

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF CHEMISTRY AND SOILS

In Cooperation with the University of Nebraska State Soil Survey  
Department of the Conservation and Survey Division

SOIL SURVEY  
PLATTE COUNTY, NEBRASKA

BY

L. S. PAINE, in Charge, and F. A. HAYES  
U. S. Department of Agriculture and  
G. E. BATES, Nebraska Soil Survey



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# SOIL SURVEY OF PLATTE COUNTY, NEBRASKA

By L. S. PAINE, in Charge, and F. A. HAYES,<sup>1</sup> U. S. Department of Agriculture,  
and G. E. BATES, Nebraska Soil Survey

## COUNTY SURVEYED

Platte County is in east-central Nebraska. Columbus, the county seat, is about 80 miles west and 10 miles north of Omaha. The county is roughly rectangular, although the western and southern boundaries are somewhat irregular. It comprises 673 square miles or 430,720 acres.

Platte County is in the southwestern part of the loess hill area of Nebraska,<sup>2</sup> and forms a part of the great plain of central Nebraska upon which minor relief has been produced by stream erosion and wind action. For convenience in reference, the county may be described as consisting of two physiographic divisions. These are the eroded plains which occur in the northern three-fifths and comprise the entire upland part of the county, and a lower, flat, or gently undulating and, in places, hummocky valley which includes the southern two-fifths of the county and is known in the Nebraska surveys as the Platte Plain. The boundary between these two divisions crosses the southern part of the county in a general east-west direction and is fairly straight, except where minor stream valleys extend from the Platte Plain into the upland.

The eroded plains or uplands present a variety of surface features. The general surface relief varies from almost level to steeply rolling or hilly, and there are numerous strips of flat alluvial lands along the larger streams. The comparatively level upland areas are rather extensive. They occur on the broad, flat-topped divides between Shell Creek and the headwaters of Loseke and Tracy Creeks in the central, north-central, and northwestern parts of the county, and in small areas in the extreme northeastern part. These upland areas occupy the highest positions in the county and are remnants, only slightly eroded, of the former level loess mantle.

The hilly land is of comparatively small extent. It occurs in small areas on the Shell Creek Valley slopes in the northeastern part of the county and around the heads of drainage ways in all parts of the uplands where erosion is severe. Most of the ridges are narrow and the slopes steep. The streams have cut deep, narrow valleys and are still actively eroding.

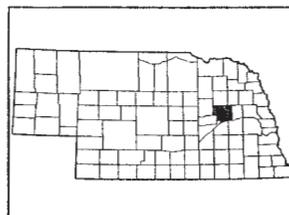


FIG. 45.—Sketch map showing location of Platte County, Nebr.

<sup>1</sup> Report written by F. A. Hayes.  
G. E. Condra, State geologist and director Nebraska soil survey.

The remainder and greater part of the eroded plains is in a more mature stage of development and has a rolling surface. The slopes to the larger streams are long and gradual, and most of the divides are well rounded. Many of the tributary heads of the major and secondary drainage channels have narrow, steep-sided valleys which gradually become broader downstream.

The narrow strips of alluvial land within the eroded plain include the bottom lands and terraces. These occur as fairly continuous areas of various widths along all the major upland streams, but especially along Shell, Loseke, and Tracy Creeks. The surface is in general flat, though locally it may be modified by slight depressions, cut-offs, and old and present stream channels. The flood plains or first bottoms occupy the lowest positions and are from 4 to 8 feet above the normal flow of the streams. The terraces are somewhat more elevated, lying from 4 to 15 feet above the flood plains and from 30 to 80 feet below the adjoining uplands. The transition from the flood plains to the terraces is commonly marked by a short, steep slope, but the slope to the uplands is rather long and gradual.

The second physiographic division, the Platte Plain, was developed by the intrenchment of Platte and Loup Rivers into the loose, loessial deposit. This produced the broad lowland belt which comprises the southern two-fifths of the county. These rivers, almost parallel to each other, flow in a general easterly direction across the southern part of the county and join near Columbus in the southeastern part.

The general surface features of the Platte Plain are similar to those of the narrow alluvial lands throughout the eroded loess-plain division of the county. However, the range in relief is wider, and the land lies at a lower level. The surface is flat or gently rolling, modified in places by shallow stream channels, depressed areas, old cut-offs, and rather extensive deposits of wind-blown sands which have left a billowy or hummocky relief.

The terraces or bench lands comprise about 85 per cent of the Platte Plain. They are composed of old valley-filling material deposited by the streams when they flowed at a different level. Subsequent intrenchment of the channels has left the deposits as terraces or benches considerably above the present flood plains. The older benches either have been entirely removed or have lost their identity through erosion. The highest remnant at present includes a large area along the northern edge of the Platte Plain in the southeastern part of the county. This is known in the Nebraska surveys as the Shell Creek Terrace.<sup>3</sup> The part of this bench occurring in this county is triangular in shape. It is about 4 miles wide along the eastern boundary and tapers to a point a few miles northeast of Oconee in the south-central part. Lower-lying alluvial lands bound it on the north, south, and west sides. It extends eastward beyond the county boundary and terminates north of Schuyler in the southern part of Colfax County. The surface is level or gently undulating, except over small areas where stream erosion has produced a rolling relief. The area lies from 70 to 100 feet above the channels of Platte and Loup Rivers and from 40 to 80 feet below the general level of the eroded loess plains. The remaining terraces throughout the Platte Plain are from 30 to 60 feet below the level of the high Shell Creek bench. These terraces are prevailingly flat, except where they are crossed by drainage ways or are modified

<sup>3</sup> See footnote 2.

by wind action. The most extensive areas showing the result of wind action are between Platte and Loup Rivers in the southwestern part of the county. In this locality the less stable soils of the terraces have been blown by the wind into low sand ridges and knolls from 5 to 30 feet high. These ridges present a hummocky and, in places, dune-like relief. In most places the slope between the different terrace levels and between the terraces and bottom lands throughout Platte Plain is short and steep, but in some places, especially between the lower benches, it is so gradual as to be almost imperceptible.

The first bottoms throughout the Platte Plain comprise the lowest land in the county. Areas are small and narrow, though fairly continuous strips from one-eighth to about 2 miles in width are in most places adjacent to Platte and Loup Rivers. Linear areas, which in few places exceed three-fourths mile in width, are along Lost and Shell Creeks where these streams flow across the main valley. This land lies only a few feet above the normal flow of the streams and in many places is subject to overflow during floods. The surface is prevailingly flat, though it is modified by low depressions, overflow channels, and small areas of rather choppy relief where the wind has blown and piled the looser sands into low, rounded ridges and knolls.

Platte County has an average elevation of about 1,550 feet above sea level. The lowest point, approximately 1,400 feet above sea level, is in the southeast corner where Platte River crosses the boundary, and the highest, about 1,750 feet, is in the uplands near St. Bernard in the northwestern part. Probably the most abrupt relief occurs between Loup River and the uplands near Monroe in the southwestern part of the county. Where Loup River crosses the western county line the elevation is about 1,540 feet above sea level. The fall between this point and the junction of Loup River with Platte River southeast of Columbus is about 130 feet. Platte River has a fall of about 6 feet to the mile throughout its course across the county. The average elevation of the uplands is about 1,625 feet and that of the Platte Plain 1,450 feet above sea level. The elevation<sup>4</sup> at Columbus is 1,440 feet, at Oconee 1,494 feet, at Duncan 1,495 feet, at Monroe 1,526 feet, at Platte Center 1,536 feet, at Creston 1,604 feet, at Tarnov 1,625 feet, at Humphrey 1,648 feet, at Lindsay 1,660 feet, and at Cornlea 1,722 feet above sea level. The general slope of the county is to the south and east.

The drainage of the county is effected southeastward through Platte River and its tributaries, with the exception of a small area in the north-central and northeastern parts of the county from which the surface run-off flows northward into Elkhorn River through Tracy Creek. Platte River flows in a general easterly direction along the southern edge of the county. Its channel varies from one-half mile to 1 mile in width. The river is extremely shallow, though it seldom overflows its banks. Loup River, its largest tributary, has an average width of about one-half mile. The smaller primary and secondary tributaries include Shell, Lost, Lookingglass, and Beaver Creeks. The last two flow into Loup River. The northwestern, central, and east-central parts of the county drain southeast through Shell Creek and its tributaries, the largest of which is Loseke Creek. The southern part

<sup>4</sup> Gannett, Dictionary of Altitudes

of the county is drained by Platte and Loup Rivers and Lost Creek, which empties into Platte River in Colfax County.

The rivers, creeks, and intermittent drainage ways, together with their primary and secondary tributaries, afford ample drainage for most of the county as all parts of the uplands, except the flatter table-like divides, are reached by drainage channels. The most imperfectly drained areas are the first bottoms or flood plains along streams and a few local depressions within the flatter parts of the uplands. Many of the smaller channels of the upland streams become filled with sediment at the point where they enter the bottoms and water spreads over the surface of the soil, producing areas of poorly drained land. Most of the larger creeks have steep gradients throughout the upland areas and are actively deepening their channels. In the lower Platte Plain the gradient is less pronounced, and the streams are more sluggish. These conditions cause considerable lateral cutting, as is shown in the tendency of the streams to meander across their flood plains. Platte River and Loup River are both rather sluggish streams with low banks and sandy stream beds.

Platte County was formed from a part of Dodge County in 1855. In 1858 it was enlarged by that part of Monroe County not included in the Pawnee Indian Reservation. Subsequent legislation has left it with its present boundaries.

The first permanent settlement in the county was made in 1856 by settlers from Columbus, Ohio, who established themselves on the north side of Loup River at Columbus. Later settlers of various nationalities, including German, Scandinavian, Irish, and American, came from Iowa, Ohio, Illinois, New York, and other States to the east.

The total population of Platte County, according to the 1920 census, is 19,464. Of this number, 84.7 per cent are native-born whites, 15.1 per cent are foreign-born whites, and only 0.2 per cent are negroes, Japanese, Chinese, and Indians. The population of the city of Columbus, which constitutes 27.8 per cent of the total, is classed as urban. The rural population averages 28.9 persons to the square mile and is densest in the Platte and Loup River Valleys. The population of the county has increased but slightly since 1910.

Columbus, the county seat and only city in the county, has 5,410 inhabitants. It is in the southeastern part of the county and is an important railroad center. Humphrey, in the north-central part, is a distributing point for farm implements, supplies, and produce. Its population is 835. Platte Center, Monroe, Duncan, Creston, Cornlea, Lindsay, and Tarnov, each with less than 500 inhabitants, are towns of local importance.

The transportation facilities of Platte County are good. The main line of the Union Pacific Railroad across Nebraska passes through Columbus and Duncan in the southern part of the county. The other railroads are all branch lines of the Union Pacific, Chicago & North Western, and Chicago, Burlington & Quincy systems. These railroads cross the county in several directions.

Platte County has a number of good roads. The Lincoln Highway crosses the southern part in an east-west direction, and the Meridian Highway extends north and south across the central part. Most of the public roads follow land lines regardless of surface features, except

along Platte and Loup Rivers where bridges are few. The Lincoln Highway and part of the Meridian Highway have been surfaced with gravel, but other roads are of dirt. The more important roads are well graded and are dragged after each rain. Little attention is given the minor roads, although they are seldom allowed to become impassable. Bridges cross Loup and Platte Rivers south of Columbus, Duncan, and Monroe. Cement culverts and bridges across the smaller drainage ways are common throughout the county. Telephones and rural delivery routes reach all sections.

Most of the surplus products, consisting of grain, hay, cattle, and hogs, are marketed outside the county. Wheat, alfalfa, and livestock are shipped to Omaha. Some of the wheat is ground at a small water-power gristmill on Shell Creek north of Columbus.

#### CLIMATE

The climate of Platte County is typical of eastern Nebraska. It is well suited to the growing of grain and hay and the raising of livestock. The long, warm summers are especially favorable for corn, and the low temperatures which occur now and then in winter are not usually destructive to winter-grown crops, which are usually protected by a covering of snow. The variation in surface relief is not sufficient to cause any appreciable differences in climate within the county.

The average date of the last killing frost is May 2 and of the first is October 4. This gives an average frost-free season of 154 days, which is ample for the maturing of ordinary farm crops. Within the 31 years from 1894 to 1924, inclusive, there were three seasons in which the last killing frost in the spring was 10 or more days later than normal and six seasons in which the first in the fall was 10 or more days earlier. The date of the latest recorded killing frost is May 27 and of the earliest is September 14.

The mean annual precipitation is 26.35 inches. Of this, 14.99 inches, or about 56.9 per cent, falls during May, June, July, and August, the principal part of the growing season. The total precipitation in the driest year on record (1916) was 16.76 inches and in the wettest year (1915) was 36.24 inches. The driest months are November, December, January, and February, the mean annual precipitation of each being less than 1 inch.

In the summer most of the rainfall occurs as heavy thundershowers, but torrential rains are rare. Severe droughts are almost unknown during May and June, but in the latter part of July and during August the rainfall varies considerably and short dry spells may occur. Crops seldom suffer severely from lack of moisture when proper cultural methods are followed, as most of the soils have a high water-retaining capacity. The amount of snowfall varies annually from a few inches to several feet. The average for 27 years is 26 inches.

During the fall and winter the prevailing wind is from the northwest; from about May 1 to October 1 it is from a southerly direction. Strong winds are common, but tornadoes are rare.

The following table, compiled from the records of the Weather Bureau station at Columbus, gives the normal monthly, seasonal, and annual temperature and precipitation for the county.

*Normal monthly, seasonal, and annual temperature and precipitation at Columbus*

[Elevation, 1,442 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1916)	Total amount for the wettest year (1915)	Snow, average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December.....	25.6	70	-24	0.72	0.36	0.44	4.7
January.....	21.9	65	-29	.44	1.26	1.48	4.8
February.....	23.1	77	-29	.94	.12	3.61	6.8
Winter.....	23.5	77	-29	2.10	1.74	5.53	16.3
March.....	36.4	92	-15	1.11	.51	2.08	5.4
April.....	49.2	100	13	2.59	1.61	2.50	1.8
May.....	60.2	103	25	3.98	3.52	3.66	Trace.
Spring.....	48.6	103	-15	7.68	5.64	8.24	7.2
June.....	69.4	104	35	4.19	2.64	4.58	0
July.....	74.5	106	41	3.44	1.31	7.13	0
August.....	73.1	109	40	3.38	3.15	3.72	0
Summer.....	72.3	109	35	11.01	7.10	15.43	0
September.....	64.6	101	25	2.76	1.03	6.19	0
October.....	52.4	94	10	1.89	.68	.55	.4
November.....	37.9	81	-8	.91	.57	1.30	2.1
Fall.....	51.6	101	-8	5.56	2.28	7.04	2.5
Year.....	49.0	109	-29	26.35	16.76	36.24	26.0

#### AGRICULTURE

Prior to 1856, when the first settlement was made in Platte County, the land supported a luxuriant growth of prairie grasses with marginal strips of trees along the larger streams. As very few of the early settlers were equipped to break the heavy sod in the loessial upland parts of the county, they located along Platte and Loup Rivers where there was an abundant supply of fuel and water and where the soils were sandy and easily tilled. The first small tracts of land were broken in 1856 and were planted to corn which, with dairy products, game, and pork, formed the chief food. As conditions became more stable, spring wheat, oats, rye, barley, and garden vegetables were grown. The early agricultural development was slow. The settlers had little capital, they were not familiar with the soil and climatic requirements, and local markets and transportation facilities were lacking.

Grasshoppers ruined crops over large areas between 1860 and 1880, and the droughts were especially severe in the early part of the decade between 1890 and 1900. In spite of these setbacks, settlement gradually spread throughout the county until all the desirable land had been taken. The construction of the railroads gave the first marked impetus to the development of farming.

Between 1879 and 1909 the value of all farm property to the farm increased from a little more than \$2,000 to nearly \$4,200. During the same period the number of farms in the county increased from 1,366 to 2,146. The number of farms has decreased slightly in the last decade.

