8	Colluvial swales & bottomland 0–1%	Silty alluvium	Deep	Loam Silt loam
JANSEN Shelby, O'Neill (Upland) before 1965	12, 26	Upland 2–10%	Clay loam Sand and gravel	Moderately deep	Loam Clay loam
JUDSON	15, 20, 21	Footslope 2–6%	Silty slope wash	Deep	Silt loam Silty clay loam
KADOKA	2	Upland 2–14%	Siltstone	Deep	Silt loam
KEITH	2, 4, 9	Upland 0–5%	Loess	Deep	Silt loam
KENESAW Colby before 1957	23, 25	Upland 0–5%	Loess with sand lenses	Deep	Silt loam
KENNEBEC Wabash before 1960	22	Bottomland 0–1 w	Silty alluvium	Deep	Silt loam
KEOTA Mitchell or Bridgeport before 1960	2, 6	Upland 2–14%	Siltstone	Moderately deep	Silt loam
KIPSON Sogn before 1965	23, 29, 30	Upland 7–30%	Limestone Limy shale	Shallow	Silt loam Silty clay loam
KUMA Keith before 1965	4, 9	Upland 0–3%	Loess	Deep	Silt loam
KYLE Pierre before 1965	1	Upland 2–6%	Shale	Deep	Clay
LABETTE	29, 30	Upland 2–8%	Limestone	Deep	Silty clay loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil [2]	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. [3]	Available Water [4]	Principal Crops	Yield Rating [5] Irrig.	Yield Rating [5] Dry
Strongly acid	Sandstone	Moderately rapid	3	2.5	Grass	—	M
Slightly acid	Silt loam	Medium	2	6.3	Corn	H	H
					Soybeans	H	H
Slightly acid to neutral	Silty clay loam	Medium	1	6.3	Sorghum	H	M
					Wheat	—	H
Neutral and slightly acid	Sandy loam Loam	Moderately rapid	2	4.0	Wheat	—	M
					Grass	—	M
Slightly acid	Silt loam	Medium	1	6.3	Sorghum	H	M
					Alfalfa	H	M
Neutral to slightly alkaline	Loamy sand	Rapid	3	2.9	Grass	—	H
Strongly alkaline	Silty clay loam Silt loam	Moderately slow	3	6.0	Grass	—	L
Slightly acid and neutral	Clay loam	Moderate	2	4.9	Sorghum	M	M
					Grass	—	M
Medium and slightly acid	Silty clay loam	Moderate	1	6.3	Sorghum	H	H
					Wheat	—	H
Neutral and mildly alkaline	Silty clay loam	Moderate	2	6.3	Wheat	—	M
					Grass	—	L
Neutral	Silty clay loam Silt loam	Moderate	1	6.3	Wheat	—	H
					Sorghum	M	L
Neutral and mildly alkaline	Silt loam	Moderate	1	6.3	Sorghum	H	M
					Wheat	—	M
Slightly acid and neutral	Silt loam	Moderate	1	6.5	Corn	H	H
					Alfalfa	H	M
Mildly alkaline	Silt loam	Moderate	2	5.2	Beets	M	—
					Grass	—	L
Mildly alkaline	Limestone	Moderate	3	2.0	Grass	—	M
Neutral	Silty clay loam Silt loam	Moderate	1	6.3	Wheat	—	H
					Sorghum	M	L
Neutral and mildly alkaline	Clay	Very slow	3	4.5	Grass	—	L
					Wheat	—	L
Slightly acid	Silty clay	Slow	3	5.5	Sorghum	—	M
					Grass	—	H

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
LAMO Lamoure before 1965	19, 22	Bottomland 0–1% w2	Silty alluvium	Deep	Silty clay loam
LANCASTER	29, 31	Upland 2–12%	Sandstone	Deep	Loam
LAS Laurel before 1959	8	Bottomland 0–1% w2	Loamy alluvium	Deep	Sandy loam
LAS ANIMAS	8	Bottomland 0–1% w2	Sandy alluvium	Deep	Sandy loam
LESHARA Lamoure before 1957	19, 22	Bottomland 0–1% w2	Silty alluvium	Deep	Silt loam
LEX Lamoure before 1965	19	Bottomland 0–1% w2	Alluvium over sand & gravel	Moderately deep	Silt loam
LIBORY Hall before 1950	14, 18, 23	Upland and terrace 1–5%	Sand over silt	Deep	Loamy sand Sandy loam
LONGFORD Nuckolls before 1960 Geary 1960–1965	26, 29	Upland 2–7%	Reddish-brown clayey silt	Deep	Silty clay loam
LORETTO Marshall before 1950	14, 15, 23	Upland and terrace 1–12%	Sand over loess	Deep	Sandy loam Loamy sand
LOUP Sarpy, Gannett or Cass before 1940	7, 13	Bottomland 0–1% w3	Sand	Deep	Loamy sand Sandy loam
LUTON 1953	22	Bottomland 0–1% w3	Clayey alluvium	Deep	Silty clay Clay
McCOOK Laurel before 1960 Las 1960–1965	8	Bottomland 0–1% w	Silty alluvium	Deep	Loam Silt loam
McGREW Wann before 1965	8	Bottomland 0–1% w2	Sandy alluvium over sand and gravel	Moderately deep	Loam Sandy loam
McPAUL	21, 22	Bottomland 0–1% w	Silty alluvium	Deep	Silt loam
MALCOLM Sharpsburg before 1960	27, 29, 30	Upland 2–15%	Silt	Deep	Silty clay loam
MARSHALL	20, 21	Upland 1–20%	Loess	Deep	Silty clay loam
MEADIN O'Neill or Simeon before 1957	12, 18	Terrace & upland 0–30%	Sand and gravel	Shallow	Sandy loam Loamy sand
MINATARE	8	Bottomland 0–1% w2	Silty alluvium	Deep	Loam Clay loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil 2	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. 3	Available Water 4	Principal Crops	Yield Rating 5 Irrig.	Yield Rating 5 Dry
Neutral and mildly alkaline	Silty clay loam	Moderately slow	2	6.0	Corn Wheat	M —	M M
Medium acid	Clay loam	Moderate	2	5.9	Sorghum Grass	— —	M H
Mildly alkaline	Loam Clay loam	Moderate	2	4.5	Corn Grass	M —	— H
Mildly alkaline	Sandy loam	Moderately rapid	2	3.9	Corn Grass	M —	— H
Mildly and moderately alkaline	Silt loam Loam	Moderate	2	6.3	Corn Alfalfa	M M	M M
Mildly alkaline	Silty clay loam Clay loam	Moderately slow	2	5.1	Corn Alfalfa	M M	L L
Neutral	Loamy sand over silt loam	Moderately rapid	2	3.8	Corn Alfalfa	M M	M M
Slightly and medium acid	Silty clay	Slow	3	5.6	Sorghum Wheat	— —	M M
Slightly acid and neutral	Loam Silt loam	Moderate	2	5.0	Corn Grass	H —	M H
Mildly alkaline	Sand	Rapid	3	2.2	Grass	—	H
Slightly acid to mildly alkaline	Silty clay Clay	Very slow	2	4.2	Soybeans Corn	— —	M M
Mildly alkaline	Loam	Moderate	1	6.0	Corn Alfalfa	H H	L L
Mildly and moderately alkaline	Sandy loam	Moderately rapid	2	4.3	Corn Grass	M —	— H
Mildly and moderately alkaline	Silt loam	Moderate	1	6.3	Corn Alfalfa	H M	H M
Medium acid	Silty clay loam	Moderate	3	6.3	Sorghum Grass	— —	M H
Medium acid	Silty clay loam	Moderate	1	6.5	Sorghum Wheat	H —	H H
Medium acid	Sand and gravel	Very rapid	3	1.4	Grass	—	L
Mod. to very strongly alakline	Clay loam	Very slow	3	5.6	Grass	—	L

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
MITCHELL	6	Terrace and footslopes	Silt over siltstone	Deep	Silt loam
MONONA Marshall before 1960	21	Upland 1–20%	Loess	Deep	Silt loam
MOODY	15	Upland 1–10%	Loess	Deep	Silty clay loam Silt loam
MORRILL Carrington before 1959	29, 30	Upland 3–15%	Reddish-brown loamy materials	Deep	Loam Clay loam
MUIR Waukesha before 1960	20, 29, 30	Terrace 0–3%	Silty alluvium	Deep	Silt loam Silty clay loam
NODAWAY Wabash before 1940	22	Bottomland 0–1% f1	Silty alluvium	Deep	Silt loam
NORA Moody before 1955	15, 16	Upland 3–20%	Loess	Deep	Silty clay loam
NUCKOLLS	23	Upland 4–15%	Reddish-brown clayey silt	Deep	Silt loam
NUNN Tripp or Yale before 1965	4, 6	Terrace 0–2%	Silty alluvium	Deep	Silt loam
ONAWA Wabash before 1950	22	Bottomland 0–1% w2	Clayey alluvium	Deep	Silty clay
O'NEILL	18	Terrace 0–5%	Sandy, gravelly alluvium	Moderately deep	Loam Sandy loam
ORELLA	2	Upland 1–20%	Clay over claystone	Shallow	Silty clay
ORTELLO Hall or Dickinson before 1957	14, 18, 23	Terrace and upland 0–8%	Sand	Deep	Sandy loam Loam
OTERO Bayard before 1965	2, 6	Footslope 1–7%	Sandy slope wash	Deep	Sandy loam Loamy sand
OVINA Cass or Gannett before 1957	7	Upland swales 0–1% w2	Sand	Deep	Sandy loam Loamy sand
PARSHALL See ALICE					
PAWNEE	27, 29, 30	Upland 1–7%	Clayey till	Deep	Silty clay loam Clay loam
PENNY Nuckolls before 1960 Geary 1960–1965	23, 26	Upland 3–15%	Reddish-brown clayey silt	Deep	Silty clay loam Silt loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil [2]	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. [3]	Available Water [4]	Principal Crops	Yield Rating [5] Irrig.	Yield Rating [5] Dry
Mildly alkaline	Silt loam	Moderate	1	6.0	Corn	M	—
					Alfalfa	M	—
Medium and slightly acid	Silt loam	Moderate	1	6.5	Sorghum	H	H
					Wheat	—	M
Neutral and slightly acid	Silty clay loam	Moderately slow	1	6.5	Corn	H	M
					Alfalfa	H	M
Medium acid	Clay loam	Moderately slow	3	5.9	Sorghum	—	M
					Wheat	—	M
Slightly acid and neutral	Silty clay loam Silt loam	Moderate	1	6.5	Sorghum	H	H
					Wheat	—	H
Neutral	Silt loam	Moderate	2	6.3	Sorghum	M	M
					Soybeans	M	M
Neutral	Silt loam Silty clay loam	Moderate	3	6.3	Sorghum	—	M
					Oats	—	M
Neutral and mildly alkaline	Silty clay loam	Moderate	3	6.3	Sorghum	—	L
					Wheat	—	M
Neutral and mildly alkaline	Clay loam Silty clay loam	Moderately slow	1	6.1	Corn	M	—
					Wheat	—	M
Mildly alkaline	Silty clay over silt loam	Slow	3	5.5	Soybeans	—	M
					Corn	—	M
Medium acid	Sandy loam	Rapid	2	4.0	Sorghum	M	L
					Alfalfa	M	L
Mildly to strongly alkaline	Claystone	Very slow	3	1.8	Grass	—	L
Medium acid to neutral	Sandy loam	Moderately rapid	1	4.5	Sorghum	H	M
					Alfalfa	H	L
Mildly alkaline	Sandy loam	Moderately rapid	2	4.2	Grass	—	L
					Alfalfa	M	—
Neutral	Sandy loam	Moderately rapid	2	4.2	Grass	—	H
					Alfalfa	M	M
Medium acid	Clay	Very slow	3	4.9	Sorghum	—	M
					Grass	—	M
Neutral	Silty clay loam	Moderately slow	3	6.3	Wheat	—	L
					Sorghum	—	L