The following table, compiled from the reports of the Federal census, gives the acreage and production of the principal crops in the county in 1879, 1889, 1899, 1909, and 1919 and shows the general trend of agriculture:

*Acreage and production of principal crops in 1879, 1889, 1899, 1909, and 1919*

Crop	1879		1889		1899		1909		1919	
	Acres	Bushels	Acres	Bushels	Acres	Bushels	Acres	Bushels	Acres	Bushels
Corn	26, 101	920, 140	96, 751	3, 960, 036	138, 428	4, 676, 870	136, 785	4, 238, 226	140, 933	4, 379, 025
Oats	7, 270	155, 717	43, 419	1, 206, 982	66, 704	2, 011, 070	67, 503	1, 357, 525	66, 643	2, 189, 111
Wheat	37, 537	228, 671	14, 836	180, 287	45, 827	563, 020	42, 042	822, 726	32, 009	328, 228
Rye	875	7, 051	241	4, 121	4, 764	58, 570	269	3, 095	2, 060	26, 038
Barley	702	10, 518	2, 253	37, 118	2, 394	59, 690	1, 730	38, 188	2, 912	78, 023
Flaxseed		4, 293	3, 972	33, 891	28	280	27	198		
Potatoes		51, 917	1, 370	112, 849	1, 275	153, 410	1, 442	127, 674	1, 267	73, 193
Hay (all kinds)	10, 419	Tons 18, 457	47, 851	Tons 62, 688		Tons		Tons		Tons
Tame					7, 403	17, 522	17, 904	38, 967	24, 253	148, 168
Wild					21, 720	29, 250	21, 536	32, 778	18, 242	20, 944
Coarse forage					1, 125	4, 155	102	507	2, 272	4, 762
Silage crops								644		4, 584
Apples		Trees Bushels								
Peaches			4, 820	495	31, 165	4, 178	40, 452	46, 451	24, 642	9, 238
Pears			4		2, 160	15	2, 701	373	12	2
Plums					557	2	745	47	391	62
Cherries			2, 719	318	5, 855	210	3, 850	464	889	70
Grapes			1, 133	18	6, 556	492	8, 416	1, 385	6, 891	1, 749
					Vines	Pounds	Vines	Pounds	Vines	Pounds
					6, 356	8, 600	7, 344	37, 208	3, 132	11, 175

<sup>1</sup> Chiefly alfalfa.

Agriculture at present consists of the production of grain, hay, and livestock. According to the 1920 census the principal crops are corn, oats, wheat, alfalfa, wild hay, barley, and rye, ranking in acreage in the order named. The same census reports that in 1919 the total value of cereals produced in Platte County was \$8,402,242, of domestic animals was \$5,598,212, of dairy products was \$383,385, and of poultry and eggs was \$484,014.

The area devoted to corn exceeds that of all other crops combined. In 1922<sup>5</sup> the average yield of corn in Platte County was 34 bushels to the acre. With favorable moisture conditions the medium or heavy-textured, dark-colored upland soils yield an average ranging in different years from 30 to 35 bushels to the acre, and yields considerably in excess of 70 bushels have been obtained. Yields on the heavier-textured and well-drained stream-bottom and terrace soils equal or exceed those obtained from the best upland soils. The average yields from the light-colored upland soils are somewhat less than those quoted above, and the lowest yields in the county are obtained on the sandy and poorly drained soils.

The less progressive farmers grow corn on the same land for several consecutive years, but much better yields are obtained where a rotation including small grains and alfalfa is followed. Seed is not carefully selected by many farmers. Most of the corn is of the dent varieties, though the strains are seldom kept pure. Reid Yellow Dent and Hogue Yellow Dent are probably the favorite varieties. Some white corn, chiefly St. Charles White and Iowa Silvermine, are grown.

<sup>5</sup> Report of Nebraska Department of Agriculture, 1922.

Most of the corn is fed to hogs, cattle, and work animals, though on farms where little livestock is kept, corn is the chief cash crop. Most of the corn is shucked from the standing stalks. Some farmers shuck only enough to supply their work animals and turn in cattle and hogs intended for market to "hog down" the remainder. There are 68 silos in the county. From 10 to 20 acres of corn are needed to fill each.

Wheat is planted on all the more nearly level loessial uplands and on the heavier-textured terrace soils but is seldom grown on sandy soils. The average yield of wheat in Platte County in 1922 was 21 bushels to the acre. On soils best suited to this grain, yields of 25 bushels to the acre are obtained in many places. Turkey is the principal variety, although the acreage in Kanred, a hardy winter wheat, is increasing. The strains of wheat are usually kept pure by the more progressive farmers, but they have become mixed on the tenant farms. Winter wheat is grown almost exclusively, as it fits into farming operations and matures in the spring before dry weather sets in. Yields of winter wheat fluctuate less than those of spring wheat, and the crop is less likely to be injured by smut and rust. A binder is customarily used in harvesting, but a header is used when the straw is short. The crop is shocked or stacked in the field for threshing. A small quantity of the grain is used in local flour mills, but most of it is sold at the local elevators.

Oats are grown on all but the sandier, rougher, and more poorly drained soils of the county. The highest yields are obtained from the loessial uplands and well-drained heavy-textured alluvial lands. Yields range from 20 to 50 bushels to the acre, depending on the type of soil, cultural practices, and the seasonal moisture conditions. The average yield of oats is 26 bushels. Kherson is the leading variety, although some Nebraska No. 21 is grown. The crop is not so profitable as either wheat or corn but is required in the food ration of work animals and is desirable in the rotation between corn and small grain or alfalfa. Little effort is made to control smut, although this disease sometimes lowers crop yields during wet seasons. The oats are usually cut with a binder and are shocked or stacked for threshing. Most of the straw is left in the field, and livestock is given access to the stacks. A little of the straw is baled.

Among the grain crops, rye follows wheat in acreage. However, the acreage devoted to this crop varies with the market. In 1922<sup>6</sup> rye yielded an average of 18 bushels to the acre. This crop is grown chiefly on the heavier upland and terrace soils. It is more drought resistant than wheat and flourishes on more impoverished soils. Most of the rye is raised for the grain, but some is used for hay and pasture. The crop is harvested either with a binder or header, depending on the length of the stems, and is threshed from the shocks or stacks. Most of the rye is fed to hogs and cattle on the farms where it is produced. Many farmers plant a small patch for pasture early in the fall.

In 1922,<sup>7</sup> barley yielded an average of 24 bushels to the acre. This crop will stand considerable moisture, and yields are best on the moist bottom-land soils, especially silty soils. Almost all the barley produced is fed to horses, hogs, and cattle.

<sup>6</sup> See footnote 5.

<sup>7</sup> See footnote 5.

Alfalfa is the principal hay crop of the county and occupies a larger acreage than that devoted to wild hay. Alfalfa does well on the loessial uplands and heavier-textured well-drained alluvial lands but succeeds best on the terrace and bottom-land soils which are well supplied with moisture but are not excessively wet. The average yield in Platte County is 2.9 tons to the acre, but yields of 4 tons are often obtained on the better soils. Alfalfa has a high feeding value and this, together with its beneficial effects on the soil, makes it a necessary crop in this region. Most of the alfalfa is fed on the farms to beef and dairy cattle, but some is used as pasture for hogs.

Most of the wild hay harvested in the county is cut from the poorly drained bottom-land soils and the sandy soils of the well-drained terraces. The yields are commonly slightly more than 1 ton to the acre. The bottom lands give the highest yield, but the growth is rank and has a coarser texture and lower feeding value than that obtained from well-drained land. Hay is stacked in the fields and is either baled for market or is hauled to the feed lots as it is needed.

Among the minor crops, timothy, clover, Sudan grass, millet, and potatoes are the most important. Clover crops are increasing in acreage each year, as they have the same beneficial effect on the soil as alfalfa and are adapted to shorter rotations. Most of the minor crops are grown chiefly for feed and for home consumption. A few watermelons and cantaloupes, which are sold mostly in the surrounding towns, are grown on the sandy terrace soils.

Most of the farmers have small orchards of apple, peach, plum, cherry, and pear trees, but most of the trees are in poor condition as little attention is given to pruning and spraying. The local demand for fruit is not supplied, and large quantities are annually shipped in from outside markets. Of the wild fruits, plums and grapes are abundant during favorable seasons. They grow chiefly along the larger streams throughout the county.

Livestock and livestock products are an important source of revenue in Platte County. Cattle raising is the livestock industry most extensively practiced. The beef cattle are mostly native stock, and the quality in general is very good. The 85,500 acres of pasture land in the county afford excellent grazing during the summer season. The winter feeding of cattle is practiced extensively.

The dairy industry receives little attention in Platte County. There are a few purebred dairy herds, chiefly of the Holstein breed, but no farm is devoted exclusively to dairying.

Hog raising is an important branch of the livestock industry. Nearly every farmer fattens a few hogs each year. Some hogs are raised in connection with the feeding of beef cattle.

Sheep raising receives little attention, though increased interest is being displayed in small breeding flocks. Some farmers import a carload or two of sheep each fall, fatten the animals on corn, alfalfa, and pasturage, and ship them to Omaha when the market is favorable.

Horse raising consists chiefly of breeding the work mares. A few mules are raised.

Poultry constitutes an important source of farm income. A small flock of chickens is raised on nearly all farms, and there is a good local demand for poultry products. Ducks, geese, turkeys, and guinea fowls are raised on a few farms.

The adaptation of certain soils to particular crops is observed to some extent by the farmers. It is recognized that the sandy Valentine soils, on account of their low lime content and instability, are not suited to alfalfa. That crop does best on the heavier-textured and well-drained terrace and flood-plain soils. It should be grown on the highly calcareous soils of the Knox series, where it prevents erosion and increases the naturally low supply of organic matter. It is recognized that corn does better than small grain on the sandy soils of the Valentine, O'Neill, and Sioux series. Corn has a deeper rooting system, which lessens the danger of root exposure during dry, windy weather. In general, however, all crops do better on the heavy-textured than on the sandy soils. Very little of the severely eroded sloping land in the rougher parts of the county is cultivated. The wet bottom lands and the areas of dune sand are best suited to pasture and hay.

Comparatively few farmers follow a definite crop rotation, and the changing of crops is governed more by the comparative demand and price of the products than by the requirements of the soil. Considerable alfalfa and clover are grown, however, and these crops tend to maintain the soil in a productive condition. The most common rotation is corn, two or three years, oats one year, wheat one year, then corn. This rotation is varied with an occasional crop of alfalfa which is allowed to remain six or seven years, or as long as it is profitable. On some farms, corn, oats, and wheat are grown in succession until yields decline. The land is then planted to alfalfa or clover. The most successful rotation is one in which corn is grown not more than two years in succession and one in which a legume is included.

Practically no commercial fertilizer is used. Considerable barnyard manure is available, but little care is taken to preserve it. It is usually piled out of doors, where much of its fertilizing value is lost through leaching before it is hauled to the fields. On tenant farms, the land in the immediate vicinity of the barnyard usually receives most of the manure, regardless of its needs.

With few exceptions the farm improvements of Platte County are good. The buildings, especially the houses, are kept painted and in good repair. Nearly all the farms are fenced and cross fenced, mostly with barbed wire, though many of the feed lots and alfalfa fields are inclosed with hog-tight woven-wire fencing. Four-horse teams are used in performing most of the farm work, although a number of tractors are in use in the more level parts of the county. Modern labor-saving machinery is in general use. Most farms are equipped with grain drills, harrows, disks, binders, mowers, rakes, riding cultivators, and manure spreaders, and a few farmers also have corn binders and hay balers. As a rule, the more expensive farm machinery is kept under shelter.

Farm laborers are scarce, especially during the busy season. Wages range from \$35 to \$45 a month, with board and room. Day laborers receive from \$2.25 to \$3. During the past season (1923) corn shuckers received from 5 to 7 cents a bushel, depending on the corn yield.

The farms range in size from less than 80 to more than 1,000 acres. Most of them contain between 100 and 320 acres. Land rental is either on the share or cash basis or is a combination of the two. Under the share system, which is the most common, the renter furnishes seed, equipment, and labor and receives three-fifths of the

crops. When the land is rented for cash, \$4 or \$5 an acre is paid for the farming land and about \$3 an acre for pasture land. The combination share and cash rent system varies widely, but on most farms the tenant rents the farming land on the share basis and pays \$3 an acre for the pasture land.

Land prices range from about \$20 to \$200 an acre, with an average of about \$175<sup>8</sup> for the county as a whole. The lowest-priced land includes the areas of dune sand, Valentine sand, and Sarpy sand, which are valuable chiefly for grazing purposes on account of their tendency to drift when the soil is disturbed, and the highest-priced land includes areas of the well-drained Waukesha soils and the more nearly level parts of the loessial uplands.

#### SOILS

Platte County lies in the plains region of the United States where the surface features and rainfall have favored a luxuriant grass vegetation. Hence all the soils of the county, with the exception of the more recent sand deposits, show the influence of the native grasses and of weathering under the prevailing climatic conditions. The humus, or organic matter, derived through the seasonal growth and decay of grass roots has become intimately mixed with the surface soil. Variations in the quantity of accumulated organic matter and in the degree and manner of weathering have produced differences in the soils derived from the same parent materials.

Platte County is near the eastern edge of that region in which the rainfall is insufficient to leach the readily soluble salts, particularly lime carbonate, from the weathered part of the soils. In fact, the county is on the border between the region characterized by a definite zone of lime accumulation in the soils, as occurs in western Nebraska, and the one in which the carbonates have been removed by leaching, as occurs in the eastern part of the State. Most of the soils, therefore, either have poorly developed zones of lime accumulation in their subsoils or are entirely devoid of such zones.

In addition to the peculiarities in the distribution and content of organic matter and lime, the soils of Platte County are characterized by the development of zones or layers in their profiles. These zones vary in thickness and in the perfection of their development in different soils but where well developed, as in the older and more deeply weathered soils of the county, they differ from one another in such important and easily discernible features as color, texture, structure, compaction, and chemical composition. These features have been produced through the action of the soil-forming agencies, including weathering, oxidation, aeration, leaching, and drainage, to which the parent soil materials have been subjected. The zones are naturally thickest and most pronounced in the smoother or more nearly level soils of the county, where conditions have been most favorable for prolonged undisturbed soil weathering. They are poorly developed and often absent in soils which have been subjected to erosion during their formation or which have developed from recently deposited or more or less unstable parent materials.

<sup>8</sup>United States census, 1920.

The oldest and most mature group of soils in the county, as affected by the climate, vegetation, and soil-forming processes of the region, is predominant throughout the uplands in the northern part. The surface soil consists of three well-defined layers, all of which are dark in color and rather friable. The upper layer consists of loose, structureless mulch, in few places exceeding 1 inch in thickness. It is dustlike when dry. The second layer is laminated, the soil grains being grouped into very fragile, thin, horizontal plates or laminae which overlap one another. This layer is from 2 to 4 inches thick. The lower surface soil layer is decidedly granular. It is from 14 to 20 inches thick and continues to an average depth of 24 inches. The soil particles are grouped into small, rounded, or subangular aggregates varying from one-sixteenth to slightly more than one-fourth inch in diameter.

In most places the three surface soil layers are similar in texture, being composed largely of silt, clay, and very fine sand particles. They are rich in organic matter, which is most abundant in the darkest-colored second or laminated layer. In both the structureless and laminated layers the organic constituents are thoroughly mixed with the mineral soil particles. In the third, or granular layer, however, the organic matter occurs chiefly as a film or coating on the surface of the granules. The film is thickest in the upper part of the layer, making that part apparently as dark and rich in organic matter as the laminated layer. However, when it is crushed the granular material becomes lighter in color than material similarly treated from the laminated layer, indicating a lower organic-matter content to the unit of soil volume. The film of organic matter decreases in thickness with depth, and the lower part of the granular layer is dark grayish brown or, when crushed, is grayish brown.