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone 1	Texture of Surface Soil
PIERRE	1	Upland 1–7%	Shale	Moderately deep	Clay
PLATTE Sarpy or Riverwash before 1957	8, 19	Bottomland 0–1% w3	Loam over sand & gravel	Shallow	Loam Sandy loam
PROMISE Pierre before 1965	11	Upland 1–7%	Shale	Deep	Clay
RELIANCE Moody before 1940	11	Upland 1–7%	Loess	Deep	Silty clay loam
RICHFIELD Keith before 1960	4, 9	Upland 0–3%	Loess	Deep	Silt loam
ROSEBUD	4	Upland 1–8%	Sandstone	Moderately deep	Loam Silt loam
ROXBURY	8	Low terrace 0–1% f1	Silty alluvium	Deep	Silt loam
RUSCO Colby or Holdrege before 1965	23, 25	Upland basin 0–1% f1	Loess	Deep	Silt loam
SALIX Wabash before 1960	22	Bottomland 0–1% w	Silty alluvium	Deep	Silt loam Silty clay loam
SAMSIL Lismas before 1965	1	Upland 2–30%	Shale	Shallow	Clay
SARPY	19, 22	Bottomland 0–1% f3	Sandy alluvium	Deep	Loamy sand Sand
SCOTT	26, 28	Upland depression f3	Loess	Deep	Silt loam Silty clay loam
SHARPSBURG Marshall before 1938	20	Upland 1–14%	Loess	Deep	Silty clay loam
SHELBY	27, 29, 30	Upland 1–14%	Clayey till	Deep	Loam Silty clay loam
SILVER CREEK Lamoure before 1957	18	Low terrace 0–1 w2	Silty alluvium	Deep	Silt loam Silty clay loam
SIMEON	7, 23	Terrace 0–3	Sandy alluvium	Moderately deep	Sandy loam Loamy sand
SOGN	29, 30	Upland 10–40%+	Limestone	Shallow	Silt loam Clay loam
STEINAUER Carrington or Shelby before 1938	27, 29, 30	Upland 8–30%+	Clayey till	Deep	Clay loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil 2	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. 3	Available Water 4	Principal Crops	Yield Rating 5 Irrig.	Dry
Neutral and mildly alkaline	Clay	Very slow	3	3.5	Grass	—	L
Mildly alkaline	Sand and gravel	Rapid	3	1.2	Grass	—	H
Mildly alkaline and neutral	Clay	Very slow	3	4.2	Grass Wheat	— —	M M
Neutral	Silty clay loam	Slow	2	6.3	Corn Grass	M —	M M
Neutral	Silty clay loam	Moderately slow	1	6.3	Sorghum Wheat	M —	— H
Neutral and mildly alkaline	Loam Clay loam	Moderate	2	4.9	Corn Wheat	M —	— M
Mildly alkaline	Silt loam	Moderate	2	6.3	Wheat Alfalfa	— M	M M
Neutral and mildly alkaline	Silty clay loam	Moderate	2	6.3	Sorghum Wheat	H —	M M
Neutral	Silt loam	Moderate	1	6.3	Corn Soybeans	H H	M M
Moderately and mildly alkaline	Shale	Very slow	3	1.3	Grass	—	L
Mildly alkaline and neutral	Sand Loamy sand	Very rapid	3	2.5	Grass Corn	— —	H L
Medium acid	Clay Silty clay	Very slow	3	4.7	Annual weeds, sedges, rushes	—	—
Medium acid	Silty clay loam	Moderately slow	1	6.2	Sorghum Wheat	H —	M H
Medium acid	Clay loam	Slow	3	5.9	Sorghum Grass	— —	M H
Neutral and mildly alkaline	Silty clay	Slow	2	5.8	Sorghum Alfalfa	M M	M M
Neutral	Loamy sand Sand	Rapid	3	2.2	Grass Alfalfa	— M	L L
Mildly alkaline and neutral	Limestone	Moderate	3	2.0	Grass	—	M
Mildly alkaline	Clay loam Clay	Moderately slow	3	5.7	Grass	—	H

SOIL CHARACTERISTICS CHART

Soil Series	Principal Area of Occurence	Physiographic Position, Slope and Drainage	Parent Material	Depth of Root Zone [1]	Texture of Surface Soil
TASSEL Canyon before 1965	4, 5	Upland 5–30%+	Sandstone	Shallow	Sandy loam
THURMAN	12, 14	Terrace and Upland 1–7%	Sand	Deep	Loamy sand Sandy loam
TRIPP	6	Terrace 0–3%	Loess and alluvium	Deep	Loam Silt loam
ULYSSES Keith before 1959	9, 17	Upland 3–14%	Loess	Deep	Silt loam
VALENTINE	7	Upland 1–30%	Sand	Deep	Sand Loamy sand
VEBAR See Creighton					
VERDEL	11	Terrace 0–3%	Silty alluvium	Deep	Silty clay loam Silty clay
VOLIN Lamoure before 1957	19	Bottomland 0–1% [w]	Silty alluvium	Deep	Silt loam
WABASH	20, 29, 30	Bottomland 0–1% [w2]	Clayey alluvium	Deep	Silty clay Silty clay loam
WAKEEN Bloomington before 1965	23, 31	Upland 3–20%	Limestone	Moderately deep	Silty clay loam
WANN Cass before 1957	19	Bottomland 0–1% [w2]	Sandy alluvium	Deep	Sandy loam
WOOD RIVER Hall before 1957	18	Terrace 0–1%	Loess and alluvium	Deep	Silt loam
WYMORE Crete or Grundy before 1959	29, 30	Upland 1–10%	Loess	Deep	Silty clay loam
ZOOK Wabash before 1965	22	Bottomland 0–1% [w2]	Clayey alluvium	Deep	Silty clay Silty clay loam

SOIL CHARACTERISTICS CHART

Reaction of Surface Soil 2	Texture of Subsoil	Permeability To Air and Water	Suitability for Irrig. 3	Available Water 4	Principal Crops	Yield Rating 5 Irrig.	Yield Rating 5 Dry
Moderately and mildly alkaline	Sandstone	Moderately rapid	3	1.5	Grass	—	L
Moderately and strongly acid	Loamy sand	Rapid	2	2.9	Corn Grass	M —	L M
Mildly alkaline	Loam	Moderate	1	6.3	Corn Alfalfa	H H	— —
Mildly alkaline	Silt loam	Moderate	3	6.3	Wheat Grass	— —	M L
Slightly acid and neutral	Sand	Rapid	3	1.5	Grass	—	L
Neutral and mildly alkaline	Silty clay	Slow	2	5.5	Grass Wheat	— —	M M
Neutral and mildly alkaline	Silt loam	Moderate	1	6.3	Sorghum Alfalfa	H H	M M
Medium acid	Silty clay	Slow Very slow	2	5.5	Corn Wheat	M —	M M
Mildly alkaline	Silty clay loam	Moderately slow	3	5.2	Wheat Grass	— —	M M
Mildly alkaline	Sandy loam	Moderately rapid	2	4.5	Corn Alfalfa	M M	M M
Neutral	Silty clay	Slow	1	5.9	Sorghum Alfalfa	H H	M L
Medium acid	Silty clay	Slow	3	5.7	Sorghum Wheat	— —	M M
Slightly acid and neutral	Silty clay	Slow	3	5.6	Corn Soybeans	— —	M M

Major Soil Groups In Nebraska

Soils may be grouped in a variety of ways depending on the characteristics or properties on which the groupings are based and on the uses to be made of the groups. The grouping used by the National Cooperative Soil Survey is a system of soil classification that defines the classes in terms of observed and measurable soil properties, and enables us to see the relationships of the soils to one another.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 and continued in use until the presently used Comprehensive System of Soil Classification was adopted in 1965.

The current system is designed to accommodate all soils throughout the world. The broadest and most inclusive group is the Order, with all of the soils grouped into ten groups, followed by the Suborder, the Great Group, the Subgroup, the Family, and the Series. The series group names are the soil names, Marshall, Crete, Keith, etc., and these number into the thousands.

The ten orders are Entisol, Vertisol, Inceptisol, Aridisol, Mollisol, Spodosol, Alfisol, Ultisol, Oxisol and Histosol. Most of the Nebraska soils are Entisols or Mollisols.

The Mollisols include most of the soils that were classified in the 1938 classification system as Chernozem, Brunizem (Prairie), Chestnut, and Reddish Prairie, and the asosciated Planosols and Humic Gley soils. Soils that are placed in the Mollisol order developed in temperate climates, have dark-colored surface horizons that are at least 10 inches thick, unless the soil is very thin, and are medium acid to alkaline in reaction. The dark-colored surface layer was formed by the decomposition of plant roots, principally roots of native prairie grasses, and surface vegetation remains that were incorporated into the soil by burrowing worms, insects and rodents. The organic carbon content must average more than 1 percent throughout the dark-colored layer (Nebraska soils range from 1 to 2 percent in cultivated fields to 4 percent in native grass meadows) and must have sufficient structure in the dark-colored layer so that it is not massive and is not hard, or very hard when dry.