The fourth layer is the upper part of the subsoil and the layer of maximum compaction. It consists of moderately compact silty clay loam from 8 to 12 inches thick and continues to an average depth of 3 feet. It was formed by the translocation of the finer particles of the surface soil through the agency of percolating water and is naturally thickest and most compact where surface run-off has been unusually slow. Although the material is moderately compact it does not attain claypan characteristics and even when dry can be crushed with only slight difficulty between the fingers and thumb. The material is grayish brown or dark grayish brown. It is decidedly columnar, the columns being composed of more or less cubical or prismatic-shaped structural units seldom exceeding three-fourths inch in their longer or vertical dimension. The organic matter, as in the granular layer, consists largely of a film or coating on the surface of the structural units. The film, however, is considerably thinner than in the overlying layer, as is indicated by the lighter color of the material.

The fifth layer, or lower part of the subsoil, is columnar but otherwise structureless. It is grayish brown and faintly compact in the upper part where it joins the zone of maximum compaction, but it becomes rapidly lighter in color and looser with depth, being light grayish-brown or almost white flourlike silt in the lower part. In most places lime is present below a depth of 5 or 6 feet. In some places the lime occurs in concretions, spots, splotches, and other concentrated forms, largely in a rather definite zone 8 or 10 inches thick.

Below this zone the quantity of lime diminishes. Elsewhere the carbonates, although present at the usual depth, do not seem to be concentrated in any particular layer but occur chiefly in finely disseminated form thoroughly mixed with the silt. The boundary between the lower part of the subsoil and the formation from which the soil has weathered is very indefinite. The unweathered parent formation, however, occurs in most places below a depth of 7 or 8 feet. This formation, which is known in the Nebraska surveys as loess, consists of light-gray or grayish-yellow calcareous silt.

The soils of this group contain worm casts and elongated, twisted rodlike forms of various lengths in all horizons beneath the laminated one. The casts are usually more abundant in the granular layer, and the rodlike forms occur chiefly in the layer of maximum compaction. The worm casts are more or less spherical and are about one-sixteenth inch in diameter. They may be grouped in rounded clusters containing from 10 to 25 individuals or may occur as fillings in old root, worm, or insect cavities. The rodlike forms, often called borings, are fillings in root, worm, and insect cavities and may at one time have consisted partly of worm casts, but if so the casts in most places have become obscured and the material comprising them is blended into a uniform mass. The borings are usually lighter or darker than the general color of the layers in which they occur, depending on whether the material composing them was derived from underlying or overlying soil layers.

The soils characterized by the profile described represent the oldest and most mature stage of soil development in the county. They differ from the Hastings soils as mapped in counties farther west in having a less pronounced and less persistent layer of lime accumulation in the lower part of their subsoils. However, the remainder of the profile is very similar to that of the typical Hastings soils, and for this reason these soils are classed with the Hastings series.

Another soil group in Platte County is composed of soils that are not so fully developed as those of the Hastings group. The surface soils, which have accumulated large quantities of organic matter, are dark brown or black. These soils usually have the three layers so characteristic of the surface soils of the Hastings series, but the layers, as a rule, are a little thinner and less pronounced than in the Hastings soils. The upper subsoil layer is brown or gray and although heavier than any other layer in the profile is much less compact than the corresponding layer in the Hastings soils. In fact, its compaction is often scarcely noticeable except by comparison with that in other parts of the soil. The greater friability of this layer is caused by better surface drainage which has prevented so much downward movement and concentration of the finer surface soil particles in the subsoil as has occurred in the Hastings soils. The lower part of the subsoil, below a depth ranging from 24 to 30 inches, is light-brown or gray loose floury silt material little modified by weathering. Carbonates, which have been largely leached to a depth greater than 4 feet in the Hastings soils, are abundant in this group below a depth ranging from 30 to 40 inches. They occur chiefly in finely divided form thoroughly mixed with the silt. The soils characterized by this profile include the Marshall soils of the uplands and the Hall soils of the well-drained terraces. In the Marshall soils, the carbonates are uniformly distributed, chiefly in finely divided forms throughout the lower part

of the subsoil. In the Hall soils the carbonates are in many places rather concentrated immediately beneath the upper subsoil layer and form a zone of higher lime content than occurs in any other part of the soil or in the parent material. The lime zone, however, is in few places so well developed or so sharply defined as in the Hall soils of central Nebraska which have a definite and persistent zone of lime accumulation in the lower part of their subsoils.

The Sioux soils, which occur on well-drained terraces, have accumulated large quantities of organic matter in their surface soils and have retained most of their subsoil carbonates. They may therefore be placed in the soil group which includes the Marshall and Hall soils from which they differ in having sandy and gravelly subsoils.

The Knox soils occur in association with the Marshall and have developed from parent materials similar to those which gave rise to the Hastings and Marshall soils. The Knox soils, however, have reached the least mature stage of development attained by any of the finer-textured upland soils. Constant erosion has prevented the accumulation of much organic matter, and the rapid run-off of the surface water has prevented the leaching of the carbonates from the subsoil. These soils have not developed definite zones or layers. The surface soils are thin and light in color, and the subsoils consist of grayish-yellow or almost white loose floury silt little modified by weathering. The Knox soils may be regarded simply as an eroded phase of the Marshall soils.

A group of soils developed on well-drained terraces have a characteristic profile. The surface soils have three persistent layers, including a surface mulch, a laminated layer, and a granular layer. These layers are similar in color, texture, and thickness to those of the Hastings soils. The upper part of the subsoil is very friable or only slightly compact silt loam or silty clay loam which closely resembles the corresponding layer in the Marshall soils. The lower part of the subsoil, below a depth ranging from 20 to 30 inches, is loose yellowish-gray or yellowish-brown silty material which, unlike the lower subsoil layer in the Marshall soils, does not contain a large quantity of carbonates. The profile shows that these soils were developed under conditions which favored rather thorough leaching and oxidation. The soils of the Waukesha series belong to this group. The O'Neill soils may also be classed with the well-drained, well-oxidized, and lime-leached group, but the material in the lower part of the subsoil is sandy and gravelly.

The Judson soils, which occupy well-drained colluvial slopes and terracelike positions, have developed on material composed largely of fine-textured surface wash from the higher slopes. These soils are closely associated with the Waukesha, however, and have not weathered sufficiently to have developed definite zones or layers in their surface soils and subsoils. In part, the profile is rather uniform in texture and structure to a depth greater than 3 feet, but the material may become slightly lighter in color in the lower part. These soils have been leached of their carbonates.

The dune-sand areas and the soils of the Valentine series have developed from accumulations of wind-blown sand, and the profile of both is immature. Dune sand is very unstable and has been least acted upon by the soil-forming processes. It consists of gray, loose, incoherent sand which has been blown by the wind into hills and

ridges from 40 to 60 feet high. The surface has been only slightly darkened by the addition of organic matter. The soils of the Valentine series have reached a more advanced stage of weathering than dune sand. Areas are more level, and the material has remained in its present position undisturbed by wind action for a longer time. The surface layers have accumulated some organic matter and are, as a rule, darker in color than those of dune sand. The subsoil consists of the unweathered incoherent parent sand. The porosity and perviousness of the sands have been unfavorable for the retention of any soluble carbonates. Because it has been reworked and reassorted to such an extent, it is impossible to determine the exact derivation of the sandy material. It probably came in part from sandy glacial deposits under the loess and in part from sands carried by Platte River from regions to the west.

The soils of the county which have developed under conditions of imperfect drainage are grouped in the Scott, Wabash, Lamoure, Cass, and Sarpy series. The excessive moisture has retarded oxidation but has favored the growth and decay of plant life, and all these soils, except those of the Sarpy series which are the most recent in origin, have dark-brown or black surface layers containing an accumulation of organic matter. The subsoils are brown, gray, or mottled yellow and gray. The subsoils of the Scott soils are extremely dense and claypanlike. Those of the Lamoure soils are fine textured but are very friable; those of the Cass and Sarpy soils are composed of loose, incoherent sand or a mixture of sand and gravel. Most of the carbonates, except in the soils of the Lamoure series, have been leached to a depth greater than 3 feet.

Although the climate and vegetation of the region, together with the action of the soil-forming processes previously mentioned, have been the controlling factors in determining the character of the soils in Platte County, the parent materials have also played an important part. In order, therefore, to clearly understand the soils and their relation to the parent materials a brief discussion of the geologic formations of the county follows:

The oldest geologic formation that influences the soils of Platte County is a sheet of sand which is exposed in many places in the valleys of Platte and Loup Rivers. The sand of this sheet has been mixed with river sediments to form the parent material of the alluvial soils and enters into the wind-blown materials of the Valentine soils and of dune sand. The Kansan drift, which lies immediately above the sand sheet, has not weathered into distinct soils in the county on account of the small area exposed, but it has added gravel, sand, and clay to small patches of the Marshall soils. The loess lies on the Kansan drift and, except where it has been removed by erosion, covers the entire county. It is the parent material of four series of upland soils, the Hastings, Marshall, Knox, and Scott series. As has already been mentioned, these soils differ according to the stage of development that they have reached. Material from the loess also enters into the composition of nearly all the alluvial soils of the county, and the parent material of the colluvial Judson soils is loess which has been moved only a short distance.

The soils of the first bottoms or flood plains have developed over recently deposited alluvium. These soils include members of the

Wabash, Lamoure, Cass, and Sarpy series. The soils developed on the older alluvial deposits of the well-drained terraces are grouped in the Waukesha, O'Neill, Hall, and Sioux series.

In the system of mapping employed by the Bureau of Chemistry and Soils the soils are grouped into series on the bases of common characteristics in color, structure, and origin. The series are divided into soil types on the basis of texture, or the relative proportion of different-sized mineral particles in the surface soil. Fourteen soil series, including 27 soil types, 1 phase of a type, and in addition the 2 miscellaneous materials classed as dune sand and river wash, are mapped in Platte County.

The surface soils of the members of the Marshall series, to a depth ranging from 8 to 14 inches, are very dark grayish brown. The material is loose, granular, and very friable. The next lower layer, which reaches a depth ranging from 20 to 24 inches, is slightly heavier in texture but is not compact. The color grades downward from that of the surface soil to brown. This layer is underlain by grayish-yellow or yellowish-brown loose, floury silt loam which is the parent loess little altered by weathering. This material is calcareous and lime concretions are present in most areas. The silt loam, with a shallow phase, silty clay loam, and fine sandy loam of this series have been mapped.

The soils of the Hastings series, to an average depth of about 10 inches, consist of very dark grayish-brown finely granular and rather friable material. This is underlain by a transitional layer through which there is a change to a browner color. Below a depth ranging from 16 to 20 inches is a layer of dark grayish-brown moderately compact silty clay loam, the heaviest layer in these soils. This material continues to a depth ranging from 26 to 30 inches and grades to a lighter-colored and more friable layer. Below a depth ranging from 40 to 50 inches the texture is silt loam and the color is grayish brown with an olive tinge. This material, which is the parent loess little changed by weathering, is structureless and breaks into irregular clods. Lime is commonly present at a depth ranging from 45 to 60 inches. These soils have previously been known in Nebraska as members of the Grundy group. Hastings silt loam and Hastings silty clay loam are mapped in this county.

The members of the Knox series have lighter-colored surface soils than either the Hastings or Marshall soils and contain less organic matter and greater quantities of lime, the subsoils and in many places the surface soils being very calcareous. Areas are mostly rough and dissected and erosion is severe. Knox silt loam is mapped in this county.

The soils of the Scott series have developed on the uplands under conditions of deficient drainage. The surface soils vary considerably in color and thickness, but the average thickness is about 8 inches. The color at the surface is in most places very dark, nearly black, but it may be almost any shade of gray. The lower part of the surface soil is generally lighter in color and locally may be almost white. Below the surface soil is heavy, nearly impervious, bluish-gray or dark-gray clay which continues to a depth of 5 or 6 feet. The material is discolored with rust-brown stains and black concretions. Below the heavy layer is the grayish-yellow silty material that underlies the entire uplands. Scott silt loam is mapped in Platte County.

The Valentine soils have brownish or grayish-brown friable surface soils and incoherent subsoils. Neither the surface soils nor subsoils are noticeably calcareous. These soils are differentiated from dune sand by the greater stability of the surface soils, by the greater content of organic matter, and by the smoother surface. In Platte County Valentine sand and Valentine loamy sand are mapped.

The Judson series comprises soils derived from mixed colluvial and alluvial materials. The surface layers are dark brown or almost black and the subsoils are brown. The subsoils are not so compact as those of the Hastings series and not so highly calcareous as are the lower subsoil layers of the Marshall soils. These soils occur on colluvial slopes or gently sloping terraces. In Platte County Judson silt loam is mapped.

The Waukesha soils are characterized by dark-brown or black surface soils underlain by brown subsoils which grade to light brown or gray in the lower part. The upper part of the subsoil is a little denser than the topsoil but is in few places compact and impervious. These soils differ from those of the Marshall series in their mode of formation, in their more generally level surface, and in their lower lime content. They occupy well-drained terraces or benches. Waukesha silt loam, Waukesha very fine sandy loam, and Waukesha fine sandy loam are mapped.

The Hall series includes soils with dark-brown or black surface soils. The upper part of the subsoil, which is grayish brown, is finer in texture and is slightly compact, but it seldom attains the density of a claypan. The lower part of the subsoil is light grayish-brown loose silt. Lime is present below a depth ranging from 30 to 36 inches. These soils occur on terraces well above overflow and are well drained. In this county, Hall very fine sandy loam is mapped.

The soils of the O'Neill series occupy sandy terraces. They have brown or dark-brown surface soils and light-brown loose sandy or gravelly subsoils. Underdrainage is generally excessive, and the soils have not retained large quantities of carbonates. O'Neill loamy fine sand and O'Neill fine sandy loam are mapped in this county.

The Sioux soils are characterized by dark-brown or black surface soils, underlain by lighter-colored sandy or gravelly subsoils. The subsoil and the soil itself in many places are highly calcareous. These soils occupy nearly level terraces. They differ from those of the Hall series in the greater sandiness and porosity of their subsoils and from those of the O'Neill series in their higher lime content. Sioux very fine sandy loam is mapped.

The Wabash series includes soils with dark-brown or black surface layers underlain by dark-drab, gray, or light-brown heavy subsoils. Both soil and subsoil are poor in lime. The soils occupy first bottoms along streams and are subject to overflow during periods of high water. Wabash silty clay loam and Wabash silt loam are mapped.

The soils of the Lamoure series are dark brown or black. The subsoils vary from yellowish brown to gray or dark drab and are, in most places, heavier in texture than the soil above. These soils occur on flood plains and are in most places poorly drained. They differ from soils of the Hall series in their lower position and poorer drainage and from those of the Wabash series in their higher lime

content and commonly lighter-colored subsoils. In Platte County the silt loam, silty clay loam, very fine sandy loam, and fine sandy loam members of the series were mapped.

The Cass soils have dark-brown or black surface soils underlain by gray sandy or gravelly subsoils. They occupy poorly drained bottom-land positions and are commonly poorly supplied with lime. The very fine sandy loam, fine sandy loam, and loamy fine sand members of the series are mapped.

The soils of the Sarpy series have light-brown or grayish-brown surface layers underlain by light-colored incoherent sandy subsoils. These soils are poor in lime and have not accumulated such large quantities of organic matter in their surface layers as have the Cass soils. They occupy the lowest positions along streams. Sarpy sand is mapped.