The Entisols include most of the soils that the 1938 classification system placed in the Regosol, Lithosol, and Alluvial groups. The most evident and most easily observed characteristic of this group of soil is the lack of distinct horizons or layers. The surface may be light-colored or dark-colored. The texture of the surface and also of the subsoil may range from sand to clay. The soils may be saline, high in calcium carbonate or gypsum, or lack these characteristics. Most of the soils on the floodplains of the streams throughout Nebraska are placed in this group along with many of the soils on steeply sloping sites and the very sandy soils.

The suborders are divisions of the order, primarily separated on the basis of soil characteristics that group the soils developed under similar environments, principally soil drainage, climate or vegetation.

The great groups are divisions based on similarity of the characteristics that reflect the soil temperature, the chemical composition, the self-mulching properties of clays and those that interfere with the growth of roots or the movement of water.

The subgroups are divisions of the great groups based on the similarity to, or deviation from, the central concept or median of the great group definition. The subgroup having the characteristics of the central concept of the great group is named the typic subgroup, and other subgroups have names that indicate the deviation from the central concept.

The family groups are established within a subgroup primarily on the basis of properties important to the growth of plants, or the behavior of soils in engineering use. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

The series group is composed of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and in arrangement in the profile.

The current system is under continual study and revision, and readers interested in the development of the system are referred to these publications: *Soil Classification—A Comprehensive System*, 7th approximation, by the Soil Survey Staff, Soil Conservation Service, U.S. Department of Agriculture, August 1960, and the supplement to this publication issued in March 1967.

The table that follows shows the classification of the 1938 system and the currently used comprehensive system. The suborder and great group classification of the comprehensive system are not shown because the subgroup name includes the suborder and the great group classification. The subgroup name, Typic Haplustoll, is composed of Ustoll, the suborder classification; Haplustoll, the great group classification; and Typic, the subgroup classification.

CLASSIFICATION OF NEBRASKA SOILS

Comprehensive System*				1938 Classification
Series	Family	Subgroup	Order	Great Soil Group
Adair	Fine, montmorillonitic, mesic	Aquic Argiudoll	Mollisol	Brunizem
Albaton	Fine, montmorillonitic, calcareous, mesic	Vertic Haplaquent	Entisol	Alluvial
Alcester	Fine-silty, mixed, mesic	Cumulic Haplustoll	Mollisol	Chernozem
Alda	Coarse-loamy, mixed, mesic	Aquic Fluventic Haplustoll	Mollisol	Alluvial
Anselmo	Coarse-loamy, mixed, mesic	Typic Haplustoll	Mollisol	Chernozem
Barney	Sandy, mixed, noncalcareous, mesic	Typic Haplustoll	Mollisol	Alluvial
Bayard	Coarse-loamy, mixed, mesic	Entic Haplustoll	Mollisol	Chestnut
Belfore	Fine, montmorillonitic, mesic	Udic Argiustoll	Mollisol	Chernozem
Boel	Sandy, mixed, mesic	Aquic Haplustoll	Mollisol	Alluvial
Boelus	Sandy over loamy, mixed, mesic	Typic Haplustoll	Mollisol	Chernozem
Boyd	Fine, montmorillonitic, mesic	Vertic Haplustoll	Mollisol	Chernozem
Bridgeport	Fine-silty, mixed, mesic	Entic Haplustoll	Mollisol	Chestnut
Buffington	Fine, mixed, mesic	Entic Haplustoll	Mollisol	Chestnut
Burchard	Fine-loamy, mixed, mesic	Udic Argiustoll	Mollisol	Brunizem
Butler	Fine, montmorillonitic, noncalcareous, mesic	Abruptic Argiaquoll	Mollisol	Planosol
Canyon	Loamy, mixed, calcareous, mesic, shallow	Ustic Torriorthent	Entisol	Lithisol
Carr	Coarse-loamy, mixed, calcareous, mesic	Typic Udifluvent	Entisol	Alluvial
Cass	Coarse-loamy, mixed, mesic	Fluventic Haplustoll	Mollisol	Alluvial
Chappell	Sandy, mixed, mesic	Aridic Haplustoll	Mollisol	Chestnut
Cheyenne	Fine-loamy, over sandy	Aridic Haplustoll	Mollisol	Chestnut
Colby	Fine-silty, mixed, calcareous, mesic	Typic Ustorthent	Entisol	Regosol
Colo	Fine-silty, mixed, noncalcareous, mesic	Cumulic Haplaquoll	Mollisol	Alluvial
Crete	Fine, montmorillonitic, mesic	Pachic Argiustoll	Mollisol	Chernozem
Crofton	Fine-silty, mixed, calcareous, mesic	Typic Ustorthent	Entisol	Regosol
Darr	Coarse-loamy, mixed, mesic	Fluventic Haplustoll	Mollisol	Alluvial
Dawes	Fine, mixed, mesic	Abruptic Paleustoll	Mollisol	Planosol
Detroit	Fine, montmorillonitic, mesic	Pachic Argiustoll	Mollisol	Chernozem
Dix	Sandy-skeletal, mixed, mesic	Entic Haplustoll	Mollisol	Regosol
Dunday	Sandy, mixed, mesic	Entic Haplustoll	Mollisol	Regosol
Duroc	Fine-silty, mixed, mesic	Pachic Haplustoll	Mollisol	Chestnut
Dwyer	Sandy, mixed, mesic	Ustic Torripsamment	Entisol	Regosol
Elsmere	Sandy, mixed, mesic	Aquic Haplustoll	Mollisol	Regosol
Epping	Loamy, mixed, calcareous, mesic, shallow	Typic Ustorthent	Entisol	Lithosol
Fillmore	Fine, montmorillonitic, mesic	Typic Argialboll	Mollisol	Planosol
Gannett	Coarse-loamy, mixed, noncalcareous, mesic	Typic Haplaquoll	Mollisol	Humic Gley
Geary	Fine-silty, mixed, mesic	Udic Argiustoll	Mollisol	Chernozem
Gering	Fine-loamy, mixed, calcareous, mesic	Aquic Ustifluvent	Entisol	Alluvial
Gibbon	Fine-silty, mixed, calcareous, mesic	Typic Haplaquoll	Mollisol	Alluvial
Glenberg	Coarse-loamy, mixed, calcareous, mesic	Ustic Torrifluvent	Entisol	Alluvial
Goshen	Fine-silty, mixed, mesic	Pachic Argiustoll	Mollisol	Chestnut
Grigston	Fine-silty, mixed, mesic	Fluventic Haplustoll	Mollisol	Alluvial
Hall	Fine-silty, mixed, mesic	Pachic Argiustoll	Mollisol	Chernozem
Harney	Fine, montmorillonitic, mesic	Typic Argiustoll	Mollisol	Chestnut
Hastings	Fine, montmorillonitic, mesic	Udic Argiustoll	Mollisol	Chernozem
Haverson	Fine-loamy, mixed, calcareous, mesic	Ustic Torrifluvent	Entisol	Alluvial