In the following pages the soils are described and their relation to agriculture is discussed; the accompanying map shows their distribution; and the following table gives their acreage and proportionate extent:

*Acreage and proportionate extent of the soils mapped in Platte County*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Marshall silt loam.....	103,360	25.4	Valentine sand.....	13,504	3.1
Shallow phase.....	6,080		Valentine loamy sand.....	2,048	.5
Marshall silty clay loam.....	72,704	16.9	Cass fine sandy loam.....	12,992	3.0
Marshall fine sandy loam.....	2,944	.7	Cass very fine sandy loam.....	7,104	1.6
Hastings silt loam.....	49,920	11.6	Cass loamy fine sand.....	5,056	1.2
Hastings silty clay loam.....	24,384	5.7	Lamoure very fine sandy loam.....	4,736	1.1
Waukesha silt loam.....	41,472	9.6	Lamoure silty clay loam.....	3,712	.9
Waukesha very fine sandy loam.....	3,392	.8	Lamoure silt loam.....	1,856	.4
Waukesha fine sandy loam.....	1,920	.4	Lamoure fine sandy loam.....	1,536	.4
Wabash silt loam.....	24,832	5.8	Sioux very fine sandy loam.....	2,048	.5
Wabash silty clay loam.....	2,496	.6	Dune sand.....	7,040	1.6
Hall very fine sandy loam.....	10,112	2.3	Sarpy sand.....	2,816	.7
O'Neill fine sandy loam.....	9,536	2.2	Scott silt loam.....	1,472	.3
O'Neill loamy fine sand.....	3,904	.9	River wash.....	1,576	.1
Knox silt loam.....	4,608	1.1			
Judson silt loam.....	2,560	.6	Total.....	430,720	100.0

#### MARSHALL SILT LOAM

The surface soil of Marshall silt loam is very dark grayish-brown moderately heavy silt loam from 8 to 14 inches thick. It is rich in organic matter, which gives it a black color when moist. The soil has a smooth, velvety feel and breaks down into fine powder. The upper part of the subsoil is brownish-gray silty clay loam only slightly more compact than the surface soil. It continues to an average depth of 24 inches. The lower part of the subsoil is yellowish-gray silt or silty clay which becomes gradually lighter in color and looser in structure until it merges, at a depth of about 30 inches, with the light-yellow or almost white, loose, floury silt of the parent loess. The transition between the different soil layers is very gradual, both in color and texture. The greater part of the surface soil is granular although to a depth of 2 or 3 inches some structureless and laminated material is usually present. The subsoil and substratum are columnar and are highly calcareous, small angular lime concretions occurring below a depth varying from 30 to 36 inches.

The thickness of the surface soil varies somewhat with the surface relief. On many of the smoother divides and more gradual slopes this layer is 10 or 12 inches thick, or slightly thicker toward the base of the slope. On sharp divides and the shoulders of hills it seldom exceeds 8 or 9 inches in thickness. Locally, where erosion has been especially severe, the soil may have been entirely removed or only a thin layer left. Where such areas are of sufficient size to warrant mapping, they are included with Marshall silt loam, shallow phase, or Knox silt loam, depending on the extent to which erosion has influenced the color and depth of their surface horizons. In a few places the surface soil of Marshall silt loam contains so much clay that the texture is silty clay loam. Small patches of Marshall silty clay loam are included with mapped areas of this soil.

Around the margins of areas of this soil bordering areas of Hastings silt loam, the subsoil has a decidedly higher content of clay and more compact structure than typical.

Included with mapped areas of this soil are numerous narrow strips of colluvial and alluvial materials along the intermittent drainage ways. In many of these the dark-colored surface material extends to a depth greater than 2 feet and is underlain by brown, slightly compact, silt loam which continues to a depth of 3 feet. Such areas are of such small extent and local occurrence that their importance did not warrant separation on the soil map.

Marshall silt loam, together with its shallow phase, is the most extensive soil in Platte County. It is the predominant soil throughout the uplands in the western and northwestern parts and occurs less extensively in the central and north-central parts of the county.

Areas of this soil vary from hilly or steeply rolling to almost flat, though they are predominantly rolling with moderate slopes and well-rounded divides. Locally, along minor drainage ways, the surface is characterized by narrow V-shaped valleys with steep and, in places, precipitous slopes. The areas having a nearly level surface are few and small.

Surface drainage is everywhere adequate and in most places is excessive. Erosion has become a serious factor on many farms and the acreage of Marshall silt loam, shallow phase, and of Knox silt loam is gradually increasing at the expense of Marshall silt loam. This soil is very retentive of moisture, owing to its high content of organic matter, its friable consistence, and its silty texture. It withstands drought better than any of the upland soils in the county, as little moisture is lost through subterranean drainage.

This soil originally supported a thick growth of prairie grasses. Narrow strips of timber were along the flood plains of the larger streams. The native grasses consisted largely of grama and buffalo grasses, with a minor growth of big bluestem and little bluestem. The timber included a fairly dense growth of elm, ash, box elder, and cottonwood. During recent years most of the prairie sod has been broken. At present about 85 per cent of the soil is under cultivation, and only the rougher areas are included in grazing and hay land.

Corn, wheat, oats, and alfalfa are the leading crops, ranking in acreage in the order named. All garden vegetables and fruits common to the region do well on this soil, which is also recognized as one of the best upland corn soils of the Mississippi Basin.

Hog raising is an important industry, and the winter feeding of cattle is practiced extensively. All the land which is unsuited to cultivation is pastured with beef cattle.

Crop yields vary widely from year to year, depending on the rainfall. During dry years the yields will probably average higher than on upland soils in eastern Nebraska, on account of the high moisture-retaining power of this soil. The average yield of corn is about 35 bushels to the acre, although as high as 80 bushels have been obtained in favorable seasons on well-managed fields. Wheat yields about 18 bushels to the acre, oats about the same as corn, and alfalfa 3 or 4 tons from three cuttings. Alfalfa is very beneficial to the land as it increases the supply of organic matter and of nitrogen and prevents destructive erosion.

Four-horse teams are used for most of the farm work, but on the more level areas tractors are sometimes used for plowing.

The current value of Marshall silt loam ranges from \$75 to \$150 an acre, depending on surface features, improvements, and location with respect to markets.

The control of erosion is the most important problem in the conservation of the fertility of this soil. Alfalfa or clover should be grown on at least 10 per cent of the land, as these crops are among the best for controlling erosion.

*Marshall silt loam, shallow phase.*—The surface soil of shallow Marshall silt loam is dark grayish-brown mellow silt loam from 6 to 10 inches thick. The material is ordinarily loose in structure but becomes moderately compact if it is worked when wet. To a depth of 4 inches, the material is fairly well supplied with organic matter, but this decreases rapidly with depth and is almost entirely absent below a depth of 24 inches. The surface soil grades abruptly to grayish-brown, loose silt loam which gradually becomes lighter in color with depth. Below a depth of 30 inches it is almost white, loose, floury silt. The subsoil, below a depth of 14 inches, is highly calcareous, and lime concretions are scattered thickly throughout the lower part.

Scattered throughout areas of this soil are small, patchy areas in which erosion has entirely removed the thin, brown surface layer and exposed the light-colored upper part of the subsoil. Where such areas are sufficiently extensive to warrant mapping, they are included with Knox silt loam.

Marshall silt loam, shallow phase, occurs in a few small scattered areas in the central, west-central, and northwestern parts of the county.

Areas of this soil range from rolling to hilly. Drainage in most places is excessive, and erosion is severe, so that the areas of Knox silt loam are gradually extending at the expense of this soil.

Shallow Marshall silt loam is of little agricultural importance in Platte County on account of its small extent. It is rather fertile and when carefully managed produces almost as well as typical Marshall silt loam. It is more subject to destructive erosion than the typical soil and is harder to manage on account of its rougher surface. About 85 per cent of the soil is under cultivation, and the remainder, which comprises only the rougher part, is used for grazing land. The native vegetation consists of a luxuriant growth of grama grass, bunch grass, redbud, and many other nutritious forage grasses.

Of the cultivated crops, corn, wheat, oats, and alfalfa are the most important. Wheat is the chief cash crop. The soil is considered very well adapted to alfalfa on account of its looseness and friability and the high lime content of its subsoil. Hogs are raised on nearly every farm, and cattle are grazed in the rough areas.

The land is managed in the same manner as typical Marshall silt loam. The current selling price ranges from \$60 to \$125 an acre, depending largely on improvements and surface features.

The conservation of the fertility of this soil depends chiefly on the control of destructive erosion. Alfalfa is a very valuable crop and should be in the rotation as often as possible, as it decreases soil washing and at the same time adds nitrogen and organic matter. Manure and old straw should be spread over the soil, and on the steeper hillsides earth or rubbish dams should be constructed in incipient gullies.

#### MARSHALL SILTY CLAY LOAM

The topsoil of Marshall silty clay loam, to a depth of about 10 inches, is dark grayish-brown or black slightly compact silty clay loam rich in organic matter. The subsoil differs little in texture or structure from the topsoil, but below a depth of 24 inches the material becomes gradually lighter in color and looser in structure and merges, at a depth of about 30 inches, with the light-yellow or almost white loose, floury silt of the parent loess. Cuts along streams and roads show a fairly well developed granular structure throughout the topsoil and upper subsoil layers and a flakelike or columnar structure below an average depth of 24 inches. The lower part of the subsoil is highly calcareous, and lime concretions are abundant in the substratum.

This soil is fairly uniform throughout the area of its occurrence, though it includes a few minor variations too small and unimportant to warrant separating on the soil map. Locally, on the shoulders of hills and on the steeper slopes, the surface soil has been greatly thinned and in places entirely removed by erosion, and the light-brown silty clay subsoil has been exposed. Were such areas of sufficient size to warrant mapping, they would be classed as a shallow phase of Marshall silty clay loam or as Knox silty clay loam, depending on the extent to which erosion has removed the surface soil. Around the margins of areas bordering Hastings silty clay loam, the subsoil is considerably more compact than typical. The two soils merge very gradually into each other, and it is necessary in many places to draw arbitrary lines in separating them on the soil map. Other variations include numerous narrow strips of colluvial and alluvial material along intermittent drainage ways. In most of these the soil consists of black, heavy, moderately granular silt loam from 18 to 24 inches thick, underlain by brown, slightly compact silt loam which continues to a depth of at least 3 feet.

Marshall silty clay loam is the predominant soil in the uplands of Creston and Sherman Townships in the northeastern part of the county and occurs in large areas throughout the Shell Creek drainage basin in the central and northwestern parts.

Areas of this soil vary from almost flat to sharply rolling and hilly. The greater part is slightly more rolling than areas of Marshall silt loam, although in general it has a similar relief. The areas of flat or

gently undulating land are small and few. Surface drainage is everywhere thorough and is excessive over most of the soil. Erosion is severe on many farms. This soil is not quite so retentive of moisture as Marshall silt loam, as the larger clay content of the surface soil causes it to check and crack, with consequent loss of moisture, during severe droughts.

Because of its large extent, high organic-matter content, and fertility, Marshall silty clay loam is an important agricultural soil in Platte County. About 85 per cent of it is under cultivation, and the remainder, including the rougher and more eroded areas, is included in grazing land. The native vegetation consists of a great variety of nutritious grasses, chief among which are buffalo, grama, wheat, little bluestem, and bunch grasses. The bunch grasses are most abundant where erosion is severe.

Of the cultivated crops, corn, wheat, oats, and alfalfa are the most important. The winter feeding of beef cattle is practiced rather extensively, and hogs are raised on every farm.

Crop yields vary widely from year to year, depending on the rainfall. During normal seasons they are about the same as those obtained on Marshall silt loam, but in excessively dry years they are usually a trifle lower. The soil is somewhat more difficult to manage than Marshall silt loam and can not be cultivated under quite so wide a range of moisture conditions.

The selling price of Marshall silty clay loam depends largely on the surface features, improvements, and location. The current price ranges from \$65 to \$150 an acre.

The methods recommended for conserving and increasing the soil fertility and preventing erosion on Marshall silt loam are well adapted to this soil.

#### MARSHALL FINE SANDY LOAM

Marshall fine sandy loam, as mapped in this county, is in reality intermediate in physical characteristics between Marshall fine sandy loam and Carrington fine sandy loam. The surface soil is dark grayish-brown, loose fine sandy loam 8 or 10 inches thick, underlain by brown very fine sandy loam or silt loam, of slightly heavier texture, which continues to a depth of about 20 inches. Below this depth the material gradually becomes lighter in color and finer in texture and merges, at a depth of about 30 inches, with loose, floury silt or silty clay which continues to a depth greater than 3 feet. The surface soil is rich in organic matter, but this material gradually decreases with depth and only slight traces occur below a depth of 30 inches. The surface soil and upper part of the subsoil are poor in lime, but below a depth of 24 inches the material is highly calcareous, and numerous lime concretions are present in the substratum.

The characteristics just described are present in the greater part of this soil in this county. However, the soil is not uniform, since many small areas contain considerable coarse sand and fine gravel intimately mixed with the finer-textured materials above a depth of 3 feet, and locally the lower part of the subsoil contains so much coarse sand and gravel as to approach gravelly sandy loam in texture. Very few of these areas contain sufficient lime to react with dilute hydrochloric acid, even in the lower part of the subsoil. Locally throughout the soil the subsoil has a slightly reddish cast, and in some

places it is mottled with splotches of gray or almost white. In several places the subsoil below a depth of 20 inches consists of heavy, plastic, gritty light-brown or brown clay which in most places continues to a depth of at least 3 feet. Because these variations are small and patchy in this county they are not separated on the soil map.

Marshall fine sandy loam occurs chiefly in small areas and narrow strips on the northern upland slopes bordering the alluvial lands along Shell Creek. The largest area, covering about 3 square miles, is in the central part of Bismarck Township in the southeastern part of the county.

Areas are gently undulating or rolling, but are traversed by numerous broad, shallow swales and are modified by narrow though usually well-rounded divides. Surface drainage is everywhere thorough and on the more steeply sloping areas is excessive, and erosion is severe. Underdrainage is excessive only where the loose, porous sand and gravel of the glacial drift deposit lie within 3 or 4 feet of the surface.

Marshall fine sandy loam is fertile, and about 90 per cent of it is under cultivation. The remainder is included in pasture land. The native vegetation consists of big bluestem, little bluestem, and grama grasses, with a minor growth of bunch grass and sand grass. Corn and alfalfa are the most important cultivated crops. Considerable wheat and oats are grown, but this soil is not so well adapted to small grains as are some of the heavier soils. Cattle raising is not practiced extensively on account of the small acreage of pasture available, but hogs are raised on every farm.

This soil is more easily managed than the heavier soils of the county and can be cultivated without injury under any moisture conditions.

It is difficult to obtain land values for this soil on account of its small extent. It is usually sold in connection with other farming land and is probably worth from \$75 to \$125 an acre, depending on the location, surface features, and improvements.

#### HASTINGS SILT LOAM<sup>9</sup>

The surface soil of Hastings silt loam consists of very dark grayish-brown or black heavy silt loam from 8 to 12 inches thick. It contains considerable clay and is slightly heavier than the average silt loam soil. The subsurface layer consists of brown, slightly compact silty clay loam somewhat heavier than the material of the surface horizon. This grades rather abruptly, at an average depth of 20 inches, to light-brown moderately compact clay or silty clay. Below a depth of 30 inches the subsoil becomes light brownish-gray silty clay, similar to the material of the subsurface layer in texture and structure. At a depth of about 4 feet this gradually merges with the loose silt or silty clay of the parent loess. The organic matter, so abundant in the surface soil, gradually decreases with depth but is seldom noticeably deficient above a depth of 30 inches. Both the soil and upper part of the subsoil are low in lime. The lower part of the subsoil is commonly more or less calcareous and the substratum below a depth of 4 feet is generally rich in lime.

A few variations occur. The surface soil is deepest in the flatter areas, and it gradually becomes shallower near the margins of the areas

<sup>9</sup> Formerly known in Nebraska as Grundy silt loam.

bordering the more sloping Marshall soils. In many places the moderately compact layer, or the upper part of the subsoil, extends below a depth of 3 feet, but locally it is much thinner, and the highly calcareous, loose silt of the parent loess occurs within a depth of 30 inches. In a few places the lower part of the subsoil is mottled with dark drab, yellowish brown, or brown. The principal surface variation is toward silty clay loam, and small areas of Hastings silty clay loam were included with this soil in mapping. The variations mentioned are of such small extent and scattered occurrence as not to warrant separate mapping.

Hastings silt loam is an extensive soil in Platte County. It occurs chiefly on the high, level table-land in the north-central part and is the predominant soil in Grand Prairie Township. It occurs locally in the extreme eastern, western, and northern parts of the county. Most areas of this soil lie at a higher elevation than any other of the upland soils. Hastings silt loam has developed on remnants of the loess plain which once covered the entire upland part of the county. Extensive undisturbed weathering, the accumulation of organic matter in the surface layer, and the downward movement of the finer silt and clay particles and their concentration in the subsurface layers have combined to produce the present soil.

The surface is almost level. Most of the soil occurs on nearly flat or gently undulating, broad divides between drainage channels. The underdrainage is only fair, owing to the moderate compactness of the upper part of the subsoil, but the slope is in most places sufficient to afford ample surface drainage except in wet seasons, when some areas remain too moist for maximum crop production.

Hastings silt loam is important agriculturally in Platte County, as its large extent, level surface, and high fertility make it valuable for general-farming purposes. It was originally covered with a thick growth of grama grass and buffalo grass but it is now practically all under cultivation. Corn, wheat, oats, and alfalfa are the leading crops, ranking in acreage in the order named. The livestock industry consists largely of hog raising and cattle feeding. The small acreage of pasture land available confines the raising of cattle to those animals used for the home meat and dairy needs.

The average yields of crops are as high as on any of the upland soils of the county, except possibly on the more level areas of Marshall silt loam.

Hastings silt loam is easy to manage considering its heavy texture. It clods badly if it is plowed when wet, but the lumps are not difficult to reduce. The smooth surface and the high fertility of the silty stone-free material make it very responsive to good farming methods. However, it is a rather heavy soil and strong machinery and heavy draft animals are needed if the largest returns are to be realized. Tractors are sometimes used to do the heavier tilling.

Hastings silt loam currently sells at prices ranging from \$100 to \$150 an acre, depending on improvements, drainage, and location.

Although the natural fertility of this soil enables it to withstand severe cropping to one grain, such methods will gradually lower the fertility and reduce crop yields. It is advisable to rotate crops, to raise more livestock in order to increase the available supply of manure, and to grow alfalfa as often as possible. Alfalfa or some

other legume should occupy an average of at least 10 per cent of the cultivated land.

HASTINGS SILTY CLAY LOAM<sup>10</sup>

Hastings silty clay loam is very similar to Hastings silt loam, except that it contains a greater percentage of clay and consequently is heavier textured in its surface soil. The material, to a depth varying from 8 to 12 inches, consists of very dark gray heavy but moderately friable silty clay loam, which is rich in organic matter and which, when moist, appears black. The remainder of the surface soil is slightly lighter in color and heavier in texture, owing to the gradually decreasing supply of organic matter and the increasing content of clay. Below an average depth of 20 inches, the material grades rather abruptly into the upper part of the subsoil which consists of brown heavy and moderately compact silty clay or clay which in most areas continues to a depth of at least 3 feet. The upper part of the subsoil is stiff and tough when moist and becomes rather hard and brittle on drying but does not attain the extreme density of a claypan. Below an average depth of 40 inches, the subsoil gradually merges with the flourey light-gray or almost white silt of the parent loess. The soil is not noticeably calcareous above a depth of 3 feet, but the substratum below a depth of 4 feet commonly contains considerable lime.

Locally the moderately compact upper subsoil horizon is much thinner than typical, and is underlain, at a depth of about 30 inches, by the loose, light-gray silt of the parent loess. This loessial material is in very few places noticeably calcareous above a depth ranging from 36 to 40 inches. The principal surface variation is toward silt loam, and small patches of Hastings silt loam are included with mapped areas of this soil.

Hastings silty clay loam is rather extensive in the northern part of the county, where it occupies the high, broad divides in close association with Hastings silt loam. The most extensive areas occur in Creston, Humphrey, Granville, and St. Bernard Townships, and one of the largest and most uniform areas is west of Humphrey in Granville Township. The soil occurs locally west and northeast of Tarnov, in the north-central part of the county. It is weathered in the same manner and from the same materials as Hastings silt loam. The larger clay content of its surface soil may result partly from more extensive weathering and partly from the larger incorporation of wind-blown silt and clay from the adjoining finer-textured soils.

Areas of this soil are prevailingly flat, and underdrainage is poor. Drainage channels are not established, and although there is commonly sufficient slope to afford adequate surface drainage in seasons of normal precipitation, during wet years the drainage is in places insufficient for maximum crop production. In dry seasons the surface soil cracks badly, with consequent injury to plant roots, and the subsoil prevents sufficient circulation of moisture for the best results.

Hastings silty clay loam is an important soil in the agriculture of Platte County. It is not so extensive as Hastings silt loam but is as fertile and productive as that soil. Practically all of it is under cultivation to corn, wheat, oats, and alfalfa. The raising of hogs and the winter fattening of cattle are practiced extensively. The soil is

<sup>10</sup> Formerly known in Nebraska as Grundy silty clay loam.

somewhat more difficult to manage than Hastings silt loam on account of its high clay content. It can not be cultivated under so wide a range of moisture conditions. If it is plowed when wet it puddles and remains in poor physical condition until granulation is restored by freezing and thawing or by subsequent wetting and drying.

The current selling price of Hastings silty clay loam ranges from \$100 to \$150 an acre, depending largely on drainage, location, and improvements.

The methods suggested for conserving and increasing the fertility of Hastings silt loam apply also to this soil. In addition, it is highly advisable to practice fall plowing, as the heavy soil is greatly benefited by adequate aeration through tillage.

#### WAUKESHA SILT LOAM

The surface soil of Waukesha silt loam is very dark grayish-brown friable silt loam from 10 to 15 inches thick. The material is rich in organic matter, which imparts the dark color, is rather loose and mellow in consistence, and has a smooth, velvety feel. The upper part of the subsoil is grayish-brown, heavy and slightly compact silt loam or silty clay loam which grades, at a depth of about 22 inches, to somewhat lighter-colored but more compact silty clay. This material, at a depth of about 30 inches, is underlain by yellowish-brown friable silt or silty clay which extends below a depth of 3 feet. The substratum, as it is seen in road cuts and along stream channels, consists of yellowish-gray or almost white loose floury silt. The surface layer and the upper part of the subsoil are not noticeably calcareous, but lime concretions occur in places in the lower part of the subsoil although their presence is not characteristic.

A few minor variations occur. Around the margins of areas adjoining the upland the surface soil has been greatly thickened in places by the addition of colluvial wash from the higher slopes. In these areas the soil consists of very dark-brown or black mellow silt loam about 20 inches thick, resting either on the compact silty clay of the typical subsoil or on rather friable silt or silty clay. In both cases the material becomes gradually lighter in color with depth and is commonly yellowish gray below a depth of 30 inches. Where this soil occurs on the lower terraces it is commonly somewhat deeper and darker in color than on the high terraces, and the rather compact subsoil is less pronounced. In a few places the material is only slightly more compact than that of the surface horizon.

Waukesha silt loam is the dominant soil between Shell Creek and Loup River in the southeastern part of the county and occurs more or less extensively along all the larger streams throughout the loessial uplands. Areas lie at several distinct bench or terrace levels, depending on the depth to which the streams had cut at the time the material was deposited. The higher terraces are from 60 to 80 feet above the present flood plains and are represented by the large Shell Creek terrace between Loup River and Shell Creek in the southeastern part of the county and by a few smaller terrace developments along Shell Creek west of Lindsay, south of Platte Center, and locally between these towns. A small high-terrace area also occurs along Lookingglass Creek in the extreme southwestern part of the county. The lower terraces lie from 10 to 30 feet above the adjoining bottom lands, chiefly along Shell, Lookingglass, and Beaver Creeks. The largest

area is south of Platte Center along Shell Creek, and small areas are along other streams in the northeastern part of the county.

The higher and older terraces are in places slightly eroded by streams and locally have a strongly undulating relief, but the crests of the low, rounded divides lie at a uniform level. The remaining terrace levels have a flat surface sloping gently down the valleys and toward the stream channels. The transition between the different terrace levels, as well as between the terraces and the flood plains, is generally marked by short, steep slopes, whereas that to the uplands is longer and more gradual.

This soil is well drained, even the flatter areas having sufficient slope to carry off the surplus moisture. The soil is very retentive of moisture and withstands drought as well as any of the upland or terrace soils of the county.

Waukesha silt loam is very fertile and includes some of the most valuable farming land in the county. Originally it supported a dense growth of grama grass and buffalo grass, but it is now practically all under cultivation, except small areas used for building sites, feed yards, and pastures for the work animals and milk cows. Corn, oats, wheat, and alfalfa are the leading crops, ranking in acreage in the order named. Cattle feeding is practiced extensively, and hogs are raised on every farm. Dairying consists of the production of only enough milk and butter to supply the home requirements.

Crop yields on this soil average slightly higher than on Marshall silt loam on account of the lower position of the areas and the more favorable moisture supply of the land.

Waukesha silt loam is managed in the same manner as Marshall silt loam. The current selling price ranges from \$150 to \$175 an acre, depending largely on improvements and location.

The fertility of the smaller high-terrace areas and that of all the lower areas of Waukesha silt loam is not being noticeably impaired by cropping.

#### WAUKESHA VERY FINE SANDY LOAM

The surface layer of Waukesha very fine sandy loam consists of dark grayish-brown very fine sandy loam from 8 to 14 inches thick. It contains a large proportion of decayed organic matter which imparts the dark color and gives the soil a mellow structure. The subsoil, to an average depth of 26 inches, is rather heavy and slightly compact silt loam or silty clay loam containing a small percentage of very fine sand. It is brown or light brown in color and in many places is faintly mottled with light-gray splotches and scattered rust-brown stains. When the material is wet it is rather sticky and plastic, but it becomes moderately hard and brittle on drying. The lower part of the subsoil consists of light-gray or light yellowish-brown loose, friable silt or silty clay. The transition in color and structure between the surface soil and the upper part of the subsoil is very gradual, but that between the two subsoil layers is in many places abrupt. The organic matter, so abundant in the surface layer, gradually decreases with depth and only slight traces occur below a depth of 30 inches. In very few places is the soil noticeably calcareous within 3 feet of the surface, although lime, both as powder and as small, angular concretions from one-sixteenth to one-fourth inch in diameter, is very abundant below a depth of 48 inches.

Although this soil is rather uniform throughout the areas of its occurrence in Platte County, it includes some patches, too small to be shown on a map, of Waukesha silt loam and Waukesha fine sandy loam.

Waukesha very fine sandy loam occurs chiefly in a few small areas and narrow strips on the terraces along Loup River and Shell Creek in the southern part of the county. Practically all of it lies within or adjacent to areas of Waukesha silt loam.

Areas of this soil are level and slope gently toward the streams. The surface lies from 10 to 20 feet above the present flood plains and drainage is good.

Owing to its small extent, Waukesha very fine sandy loam is of little agricultural importance in Platte County. It is, however, a very productive soil, and in counties where it occurs more extensively is regarded as one of the best soils for general farming. Practically all of it is under cultivation in this county. Corn, oats, wheat, and alfalfa are the principal crops. Hog raising is practiced extensively, and many farmers feed cattle during the winter months.

Current prices of Waukesha very fine sandy loam range from \$125 to \$200 an acre, depending largely on the location and farm improvements.

#### WAUKESHA FINE SANDY LOAM

The surface soil of Waukesha fine sandy loam is dark grayish-brown, loose and friable fine sandy loam from 10 to 14 inches thick. It contains a large porportion of medium and coarse sand, the finer sand predominating, and is rich in organic matter. The subsoil is slightly lighter-brown and somewhat heavier fine sandy loam which grades, at a depth of about 30 inches, to gray fine or very fine sandy loam which continues below a depth of 3 feet. The lower part of the subsoil is loose and friable, though it does not attain the mellowness of the surface layer. The transition between the different soil layers is so gradual as to be scarcely noticeable. The soil has a low lime content within a depth of 3 feet, but below a depth of 4 or 5 feet the material grades rather abruptly to light-gray, highly calcareous, loose, floury silt or very fine sandy loam in which lime concretions are abundant.

In a few places the subsoil differs from typical in that it contains much more clay and below a depth of 18 inches is rather tough and compact gritty clay which continues below a depth of 3 feet.

The total area of this soil does not exceed 3 square miles. One small area is 3 miles southwest of Columbus and another is about 4 miles northwest of that town. The soil has developed in about the same way as have other members of the Waukesha series.

Areas of Waukesha fine sandy loam are flat or very gently undulating and the drainage is everywhere good. Surface channels are not established but the internal drainage is excellent.

Owing to its small extent, this soil is of little agricultural importance in Platte County. It is very fertile, and practically all of it is under cultivation to corn, wheat, oats, and alfalfa. A few farmers feed cattle during the winter, and hogs are raised for market on every farm. Crop yields are about the same as on Waukesha silt loam.

This soil is managed in the same manner as the heavier-textured soils of the county, but it can be cultivated under a wider range of moisture conditions and with lighter machinery and draft animals.

The better farmers grow more alfalfa and raise more livestock than is found on the average farm of this type in other counties of Nebraska. Under such management, the land is in no danger of becoming exhausted.

Waukesha fine sandy loam has about the same value as the silt loam and very fine sandy loam members of the series.

#### WABASH SILT LOAM

Wabash silt loam, to an average depth of 12 inches, consists of very dark grayish-brown or black rather heavy silt loam rich in organic matter and containing a small percentage of very fine sand. The upper part of the subsoil is dark grayish-brown or black silty clay which is rather compact but is not commonly so heavy as the corresponding layer in Bremer silt loam. Below a depth of about 2 feet, the material grades to brown or brownish-drab silty clay, slightly less compact than the upper part of the subsoil. This layer extends below a depth of 36 inches. It is commonly mottled with rust brown below a depth of 30 inches. The substratum, as exposed along stream cuts, grades at a depth of about 4 feet to light-gray, loose, floury silt which continues to a great depth. The material is not noticeably calcareous within 36 inches of the surface.

This soil includes a few variations, too inextensive to warrant separate mapping. Locally, along Shell Creek, the subsoil below a depth of 28 or 30 inches is light-brown, loose, floury silt or silty clay very similar to the corresponding layer of Waukesha silt loam. In many places throughout the soil are small patchy areas in which the material shows no appreciable difference in color, texture, or structure to a depth of 3 feet, and the subsoil is friable dark-brown silt loam throughout. Had such areas been of sufficient size to warrant mapping they would have been classed with Judson silt loam. In another variation, the subsoil becomes gradually heavier and more compact with depth and is bluish-gray almost pure clay in the lower 6-inch stratum. The principal surface variation is toward very fine sandy loam, and small patchy areas of Wabash very fine sandy loam are included with mapped areas of this soil. Here and there along Shell Creek are small depressed areas, few exceeding 1 acre in extent, which closely resemble the Scott silt loam of the uplands and terraces.

Wabash silt loam is the predominant flood-plain soil along all the major streams throughout the uplands of the county. The areas are elongated in shape and are fairly continuous. They vary in width from a few rods to more than 1 mile, and most of them extend to the edge of the channels on both sides. The largest areas are along Shell, Loseke, Tracy, and Lookingglass Creeks. The flood plains of some of the smaller streams are so narrow that a slight exaggeration is necessary to show this soil on the map. Wabash silt loam does not occur along Platte and Loup Rivers. The materials composing the soil are of alluvial origin, having been washed from the adjoining uplands and deposited on the present flood plains. The decay of the vegetation, developed under moist conditions, accounts for the dark color and high content of organic matter.

The surface of Wabash silt loam is generally flat, except when it is broken by slight depressions and old stream channels. Drainage is variable but over the greater part of the soil is adequate. As the

soil lies from 6 to 12 feet above the normal flow of the streams, it is not subject to inundation from the main channels except during seasons of excessive rainfall and even then the water seldom remains on the land longer than a few hours. In the lower areas, however, the water accumulates on the surface and disappears slowly on account of the heaviness of the plastic subsoil. Many small, intermittent drainage ways in the uplands carry the surface water to the edge of areas of this soil. Here, on account of the decreased velocity of the current, the channel becomes filled with sediment and the water spreads over the surface. A few of the poorly drained areas have been improved by ditching and tiling.