*Classification made available by Soil Conservation Service, Lincoln, Nebraska—Revised to April 1969.

CLASSIFICATION OF NEBRASKA SOILS

Comprehensive System*				1938 Classification
Series	Family	Subgroup	Order	Great Soil Group
Haynie	Coarse-silty, mixed, calcareous, mesic	Typic Udifluvent	Entisol	Alluvial
Hedville	Loamy, mixed, mesic	Lithic Haplustoll	Mollisol	Lithosol
Hobbs	Fine-silty, mixed, mesic	Cumulic Haplustoll	Mollisol	Alluvial
Holdrege	Fine-silty, mixed, mesic	Typic Argiustoll	Mollisol	Chernozem
Holt	Coarse-loamy, mixed, mesic	Typic Argiustoll	Mollisol	Chernozem
Hord	Fine-silty, mixed, mesic	Pachic Haplustoll	Mollisol	Chernozem
Inavale	Sandy, mixed, mesic	Typic Ustipsamment	Entisol	Alluvial
Janise	Fine-loamy, mixed, calcareous, mesic	Typic Ustiorthent	Entisol	Solonetz
Jansen	Fine-loamy, over sandy or sandy skeletal, mixed, mesic	Udic Argiustoll	Mollisol	Chernozem
Judson	Fine-silty, mixed, mesic	Cumulic Hapludoll	Mollisol	Brunizem
Kadoka	Fine-silty, mixed, mesic	Typic Argiustoll	Mollisol	Chestnut
Keith	Fine-silty, mixed, mesic	Typic Argiustoll	Mollisol	Chestnut
Kenesaw	Coarse-silty, mixed, mesic	Typic Haplustoll	Mollisol	Regosol
Kennebec	Fine-silty, mixed, mesic	Cumulic Hapludoll	Mollisol	Brunizem
Keota	Coarse-silty, mixed, calcareous, mesic	Ustic Torriorthent	Entisol	Regosol
Kipson	Loamy, mixed, mesic, shallow	Entic Haplustoll	Mollisol	Lithosol
Lamo	Fine-silty, mixed, calcareous, mesic	Cumulic Haplaquoll	Mollisol	Alluvial
Lancaster	Fine-loamy, mixed, mesic	Udic Argiustoll	Mollisol	Brunizem
Las	Fine-loamy, mixed, calcareous, mesic	Aquic Ustifluvent	Entisol	Alluvial
Las Animas	Coarse-loamy, mixed, calcareous, mesic	Fluventic Haplaquept	Entisol	Alluvial
Leshara	Fine-silty, mixed, mesic	Cumulic Haplustoll	Mollisol	Alluvial
Loup	Sandy, mixed, noncalcareous, mesic	Typic Haplaquoll	Mollisol	Alluvial
Luton	Fine, montmorillonitic, noncalcareous, mesic	Vertic Haplaquoll	Mollisol	Alluvial
Marshall	Fine-silty, mixed, mesic	Typic Hapludoll	Mollisol	Brunizem
Meadin	Sandy-skeletal, mixed, mesic	Entic Haplustoll	Mollisol	Regosol
Minatare	Fine, mixed, mesic	Aquic Natrargid	Aridisol	Solodized Solonetz
Mitchell	Coarse-silty, mixed, calcareous, mesic	Ustic Torriorthent	Entisol	Regosol
Monona	Fine-silty, mixed, mesic	Typic Hapludoll	Mollisol	Brunizem
Moody	Fine-silty, mixed, mesic	Udic Haplustoll	Mollisol	Chernozem
Morrill	Fine-loamy, mixed, mesic	Typic Argiudoll	Mollisol	Brunizem
Muir	Fine-silty, mixed, mesic	Pachic Haplustoll	Mollisol	Brunizem
Nora	Fine-silty, mixed, mesic	Typic Haplustoll	Mollisol	Chernozem
Nuckolls	Fine-silty, mixed, mesic	Typic Haplustoll	Mollisol	Chernozem
O'Neill	Coarse-loamy, mixed, mesic	Typic Haplustoll	Mollisol	Chernozem
Orella	Clayey, mixed, calcareous, mesic, shallow	Typic Ustorthent	Entisol	Lithosol
Ortello	Coarse-loamy, mixed, mesic	Udic Haplustoll	Mollisol	Chernozem
Otero	Coarse-loamy, mixed, calcareous, mesic	Ustic Torriorthent	Entisol	Regosol
Ovina	Coarse-loamy, mixed, mesic	Aquic Haplustoll	Mollisol	Regosol
Pawnee	Fine, montmorillonitic, mesic	Aquic Argiudoll	Mollisol	Brunizem
Pierre	Very fine, montmorillonitic, mesic	Ustertic Camborthid	Aridisol	Chestnut
Platte	Sandy, mixed, mesic	Mollic Psammaquent	Entisol	Alluvial
Rosebud	Fine-loamy, mixed, mesic	Typic Argiustoll	Mollisol	Chestnut
Sarpy	Sandy, mixed, mesic	Typic Udipsamment	Entisol	Alluvial