About 95 per cent of the Wabash silt loam is under cultivation and the remainder, including the areas of poor or variable drainage, is included in pasture and hay land. The native vegetation consists of a rank growth of numerous water-loving and prairie grasses, and narrow strips of mixed ash, elm, cottonwood, box elder, and willow trees are along the stream channels. Of the cultivated crops, corn, wheat, oats, and alfalfa are the most important. Hog raising and cattle feeding are practiced rather extensively.

This soil is one of the most productive in the county. Crop rotation is not systematically practiced, and some fields are planted to corn for four or five successive seasons.

The current selling price of Wabash silt loam ranges from \$90 to \$200 an acre, depending chiefly on drainage but to a smaller extent on location and improvements.

#### WABASH SILTY CLAY LOAM

The surface soil of Wabash silty clay loam, to an average depth of 10 inches, is dark grayish-brown or black heavy silty clay containing barely sufficient very fine sand to make it loamy. The subsoil differs little in color from the surface layer, but to a depth of 8 or 10 inches it is slightly more compact owing to its larger clay content. The lower part of the subsoil is decidedly dense, compact clay or silty clay which continues to a depth greater than 3 feet and in a few places contains small gray or rust-brown mottles. Both the surface soil and subsoil are rich in organic matter, which imparts the dark color. The soil is not noticeably calcareous within a depth of 3 feet. The structural transition between the different soil layers is commonly very gradual, though locally it may be very abrupt between the two layers of the subsoil.

Only a few small areas of this soil are in the county. The largest occurs as a narrow strip along one of the tributaries to Loseke Creek in Bismarck and Shell Creek Townships. This is a first-bottom or flood-plain soil and has weathered on alluvium recently deposited by the streams during periods of high water. Fine-textured surface wash from the surrounding or adjoining soils has been largely responsible for the heaviness of this soil.

Wabash silty clay loam occurs in rather depressed areas and is poorly drained. Most areas occur at a slightly lower level than the surrounding soils and receive much of their surface drainage. The water disappears slowly on account of the heaviness and imperviousness of the subsoil.

Practically all of this soil is in pasture and hay. The native vegetation consists of a great variety of coarse marsh grasses, with sedges

and cat-tails in the lower areas. Corn and alfalfa are grown in a few of the better-drained areas and yield about the same as on Wabash silt loam.

No separate sale value is available for this soil, as in only a few places does it constitute an entire farm. On account of its poor drainage it has a tendency to decrease the general value of the farm on which it occurs.

The chief need of this soil is adequate drainage. It is probably the most fertile soil in the county and is especially adapted to corn and alfalfa. A system of tiling or surface ditching would reclaim it for crop production.

#### HALL VERY FINE SANDY LOAM

To an average depth of 10 inches, Hall very fine sandy loam consists of very dark gray or dark grayish-brown loose friable material consisting chiefly of silt, very fine sand, and organic matter. The color varies somewhat, depending on the moisture conditions. When the material is extremely dry it has a decidedly grayish cast, but when it is moist it appears almost black. The upper part of the subsoil, which continues to an average depth of 2 feet, consists of light-brown heavy silty clay. The lower part of the subsoil is light-gray, friable silt or silty clay which becomes gradually looser in consistence and lighter in color with depth. Below a depth of 4 feet the subsoil merges with light yellowish-gray or almost white loose, floury silt. The transition between the surface soil and the upper part of the subsoil is very abrupt in color, texture, and structure, but that between the two subsoil layers is very gradual. The soil is highly calcareous below an average depth of 24 inches, and lime concretions are abundant in the substratum.

A few variations occur. Scattered throughout the soils are small patches in which the material is not noticeably calcareous within a depth of 3 feet. Had such areas been of sufficient size to warrant mapping, they would have been included with Waukesha very fine sandy loam. Around Columbus, in the southeastern part of the county, a considerable area closely resembles Lamoure very fine sandy loam in physical characteristics. Locally the subsoil is but little heavier than the surface layer and consists of loose, yellowish-brown silt or very fine sandy loam which grades, at a depth of about 30 inches, to almost white floury silt.

Several areas of this soil occur on the terraces of Platte River and Loup River in the southern part of the county. The largest and one of the most typical areas is east of Oconee on the north side of Loup River.

Hall very fine sandy loam has weathered from fine-textured alluvial materials deposited by the streams when they were flowing at higher levels. The surface is prevalingly flat, with a gentle slope down the valleys and toward the streams. Drainage is generally good, as the slope is sufficient to carry off most of the surplus water and the subsoil affords good internal drainage. In the large area of the soil near Columbus, drainage is only fair as the surface lies somewhat below that of most of the soil. In wet years the underlying water table is too high for maximum crop production.

Hall very fine sandy loam is a fertile soil but on account of its rather small extent is not important in the general agriculture of this

county. About 80 per cent of it is under cultivation, and the remainder, including a few poorly drained depressed areas and the large area around Columbus, is in city lots, building sites, and pasture land. The native vegetation consists largely of grama grass and buffalo grass, but marsh grasses, wire grass, and sedges abound in the more poorly drained areas.

Of the cultivated crops, corn, wheat, oats, and alfalfa rank in acreage in the order named. The yields are about the same as those obtained on Waukesha silt loam and Waukesha very fine sandy loam, and the soil is managed in the same manner as the Marshall silt loam of the uplands. On account of its larger sand content, this soil can be cultivated under a slightly wider range of moisture conditions than most silt loam soils.

The current selling price for this land ranges from \$125 to \$200 an acre for farming purposes, the price depending largely on improvements, location, and drainage conditions. In the vicinity of Columbus the sale value is much higher.

#### O'NEILL FINE SANDY LOAM

To a depth ranging from 8 to 12 inches, O'Neill fine sandy loam consists of dark grayish-brown loose friable fine sandy loam containing a comparatively high proportion of very fine sand and a low percentage of silt. In a few places the sandy material predominates, and the soil approaches loamy fine sand in texture. As is indicated by the dark color, the material is rich in organic matter. The upper part of the subsoil is brown, loose, incoherent loamy fine sand containing slightly less organic matter than the surface layer. This layer is very similar in physical characteristics to the surface soil of O'Neill loamy fine sand. Below an average depth of 24 inches, the percentage of organic matter rapidly decreases, and the material becomes gray or light-gray fine sand or medium sand. This continues to a depth greater than 3 feet. Neither the surface soil nor subsoil is noticeably calcareous. In many places, below a depth of 30 inches, the subsoil contains considerable coarse sand and fine gravel. This condition is not typical of the soil as a whole, as the sand in the subsoil is commonly very similar to or only slightly coarser than that in the surface layer.

Although this is the most extensive sandy terrace soil in the county, its total extent is small. It occurs on the terraces of Loup River and Platte River. The largest area, a broad strip covering about 10 square miles, is south of Loup River in the southwestern part of the county.

Areas of O'Neill fine sandy loam are flat or very gently undulating. Drainage is everywhere good, as in most places the slope is sufficient to carry off the surplus water and the porous material affords ample underdrainage. The soil is slightly droughty during seasons of low rainfall, and crops seldom yield as well as on the heavier-textured soils.

About 80 per cent of this soil is under cultivation. The remainder is used for grazing. The native vegetation consists largely of grama grass, bunch grass, sand grass, and *Stipa* or needle grass. Corn, wheat, alfalfa, and oats are the chief crops. Most of the wheat is sold to local elevators, and the corn, oats, and alfalfa are fed to cattle, hogs,

and work animals on the farms. Hog raising is a rather important industry, as the land is better adapted to corn and alfalfa than to small grain.

In farming this soil, it is seldom necessary to plow more often than once in three or four years. Thorough disking keeps the land in good condition for crops during the intervening years. This soil can be cultivated without injury under any moisture conditions. It is very stable, considering its sandiness, and seldom blows badly even during the driest years.

The current selling prices for this soil range from \$75 to \$100 an acre, depending on improvements and location.

#### O'NEILL LOAMY FINE SAND

The surface soil of O'Neill loamy fine sand is loose, rather incoherent fine sand and very fine sand in which the fine sand predominates. It contains sufficient organic matter to give it a brown or dark-brown color and a loamy feel but not sufficient to prevent the soil blowing when the native sod is destroyed. The subsoil, below an average depth of 10 inches, is loose, incoherent, fine sand or medium sand. It is light brown in the upper part but becomes gradually lighter in color with depth and is generally gray or yellowish gray below a depth of 24 inches. The subsoil continues to a depth greater than 3 feet, and the lower part in many places contains considerable coarse sand and fine gravel. The transition in color between the surface soil and subsoil is generally rather abrupt, but over a considerable part of the soil the different layers grade imperceptibly into one another and the soil becomes gradually lighter in color and coarser in texture with depth. Neither the surface soil nor the subsoil contains sufficient lime to react when dilute hydrochloric acid is applied. The material is practically devoid of organic matter below a depth of 30 inches.

This soil is very uniform throughout the areas of its occurrence in Platte County, though it includes patches of O'Neill fine sandy loam.

O'Neill loamy fine sand occurs in scattered small areas and narrow strips on the terraces of Platte and Loup Rivers. One of the largest and most typical areas is south of Duncan, along the main line of the Union Pacific Railroad. The soil has weathered from sandy alluvial sediments deposited by the streams when they were flowing at a higher level.

Areas of this soil vary from flat to gently undulating. In a few areas the surface has been so modified by wind action as to become slightly hummocky. Drainage is everywhere thorough and over much of the soil is excessive. Surface channels are not well established, but the rainfall is absorbed and carried off through the loose, porous sands.

O'Neill loamy fine sand is not considered an important farming soil on account of its small extent, droughtiness, and tendency to drift when cultivated. About 40 per cent of it is used for crop production and the rest is utilized for pasture. The native vegetation, consisting of grama grass, bluestem, sand grass, and needle grass, will support from 150 to 250 cattle to the square mile during the summer grazing

season, depending on the rainfall. Corn is the chief cultivated crop. Little small grain is grown. Alfalfa does fairly well after the roots become established, but many of the young plants die during dry weather, making it necessary to reseed the land. The grazing of beef cattle is practiced rather extensively.

The current selling price of O'Neill loamy fine sand ranges from \$30 to \$60 an acre, depending largely on improvements, drainage, and farming possibilities.

The use of this land for crop production depends on the prevention of wind erosion and the conservation of organic matter and soil moisture. It is doubtful if more of the soil should be broken, as it is very difficult to manage under cultivation. The land already in use for crop production should not be tilled more often than is absolutely necessary to control the weeds, and it should have a vegetative covering as much of the year as possible. Liberal applications of barnyard manure and coarse straw are beneficial in stabilizing the soil and increasing its water-holding capacity.

#### KNOX SILT LOAM

To a depth ranging from 4 to 8 inches, Knox silt loam consists of grayish-brown or yellowish-brown mellow silt loam which is composed largely of silt, has a smooth floury feel, and contains very little organic matter. The subsoil is grayish-yellow, loose, floury silt which continues to a great depth. This layer is mottled with white and reddish-yellow iron stains below a depth of 30 inches. Both surface soil and subsoil are highly calcareous, and lime concretions are common on the surface and throughout the soil. The material has a pronounced columnar structure.

A few variations occur. Scattered throughout the soil are patches in which the surface soil is brown or dark-brown silt loam from 4 to 6 inches deep, underlain by the grayish-yellow loose, floury silt of the typical subsoil. If such areas were of sufficient size to warrant mapping they would be classed with Marshall silt loam, shallow phase, as the two soils differ only in the color and depth of their surface layers.

The total area of Knox silt loam in Platte County is 7.2 square miles. This soil occurs chiefly in a large area north of Lindsay, in the northwestern part of the county. Most of the soil is rough and gullied, as it occurs on steep slopes, hilltops, and the sharp crests of ridges. Drainage is excessive, and erosion is serious.

Owing to its small extent, unfavorable surface features, and low supply of organic matter, this soil is of little agricultural importance though it is productive when carefully managed. About 70 per cent of it is under cultivation to the same crops as are grown on Marshall silt loam. Yields are fair. Farming practices are the same as for Marshall silt loam, except that greater care is ordinarily taken to prevent erosion. Most of this soil is sold in connection with better farming land. It usually reduces the value of the farm on which it occurs.

The steeper slopes of Knox silt loam should remain in pasture, as it is extremely difficult to prevent their erosion if the soil is cultivated. Terracing the slopes along contour lines would assist greatly in checking erosion. The use of a large acreage for leguminous crops such as

alfalfa and clover, to which the soil is well adapted, also would aid in checking erosion. Knox silt loam is recognized as being adapted to small fruit, but in Platte County the climate limits the production of certain kinds of fruit.

#### JUDSON SILT LOAM

To a depth of about 15 inches, Judson silt loam consists of very dark brown or almost black mellow silt loam. This is underlain, to a depth greater than 36 inches, by material of about the same texture but of variable color. In most areas the subsoil is slightly lighter colored than the surface material, owing probably to a lower supply of organic matter, but in many places practically no color change is noticeable even in the lower part of the subsoil. Both surface soil and subsoil are rich in organic matter, as is indicated by the dark color of the material to a depth of 3 feet. Little of the material is noticeably calcareous, but in a few places light-gray, highly calcareous silt or silty clay occurs at a depth below 30 inches. Locally the subsoil below a depth of 24 inches is slightly more compact than the remainder of the soil, owing to the downward movement and concentration of the finer soil particles. The principal textural variation of the surface soil is toward very fine sandy loam, and small patches of material of this texture are included in mapped areas of this soil.

Judson silt loam occurs in a few small, scattered areas, chiefly in the northern and northeastern parts of the county. The largest areas are along the east side of Shell Creek northwest and southeast of Lindsay.

This land is smooth, with a decided slope toward the stream channels. The surface is from 10 to 15 feet above the normal flow of the streams, and areas are well drained, but are in no place subject to rapid erosion. The soil is retentive of moisture, and crops seldom suffer from drought.

Judson silt loam is one of the most productive soils in the county but is of little agricultural importance on account of its small extent. Practically all of it is under cultivation, and any crop common to the region can be successfully grown. Corn, wheat, oats, and alfalfa are the chief crops, and potatoes and other vegetables are grown to supply the home needs.

On account of its more nearly level surface and consequent freedom from erosion, Judson silt loam is somewhat easier to manage than Marshall silt loam.

Accurate sale prices are not available, as this soil occupies but a small part of the farms on which it occurs. Its presence, however, tends to increase the general value of the farms.

#### VALENTINE SAND

To a depth greater than 3 feet Valentine sand consists of loose, incoherent grayish-brown fine, medium, and coarse sand, composed chiefly of quartz and feldspar, in which the medium sand predominates. To a depth varying from 8 to 12 inches the material is slightly darker than the remainder of the soil. This darker color results from more extensive weathering and the accumulation of small quantities of organic matter. Not sufficient organic matter is present, however, to prevent the soil from drifting when the protective vegetation is

removed. The lower layers are practically devoid of organic matter. Neither the surface soil nor subsoil is noticeably calcareous. In small patches in the more level or depressed areas so much organic matter has accumulated in the surface soil that the texture approaches loamy sand. In these areas the material to a depth of 6 or 8 inches is light brown or brown.

Valentine sand occurs in a few large areas between Platte and Loup Rivers in the extreme southwestern part of the county. The surface varies from almost flat to decidedly rolling. Much the greater part of the soil is characterized by low, rounded ridges and knolls with intervening level depressions, which give the surface a hummocky appearance. Drainage is everywhere good and in many places is excessive. There is very little run-off, as the loose, porous sand absorbs the water as fast as it accumulates.

Valentine sand is of little value for crop production, on account of its low supply of organic matter, its low water-retaining capacity, and the danger of drifting when the native sod is broken. A few of the more favorably situated areas are used for the production of corn, but the yields are commonly low, except in the more favorable years. Most of the land retains its original covering of grasses and is used for grazing cattle and for hay. The native vegetation consists of sand grass, stipa or needle grass, big and little bluestem, and some grama grass. These grasses will support from 200 to 300 head of cattle to the square mile during the grazing season.

Valentine sand sells for prices ranging from \$30 to \$50 an acre, depending largely on the improvements, location, and surface features. This soil should probably be left with its native covering of grasses and used only for pasture and hay land. It is extremely difficult to manage when under cultivation and the soil drifts badly if it is not protected with a vegetative covering.

#### VALENTINE LOAMY SAND

Valentine loamy sand differs from Valentine sand only in the darker color and larger organic-matter content of its surface layer. The surface material consists of brown or light-brown medium sand from 8 to 15 inches thick. Sufficient organic matter is present in the surface soil to give it a loamy texture. The subsoil consists of gray, loose, incoherent sand, which continues to a great depth with little change in color or texture. Neither the surface soil nor subsoil is noticeably calcareous. The depth and color of the surface soil vary considerably with the relief of the areas. On the flatter areas, where conditions have favored the accumulation of organic matter, the soil is in places dark-brown loamy sand or loamy fine sand from 12 to 15 inches thick, but on the low ridges and knolls it is very shallow and poorly supplied with organic matter.

The total area of this soil is about 3 square miles. It occurs in a few small areas between Platte and Loup Rivers in the southwestern part of the county. Most of the areas are within or bordering areas of Valentine sand.

This land is flat or gently undulating, broken locally by small ridges and knolls composed of nearly pure sand. In general the surface is more level than that of Valentine sand. Surface drainage has not been established, as the rain water readily sinks into the porous

sand and there is practically no run-off. On account of its slightly greater supply of organic matter, this soil, as a whole, is more retentive of moisture than Valentine sand.

Valentine loamy sand is of little agricultural importance in this county, on account of its small extent and inadequate supply of organic matter. It blows badly when the protective sod is disturbed. The native vegetation consists largely of sand grasses, needle grass, grama grass, and bluestem. About 80 per cent of the soil is used for grazing and for the production of hay. For these purposes it has a higher value than Valentine sand. The remaining 20 per cent of the soil is used chiefly for corn, though small fields of oats, wheat, and potatoes are sometimes planted.

This soil is easily managed and can be cultivated under any moisture condition without injury, provided care is taken to prevent drifting. It should not be left longer than is absolutely necessary without a protective covering of vegetation.

Accurate land values are not available for this soil, as it is usually sold in connection with Valentine sand. It slightly increases the general value of the farms on which only these two soils occur, on account of its larger supply of organic matter and consequent greater fertility.

#### CASS FINE SANDY LOAM

To a depth ranging from 10 to 14 inches, Cass fine sandy loam consists of dark-gray or dark grayish-brown loose, friable fine sandy loam rich in organic matter. The sand present is chiefly of the fine and medium grades although considerable very fine sand and some silt are also present. The upper part of the subsoil is loose, medium sand containing sufficient organic matter to give it a brown color and loamy texture. Below an average depth of 24 inches the material grades abruptly to gray or light-brown incoherent sand of the medium and coarse grades. This continues to a depth greater than 3 feet, is practically devoid of organic matter, and contains barely sufficient silt and clay to bind the dry sand particles together rather firmly. This soil contains little lime. Rust-brown stains are common below a depth of 2 feet. Locally, the subsoil becomes gradually coarser with depth and below a depth of 30 inches consists of a loose, incoherent mass of coarse sand and fine gravel.

This soil is rather extensive on the flood plains of Platte and Loup Rivers, where it occurs as broken linear areas generally bordering the stream channels and varying in width from a few rods to about three-fourths mile.

Areas of this soil are flat but are modified by numerous depressions, dry channels, and slight elevations. The surface lies only a few feet above the normal flow of the streams, and some areas along Loup River are subject to overflow during periods of high water. Platte River seldom overflows its banks, but in wet years the water table along this stream often rises to within 3 feet of the surface, and the soil becomes too moist for profitable farming. In very dry years the underdrainage is excessive and crops do not do so well as on soils with heavier subsoils.

Owing to its uncertain drainage, Cass fine sandy loam is among the less important agricultural soils in Platte County. About 50 per cent of it is under cultivation and the remainder, including the more

poorly drained areas, is used for pasture and hay. The native vegetation consists of a great variety of prairie and water-loving grasses, with narrow strips of trees, mostly elm, ash, cottonwood, and willow, along the stream channels. Cottonwood and willow predominate along Platte River. Corn, oats, wheat, and alfalfa are grown on the cultivated areas, but because of the difficulty in preparing a firm, compact seed bed, this soil is not so well adapted to small grains as are some of the heavier soils. Truck crops are grown to a small extent, as the soil warms up early in the spring. Cattle are grazed on the poorly drained areas, and hogs are raised on nearly every farm.

Cass fine sandy loam is very fertile but is not so productive as the heavier-textured soils. Because it is loose and sandy it can be cultivated under a wide range of moisture conditions and can be worked with light machinery and little power. It is seldom necessary to plow it more often than once in three or four years, as thorough disking keeps it in good condition for most crops.

The current selling price of Cass fine sandy loam varies from \$75 to \$125 an acre, depending largely on drainage and the adaptability of the area to crop production.

The chief measure recommended for conserving the fertility and increasing the water-holding capacity of this soil is to maintain and increase the supply of organic matter. The poorly drained areas should be tiled or ditched.

#### CASS VERY FINE SANDY LOAM

To a depth varying from 8 to 12 inches, Cass very fine sandy loam consists of dark grayish-brown friable very fine sandy loam containing a comparatively large proportion of silt and only a small percentage of particles coarser than fine sand. The upper part of the subsoil is gray very fine sandy loam of slightly heavier texture than the surface layer. The lower part of the subsoil, below a depth of about 2 feet, is gray or light grayish-brown very fine sand, loose and rather incoherent in its natural condition but containing sufficient silt and clay to bind the dry sand particles together rather firmly. Rust-brown streaks are present in many places below a depth of 28 inches. The soil is commonly calcareous to a depth of 3 feet. The surface soil is rich in organic matter, as is indicated by the dark color, but this material decreases with depth and is lacking in the lower part of the subsoil.

Locally the subsoil below a depth of 10 inches is gray or almost white fine or medium sand which may continue to a depth of 3 feet or may grade to a mixture of coarse sand and gravel at a depth of about 30 inches. In another subsoil variation the material is made up of alternate layers of silt and very fine sand, the sand predominating. The principal surface variation is toward fine sandy loam and small patches having this texture are included in mapped areas of this soil. All these variations are of such small extent and local importance as not to warrant separation on the soil map.

Cass very fine sandy loam occurs chiefly in a few areas on the Loup River flood plains, although patches occur along Platte River. The largest area, about 2½ square miles in extent, is north of Columbus. The soil has weathered from alluvium recently deposited by the streams during periods of high water.

Areas of this soil are prevailingly flat except where they are crossed by old stream channels, sloughs, and low ridges. Drainage is variable. In most places it is adequate for crop production, but in wet years the underlying water table, over large areas, rises too near the surface for most crops, and in a few of the depressed areas the soil is so saturated that marshy conditions exist.

About 80 per cent of this soil is under cultivation and the remainder, including the poorly drained areas, is used for pasture and hay. The native vegetation consists of a great variety of coarse prairie and marsh grasses. The principal cultivated crops are corn, oats, wheat, and alfalfa. Cattle raising is practiced on farms on which there is some poorly drained land suitable for pasture, and hogs are raised most extensively on farms producing alfalfa.

This soil warms up early in the spring and is well adapted to truck farming.

The present selling price ranges from \$75 to \$150 an acre depending largely on drainage. Areas lying within or around towns sell for much more than the higher figure mentioned, as the sale price there has no relation to the agricultural value of the land.

This soil, like Cass fine sandy loam, can be improved by draining it and increasing the supply of organic matter.

#### CASS LOAMY FINE SAND

To a depth of 8 or 10 inches, Cass loamy fine sand consists of dark-brown or dark grayish-brown loose incoherent sand containing sufficient well-decomposed organic matter to impart the dark color and loamy texture but not sufficient to prevent the soil from blowing during dry, windy weather if the protective vegetation is removed. The subsoil is gray incoherent fine or medium sand, practically devoid of organic matter below a depth of 18 inches. In most places the transition between the surface soil and subsoil is very abrupt. The entire soil mass is poorly supplied with lime, though in places it gives a faint effervescence when dilute hydrochloric acid is applied.

Locally the subsoil, below a depth of 30 inches, is composed of coarse sand and fine gravel. In a few of the more poorly drained areas, rust-brown streaks and splotches occur in the lower part of the subsoil and the sand in some of these areas is very coherent, due to the admixture of a small quantity of clay. The principal surface variations are toward fine sandy loam and sand. The fine sandy loam occurs in the lower areas where conditions have especially favored the growth and decay of plant life, and the sand is found in the more exposed areas where much of the organic matter has been removed by the wind. Almost pure sand constitutes the surface layer in a few places adjacent to the streams. In these patches the soil is of such recent origin that not sufficient organic matter has accumulated to make it loamy.

This soil occurs only in a few small areas and narrow strips on the flood plains of Platte and Loup Rivers. Most of these areas are adjacent to the stream channels.

The surface of this soil is flat, modified in places by depressed areas, dry channels, and slight elevations. Drainage is variable. Most of the soil lies only a few feet above the normal flow of the streams. In wet seasons the underlying water table rises too near the surface

for profitable farming, and in dry years the underdrainage is excessive and crops suffer from lack of moisture.

Cass loamy fine sand is of little agricultural importance on account of its small extent, uncertain drainage, and the danger of blowing when the native sod is destroyed. About 90 per cent of it is included in grazing and hay land, and the remainder is used chiefly for the production of corn.

The native vegetation on this soil consists of coarse marsh grasses and sedges in the poorly drained areas, and of bluestem, *Stipa*, or needle grass, and sand grasses on the better-drained parts. The grazing of beef cattle is the principal industry. A few hogs are raised on most farms.

Land of this type sells at prices varying from \$30 to \$50 an acre, depending on drainage and improvements.

Most of this soil should probably be kept in pasture or hay, as it produces a fair yield of native forage. It is extremely difficult to manage under cultivation, especially during dry windy weather, as the soil blows badly.

#### LAMOURE VERY FINE SANDY LOAM

To an average depth of 8 inches, Lamoure very fine sandy loam consists of dark grayish-brown or almost black loose, friable, very fine sandy loam rich in organic matter and containing a comparatively large percentage of silt and clay and little material coarser than fine sand. The upper part of the subsoil is gray very fine sandy loam. Because of its larger clay content it is slightly more compact than the surface material. The lower part of the subsoil, below a depth of about 20 inches, is light-gray compact silty clay containing only a small percentage of very fine sand. The subsoil layers are sticky and plastic when wet but become hard and brittle on drying. In but few places is the surface soil noticeably calcareous. Below an average depth of 24 inches lime is present in such abundance, both as finely divided material and as small angular concretions, that it gives the subsoil a mottled gray and white appearance. The percentage of organic matter in the soil gradually decreases with depth, and only slight traces occur below a depth of 2 feet. In a few small, scattered areas the surface soil contains sufficient alkali to prevent the growth of any vegetation other than a species of salt grass. Such areas are so inextensive that they have practically no influence on the general value of the land for grazing or crop production.

Lamoure very fine sandy loam is of rather small total extent in Platte County. It is the dominant flood-plain soil along Lost Creek, in the southeastern part, and occurs locally along Platte and Loup Rivers, in the southern and south-central parts of the county. Most of the areas are elongated and range in width from one-eighth to about three-fourths mile. The soil has developed in the same way as the other members of the Lamoure series. It is of recent origin, having weathered from fine-textured loessial sediments deposited by the streams during periods of high water.

Areas are prevailingly flat, though they are locally broken by shallow depressions and stream channels. Drainage is variable. The greater part of the soil lies from 6 to 8 feet above the normal flow of the streams and is not subject to inundation from the main chan-

nels. During normal seasons most of the soil is sufficiently drained for crop production, but in wet years the underlying water table, over large areas, rises too near the surface for most crops.

Owing to its small area and variable drainage, this soil is of little importance in the general agriculture of the county, but where drainage is adequate it produces high yields of corn and alfalfa. It is not so well adapted to small grains as are the higher terrace soils of similar characteristics. About 60 per cent of this soil is under cultivation and the remainder, including the more poorly drained areas, is used for pasture and hay. The native vegetation consists of a great variety of prairie and marsh grasses.

Crop yields are very uniform, as the low position of the soil and the nearness of the water table to the surface favors an adequate moisture supply even during periods of dry weather. On account of their high lime content all the Lamoure soils, where adequately drained, are especially well adapted to alfalfa.

The soil is easy to manage and can be cultivated under a rather wide range of moisture conditions.

The current selling price of Lamoure very fine sandy loam is from \$40 to \$150 an acre, depending largely on drainage conditions.

#### LAMOURE SILTY CLAY LOAM

The surface soil of Lamoure silty clay loam, to an average depth of 12 inches, is black heavy silty clay containing barely sufficient very fine sand to give it a loamy texture. The upper part of the subsoil is brownish-black or drab compact clay which extends to a depth of about 2 feet. The lower part of the subsoil is gray, slightly compact silty clay loam containing considerable very fine sand. The transition between the surface layer and the upper part of the subsoil is very gradual in color, texture, and structure, and that between the two subsoil layers is commonly very abrupt. The surface soil is rich in organic matter, but this gradually decreases with depth and is very scarce below a depth of 2 feet. The subsoil, and in many places the surface soil, is highly calcareous. Lime concretions are abundant below a depth of 24 inches. In many places the subsoil is mottled with numerous rust-brown stains caused by poor drainage.

This soil occurs only in a few small areas on the flood plains of Loup River, Lost Creek, and Lookingglass Creek. The largest area, covering about 3 square miles, is north of Oconee along Lost Creek. The soil has weathered from fine-textured alluvial sediments deposited by the streams during periods of high water.

Areas of Lamoure silty clay loam are flat and drainage is generally poor. Much of the soil is subject to frequent overflow from the main streams. About 60 per cent of the soil is included in pasture and hay land. The native vegetation consists chiefly of marsh grasses and sedges. Corn and alfalfa are grown on the better-drained areas. The soil is rather difficult to manage on account of its large clay content. If it is plowed when it is wet, clods form and the land remains in poor physical condition until granulation is restored by subsequent freezing and thawing or wetting and drying. It is almost impossible to plow the soil when it is extremely dry.

This land sells for prices ranging from \$40 to \$100 an acre, depending on drainage conditions.

Lamoure silty clay loam is among the most fertile soils of the county. Its chief need is artificial drainage. All the land could be reclaimed for crop production by tiling or ditching, but little effort is made to drain the soil as, under existing conditions, it produces profitable crops of wild grasses for hay and pasture.

#### LAMOURE SILT LOAM

The surface soil of Lamoure silt loam is very dark grayish-brown or slate-colored mellow silt loam from 8 to 12 inches thick. The upper part of the subsoil is moderately compact, brown silty clay loam underlain, at a depth of about 24 inches, by yellowish-gray slightly compact clay or silty clay which continues to a depth greater than 3 feet. The entire soil commonly contains a rather high proportion of very fine sand. The surface soil, to a depth of 6 or 8 inches, is rich in organic matter, but this material gradually decreases with depth and only slight traces occur below a depth of 24 inches. The subsoil is very sticky and plastic when wet but becomes hard and brittle on drying. The surface soil and upper subsoil layers in but few places are noticeably limy, but the lower part of the subsoil and the substratum are highly calcareous, and small angular lime concretions, from one-sixteenth to one-half inch in diameter, are abundant below a depth of 2 feet. As mapped, Lamoure silt loam includes some areas of very fine sandy loam and silty clay loam, all too small to be located accurately on the soil map.

Lamoure silt loam occurs only in a few small areas within the flood plains of Loup River and Shell Creek. The largest area, covering about 2 square miles, is east of Shell Creek in Burrows Township. The soil has weathered on fine-textured alluvium deposited in the present flood plains of streams.

Areas of Lamoure silt loam are flat, though locally they may be modified by shallow depressions and old stream channels. Natural drainage is poor. Most of the soil is too moist for crop production and is used for pasture and hay land. The native vegetation is largely coarse marsh grasses. Some corn and alfalfa are grown on the better-drained areas, including a few small patches which have been artificially drained. The soil is naturally strong and productive and, when adequately drained, the yields of corn and alfalfa are as high as on any other soil in the county.