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CLASSIFICATION OF NEBRASKA SOILS

Comprehensive System*				1938 Classification
Series	Family	Subgroup	Order	Great Soil Group
Scott	Fine, montmorillonitic, mesic	Aeric Argialboll	Mollisol	Planosol
Sharpsburg	Fine, montmorillonitic, mesic	Typic Argiudoll	Mollisol	Brunizem
Shelby	Fine-loamy, mixed, mesic	Typic Argiudoll	Mollisol	Brunizem
Sogn	Loamy, mixed, mesic	Lithic Haplustoll	Mollisol	Lithosol
Steinauer	Fine-loamy, mixed, calcareous, mesic	Typic Udorthent	Entisol	Regosol
Tripp	Coarse-silty, mixed, mesic	Typic Haplustoll	Mollisol	Chestnut
Ulysses	Fine-silty, mixed, mesic	Typic Haplustoll	Mollisol	Regosol
Valentine	Sandy, mixed, mesic	Typic Ustipsamment	Entisol	Regosol
Wabash	Fine, montmorillonitic, noncalcareous, mesic	Vertic Haplaquoll	Mollisol	Humic Gley
Wann	Coarse-loamy, mixed, mesic	Aquic Fluventic Haplustoll	Mollisol	Alluvial
Wood River	Fine, montmorillonitic, mesic	Typic Argiustoll	Mollisol	Chernozem
Wymore	Fine, montmorillonitic, mesic	Aquic Argiudoll	Mollisol	Brunizem

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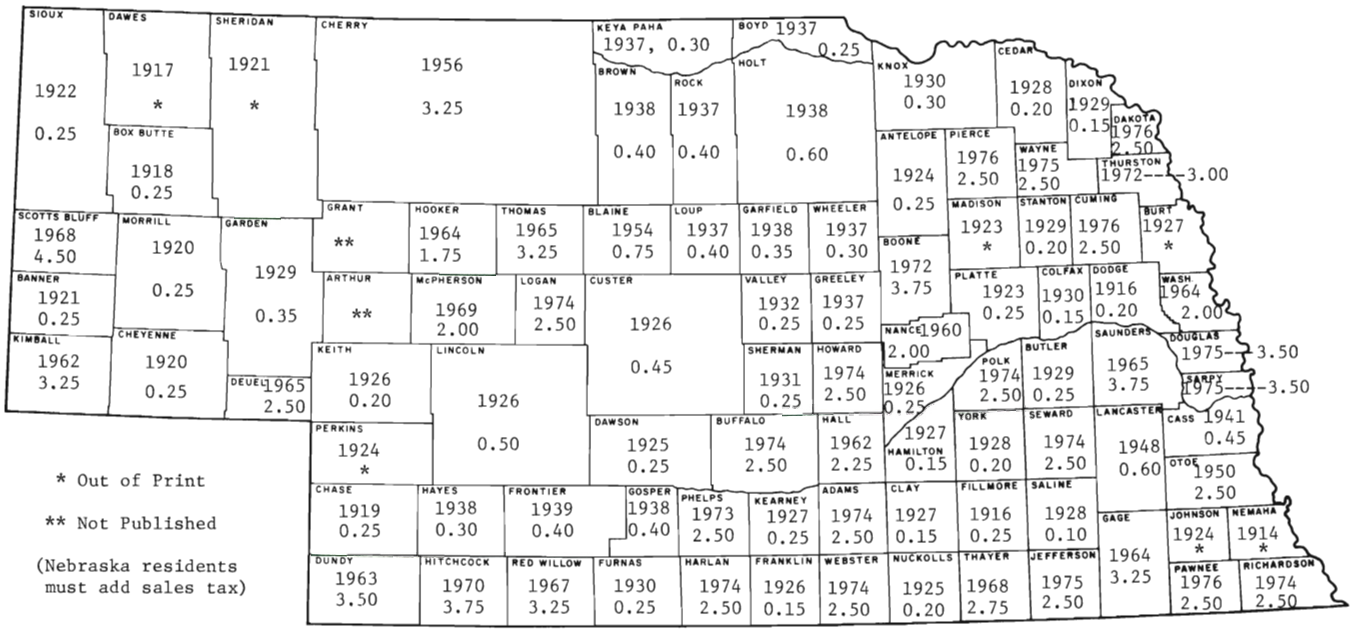
SOIL SERIES ON INACTIVE LIST