Lamoure silt loam is usually sold in connection with better-drained farming soil, and accurate sale values are not available.

#### LAMOURE FINE SANDY LOAM

To a depth varying from 8 to 12 inches, Lamoure fine sandy loam consists of dark-gray, friable fine sandy loam containing considerable very fine sand and silt and little material coarser than fine sand. The upper part of the subsoil is slightly compact gray silt or silty clay which contains sufficient very fine sand to make the material gritty and plastic when it is moist. The lower part of the subsoil, below a depth of about 20 inches, is light-gray very fine sandy clay, slightly less compact than the upper part. The surface soil is rich in organic matter, but this gradually decreases with depth and is scarce below a depth of 24 inches. The surface layer and the upper part of the subsoil in few places are noticeably calcareous, but lime is

abundant below a depth of 20 inches, and numerous small angular concretions occur in the lower part of the subsoil and in the substratum.

This soil occurs chiefly in a few scattered areas on the Platte River flood plains in the southern part of the county. The largest area, covering about  $1\frac{1}{2}$  square miles, is near the mouth of Prairie Creek in the southwestern part of the county. This soil has been formed in the same way as the other Lamoure soils. Its larger content of sand is caused partly by local variations in the character of the sediments from which it has weathered and partly by the addition of wind-blown sands from the Cass and Sarpy soils.

Areas of Lamoure fine sandy loam are flat, modified by slight elevations and shallow depressions. The surface lies slightly above that of Lamoure silt loam and Lamoure very fine sandy loam, and the soil is, as a rule, better drained.

This soil is very productive but, on account of its small extent, is of little agricultural importance in this county. About 80 per cent of it is under cultivation to corn, oats, and alfalfa. The remainder, including the more poorly drained areas, is used for pasture and hay land. Crop yields are about the same as those obtained on the very fine sandy loam member of the series.

The current selling price of this land ranges from \$50 to \$125 an acre, depending on drainage and improvements.

#### SIoux VERY FINE SANDY LOAM

To an average depth of 8 inches Sioux very fine sandy loam consists of very dark grayish-brown or almost black, loose, friable, very fine sandy loam containing a large proportion of silt and very little material coarser than fine sand. The upper part of the subsoil is slightly lighter-brown very fine sandy loam. Below an average depth of 24 inches this grades abruptly to light-gray very fine sand which continues below a depth of 3 feet. The subsoil layers are loose and friable in their natural state, but they contain sufficient silt and clay to make them slightly compact when dry. The surface soil is rich in organic matter, as is indicated by the dark color and loamy texture, but this material gradually decreases with depth and only slight traces occur below a depth of 24 inches. The transition in color is very gradual between the surface soil and the upper part of the subsoil. Neither of these layers is noticeably calcareous, but the lower part of the subsoil and the substratum are rich in lime.

In many places throughout this soil the subsoil becomes gradually coarser and less coherent with depth and grades, at a depth of about 30 inches, to loose, medium, or coarse sand containing considerable fine gravel. Two small areas of Sioux fine sandy loam were observed, but on account of their small extent they were included with this soil in mapping.

Sioux very fine sandy loam occurs in only three small areas east and northeast of Columbus, on the terraces of Loup River. Their total extent is less than four square miles. The soil has weathered from sandy alluvial materials deposited by the stream when it was flowing at a higher level.

The areas of this soil are flat, modified in places by low, rounded knolls and shallow depressions. The surface lies slightly below the general level of the surrounding terrace soils; but the loose, porous

subsoil affords ample underdrainage. A few of the depressed areas collect seepage water from the higher levels, but they seldom remain too moist for crop production. The soil is more retentive of moisture than the average Sioux soil, probably on account of the finer texture and lower gravel content of the subsoil. Crops seldom suffer from drought except during prolonged dry weather.

Owing to its small extent, this soil is of very little agricultural importance in Platte County. It is very fertile and practically all of it is under cultivation to corn, wheat, oats, and alfalfa. Grain yields are only slightly lower than those obtained on better-drained soils, and the yield of alfalfa averages about the same as on the heavier terrace soils. Sioux very fine sandy loam, however, requires greater care in crop rotation and fertilization if its high producing power is to be maintained. It can be tilled without injury under a rather wide range of moisture conditions. It is usually managed in the same manner as the heavier terrace soils.

Sioux very fine sandy loam is of small total extent and has no established sale value in this county, but it is probably worth from \$100 to \$120 an acre, depending on improvements.

This soil is exceptionally well adapted to legumes, especially alfalfa, on account of its highly calcareous subsoil. Alfalfa is an excellent crop for maintaining fertility, as it adds both humus and nitrogen to the soil. It should be grown in the rotations as often as possible.

#### DUNE SAND

Dune sand consists of light-brown or grayish-brown incoherent fine or medium sand which continues to a depth greater than 3 feet with little change in color, texture, or structure. The immediate surface contains some organic matter but not enough to prevent drifting when the native sod is destroyed. The material is not noticeably calcareous.

There is little variation in dune sand as it is mapped in this county, though locally the material is rather loamy, owing to the presence of a larger percentage of silt, clay, and organic matter than typical. The loamier areas have a thicker grass covering than most of the soil and, therefore, a greater grazing value.

Dune sand occurs only in a few areas between Loup and Platte Rivers in the southwestern part of the county. The areas range in size from a few acres to about 10 square miles. This soil has probably developed in the same manner and from the same materials as Valentine sand, from which it differs chiefly in its more uneven surface, lower supply of organic matter, and lesser stability. The uneven relief, which has been caused by wind action, varies from steeply rolling to hilly. The sand has been piled into dunes ranging in height from 30 to 50 feet. Scattered blow-outs occur, although at present only a negligible part of the dune sand is subject to active wind erosion. There are no continuous waterways through this soil, and all the rainfall is absorbed.

Dune sand has a very low grazing value, and it has almost no value for crop production, as the destruction of the native vegetation is followed by damaging wind erosion. Nevertheless, a few patches of corn are grown here and there. The yield is poor, especially after the first year, as most of the organic matter blows away, leaving only

gray sand for the seed bed. Practically all the dune sand is used for pasture. The native vegetation includes many grasses, of which long-leaved reed grass, redfieldia, and *Stipa* are the most common.

The present selling price of dune sand ranges from \$25 to \$35 an acre, depending on improvements. Dune sand should not be brought under cultivation, as it is a fairly good grazing soil but is of practically no value for crops after the first year. When the native sod is broken, the drifting sand commonly spreads over a considerably larger area than that originally disturbed, and it requires years for prairie grasses to reestablish a sod over the loose, drifting sand. Dune sand is fairly retentive of moisture, considering its loose consistence, and during prolonged droughts the native grasses often remain green long after those on the hard-land soils have withered.

#### SARPY SAND

The surface soil of Sarpy sand consists of grayish-brown or light grayish-brown loose, incoherent sand. It is underlain to a depth of 3 or more feet, by a subsoil of the same texture and structure. The surface 4-inch layer, because of the presence of a small quantity of organic matter, is generally slightly darker than the remainder of the soil. The soil is in few places noticeably calcareous. Locally, the lower part of the subsoil is mottled with rust-colored stains, and in a few places the material, below a depth of 30 inches, grades abruptly to coarse sand and fine gravel. This soil differs from Cass loamy fine sand in its coarser texture, lower percentage of organic matter, and lighter-colored surface soil. In many places it closely resembles river wash, but it is more stable and not so greatly influenced by each slight rise of the streams as is this material.

Sarpy sand occurs in numerous small areas and narrow strips adjacent to and within the channels of Platte and Loup Rivers. It consists of slightly weathered sandy alluvium which has been so recently deposited by the streams that sufficient time has not elapsed for the accumulation of enough organic matter to make the surface soil dark in color.

Areas of this soil are generally flat, though they may be modified in places by old cut-offs and depressions and by slight elevations formed by the wind which, in the more exposed areas, whips the loose sand into low, rounded knolls and ridges. The surface lies slightly above that of river wash, though it is subject to inundation during periods of high water. Overflows do little damage, as the land is seldom used for crop production. In dry years underdrainage is excessive and the native vegetation often suffers from lack of moisture, but in wet years the underlying water table is very near the surface and in the lower areas marshy conditions sometimes prevail.

Practically all of this soil is used for pasture and hay, but the native vegetation is sparse and the land does not have a high value even for pasture. Scrub willow, ash, elm, and cottonwood trees grow in narrow strips along the stream banks. Corn is grown in a few fields, but the yields are commonly low.

The land currently sells for \$20 or \$30 an acre for grazing purposes. It is doubtful if any of it should be used for cultivated crops. The sowing of such crops as alsike and timothy in the poorly drained areas and of sand grasses on the drier and more exposed parts would tend to increase the value of the land for pasture.

## SCOTT SILT LOAM

The surface soil of Scott silt loam, to a depth varying from 6 to 15 inches, is very dark brown or black heavy silt loam rich in organic matter. This material contains a comparatively large proportion of clay and in a few of the more poorly drained areas it approaches silty clay in texture. The subsoil is black heavy clay which gradually becomes lighter in color and heavier in texture with depth and merges with dark-gray or slate-colored heavy, stiff, compact clay at a depth of about 24 inches. This heavy claypanlike layer continues to a depth greater than 3 feet. It contains scattered black, hard, and round concretionary forms from one-sixteenth to one-fourth inch in diameter. These are especially noticeable in the more poorly drained areas. Rust-brown mottles occur in many places below a depth of 30 inches, and when dry the lower part of the subsoil has a decidedly grayish cast. The soil is not noticeably calcareous within 3 or 4 feet of the surface. Locally a layer of loose ash-gray silt from 2 to 4 inches thick occurs between the surface soil and the heavy clay of the subsoil.

Scott silt loam is one of the least extensive soils in Platte County. It occupies a few small scattered basinlike depressions, locally known as "buffalo wallows" in the areas of Marshall, Hastings, and Waukesha soils. Patches are most numerous on the high Shell Creek terrace in the southeastern part of the county.

Drainage is poor, and in the spring after heavy rains water stands on the surface for periods varying from a few days to several weeks.

Owing to its small extent and poor drainage this soil is of little agricultural importance. Practically all of it is included in farm pastures. The native vegetation consists of sedges and other water-loving plants, with prairie grasses along the borders of the areas. Many of the smaller patches lie within cultivated fields, but these usually are not tilled.

Scott silt loam has no separate sale value, as it usually occupies only a small part of the farms on which it occurs.

## RIVER WASH

River wash includes a few small sand bars, sand flats, and sand islands adjacent to and within the channels of Platte and Loup Rivers. The material lies only a few feet above the normal flow of the streams and is inundated with each slight rise. River wash is not regarded as a permanent soil. Its boundaries change with each overflow, and even during the normal flow of the streams the areas are shifted about, destroyed, or enlarged by the changing currents.

## SUMMARY

Platte County is in east-central Nebraska. It is roughly rectangular and comprises an area of 673 square miles, or 430,720 acres.

The county has an average elevation of about 1,550 feet above sea level. The general slope is to the south and east.

Drainage is effected through Platte River and its tributaries, and through tributaries leading into Loup River. Most of the county is well drained.

Platte County was established in 1855, and the first permanent settlement was made at Columbus in 1856. According to the 1920 census, the population is 19,464, of which 27.8 per cent is classed as urban.

Platte County is crossed in several directions by railroads which furnish good connections with outside points.

The climate of Platte County is well suited to growing grain and hay and raising livestock.

The present agriculture of the county consists of the production of grain, hay, and livestock. The principal crops are corn, oats, wheat, alfalfa, wild hay, barley, and rye. Cattle raising is practiced rather extensively, and hogs are raised on nearly every farm.

Land values range from about \$20 to \$200 an acre, with an average of about \$150 for the county as a whole. The highest-priced land includes the well-drained Waukesha terrace soils and the more nearly level areas of the loessial uplands.

The soils of Platte County have developed under a prairie vegetation, and with the exception of the more recent sand deposits they all show the influence of the native grasses and of weathering under the prevailing climatic conditions. The soils present various differences in structure and in chemical and physical composition, due to the varying degrees of weathering, leaching, and oxidation.

The most mature upland soils in Platte County have been grouped in the Hastings series. The Marshall soils are slightly less mature upland soils. The Knox soils occur in close association with the Marshall and really constitute an eroded phase of the Marshall soils. The Scott soils are poorly drained soils occurring in small scattered basins in the flatter parts of the uplands.

The Valentine soils and dune sand are very similar, both consisting largely of sand and containing very little organic matter. The Valentine soils are somewhat more stable than dune sand.

The well-drained terrace soils have been grouped in the Waukesha, Judson, O'Neill, Hall, and Sioux series, and the first-bottom or flood-plain soils in the Wabash, Lamoure, Cass, and Sarpy series.

River wash is a miscellaneous classification of material occurring on sand bars, sand flats, and sand islands adjacent to or within the channels of Platte and Loup Rivers.



[PUBLIC RESOLUTION—NO. 9]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

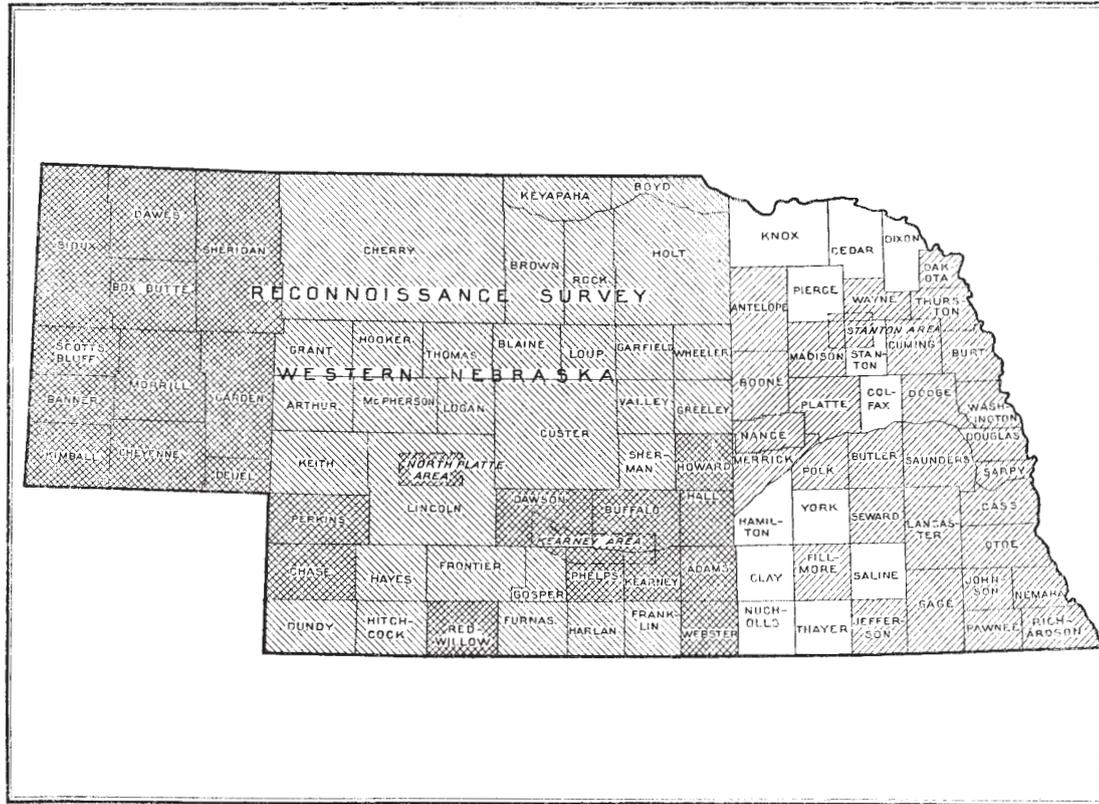
*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]





Areas surveyed in Nebraska, shown by shading

# Accessibility Statement

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- (3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

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