Older Surveys Use This Soil Name	More Recent Surveys Use This Soil Name
Banks	Bankard
Bearden	Hall, Hord
Bloomington	Wakeen
Bremer	Muir
Carrington	Shelby
Cody	Chappell
Crawford	Geary
Derby	Ortello
Dunlap	Keith, Rosebud
Dunesand	Valentine, hilly
Ewing	Jansen
Genessee	Sarpy, Inavale
Glendive	Glenberg
Grundy	Crete, Butler, Wymore, Fillmore
Hamburg	Rough broken land
Havre	Haverson
Knox	Crofton
Lamoure	Lamo
Laurel	Haverson, Las, McCook
Lincoln	Las, Lamo
Lindley	Crofton
Parshall	Chappell, Alice
Plainfield	Meadin
Plattsmouth	Leshara
Ray	McPaul
Rauville	Wet alluvial land
Sidney	Dix, Chappell
Sioux	O'Neill
Sparta	Meadin
Thayer	Wakeen, Kipp
Thurston	Thurman, Ortello
Vebar	Creighton
Waukesha	Muir
Yale	Nunn



* Out of Print

** Not Published

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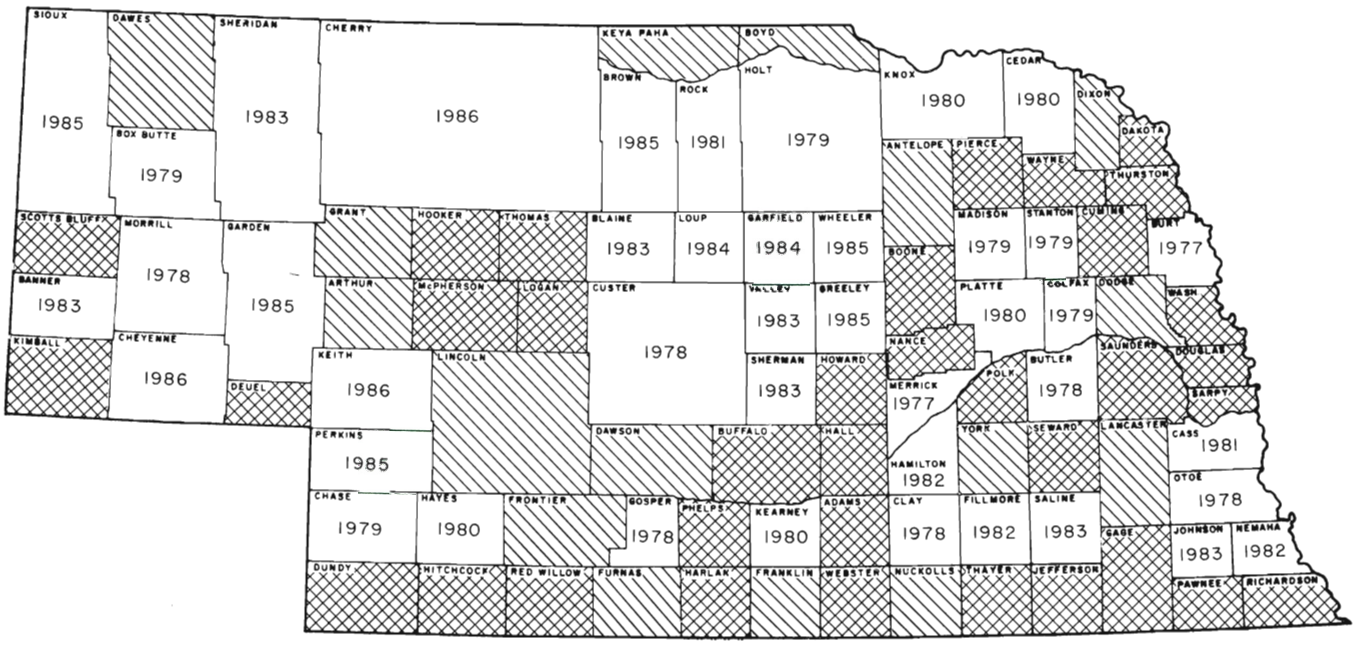
COUNTY SOIL SURVEY REPORTS

Date of survey, cost (dollars), and availability



PROGRESS OF SURVEYS AND PUBLICATIONS

Recent Publications

Field work completed

1980 Estimated date Field work completed *

* Information courtesy of Soil Conservation Service - Lincoln, Nebraska