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SOIL SURVEY

Roosevelt-Duchesne Area Utah

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
UTAH AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of the Roosevelt-Duchesne Area will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their locations on a map; and tells what they will do under different kinds of management.

In making this survey, soil scientists walked over the fields and pastures. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, roads, and many other landmarks can be seen on the map.

Locating the soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has a symbol Am. The legend for the detailed map shows that this symbol identifies Avalon fine sandy loam, 3 to 5 percent slopes. This soil, and all the others mapped in the county, are described in the section, Descriptions of the Soils.

Finding information

Few readers will be interested in all of the soil survey report, for it has special sections for different groups. The introductory part, which mentions physiography and climate and gives some statistics on agriculture, will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers can learn about the characteristics of the soils and something about their use and management in the section, Descriptions of the Soils. Additional information on the use and management of the soils can be found in the sections, Management of Cropland and Pasture; and Irrigation, Drainage, and Salinity. The capabilities and limitations of each soil are indicated in the section, Capability Groups of Soils.

Soil scientists will find information about how the soils were formed and how they were classified in the section, Formation and Classification of Soils.

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Work on this survey was done mainly between 1937 and 1940, with some rechecking in 1954. Unless otherwise indicated, all statements in the report refer to conditions in the Area in 1954.

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SOIL SURVEY OF ROOSEVELT-DUCHESNE AREA, UTAH

BY LE MOYNE WILSON, IN CHARGE, AND D. S. JENNINGS, DUANE JENSEN, J. D. PETERSON, CLARK FOULGER, AND HARRY K. WOODWARD, UTAH AGRICULTURAL EXPERIMENT STATION, AND H. J. MAKER, H. H. MOLLENHOFF, AND R. C. McCONNELL, SOIL CONSERVATION SERVICE

CORRELATION BY W. G. HARPER, W. M. JOHNSON, AND A. T. STRAHORN, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE UTAH AGRICULTURAL EXPERIMENT STATION

Description of the Area

The Roosevelt-Duchesne Area is in northeastern Utah: It includes most of the arable and potentially arable land in Duchesne County and in the western part of Uintah County (fig. 1). The Area occupies approximately 644,914 acres. It includes most of the land now being irrigated or that is likely to be irrigated in the future. Except for the southeastern part of the Area, where the Duchesne and Green Rivers form the boundary, the boundary lines run mainly along section lines.

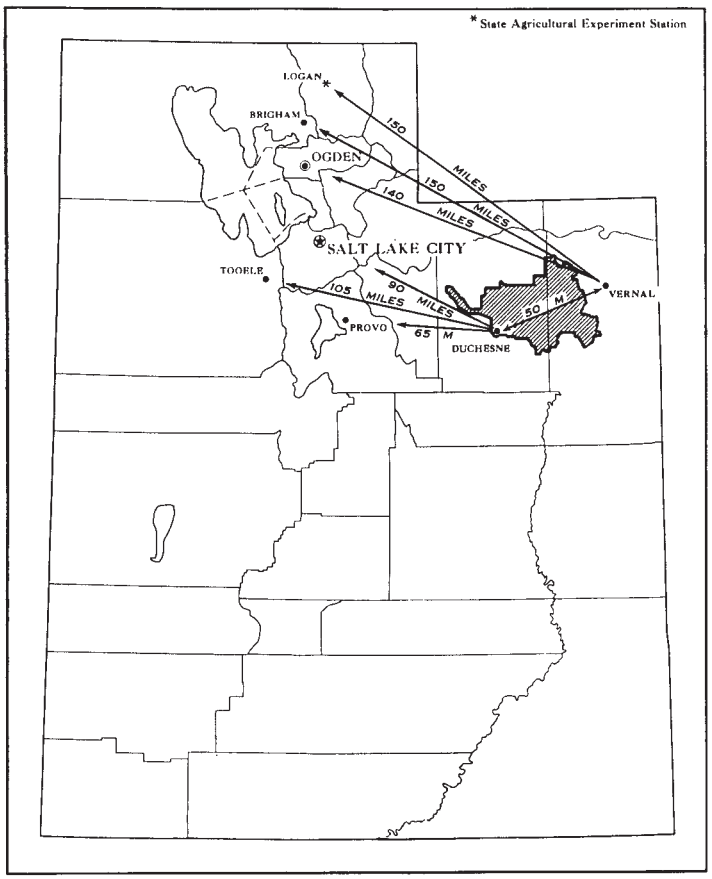

Figure 1.—**Location of the Roosevelt-Duchesne Area in Utah.**

Physiography, Relief, and Drainage

Physiography, relief, and drainage have all influenced the development of the soils in the Roosevelt-Duchesne Area. The following is a discussion of these features.

Physiographic features.—All of the Roosevelt-Duchesne Area lies within the western part of the Uinta Basin section of the Colorado Plateaus province.[1] The Uinta Basin is a structural depression that lies between the lofty Uinta Mountains on the north and the Tavaputs Plateaus on the south.

The adjacent Uinta Mountains rise somewhat gradually above the basin.[2] The central part of the range rises to a maximum elevation of between 13,400 and 13,525 feet above sea level, or to 7,000 feet above the Uinta Basin. Much of the Area is between 5,000 and 6,000 feet above sea level. The lowest elevation in the Area, 4,655 feet, is at Ouray. The highest elevation at which crops are grown, near Mountain Home, is about 7,000 feet above sea level. Elevations at various other places within the Area are Duchesne, 5,517 feet; Myton, 5,084 feet; Neola, 6,017 feet; and Fort Duchesne, 4,991 feet.

Relief.—The Uinta Basin section, of which this Area is an important part, is a plateau that has been dissected by many streams. Of the different kinds of relief recognized, the more important are: (1) Smooth, gently sloping benches or mesas; (2) broad to narrow valley flood plains that are dissected by streams; (3) low terraces, alluvial fans, and foot slopes that lie between the bases of mesa escarpments and the valley flood plains; (4) rolling uplands; and (5) steep, rough broken and eroded lands. These different types of relief are not confined to any specific locality but are scattered more or less throughout the Area. The mesas and rolling uplands are more extensive in the northern part, and the valley flood plains occur mainly in the central and southern parts.

Drainage.—All of the Roosevelt-Duchesne Area is drained by the Green River and its tributaries. The Green River forms the southeastern boundary of the area. The Duchesne River, a branch of the Green River, is the largest stream within the Area. It rises in the Uinta Mountains, flows southeasterly through the

[1] FENNEMAN, N. M. PHYSIOGRAPHY OF THE WESTERN UNITED STATES. 534 pp., illus. New York and London. 1938.

[2] ATWOOD, WALLACE W. GLACIATION OF THE UINTA AND WASATCH MOUNTAINS. U. S. Geol. Survey. Prof. Papers 61 and 62. 96 pp., illus. 1909.

Area, and joins the Green River at Ouray. The two principal tributaries of the Duchesne River are the Lake Fork and Uinta Rivers. These two streams and their main branches begin in the high Uinta Mountains and flow southward to the Duchesne River. The Lake Fork River joins the Duchesne near Myton, and the Uinta River flows into the Duchesne south of Randlett.

Between the principal rivers the landscape is cut by deep channels, most of which are occupied by intermittent streams. These channels, which originated in the Uinta Mountains, extend southward to the large rivers. Pleasant Valley, in the southern part of the Area, is drained by Pleasant Valley Wash, which flows into the Green River southwest of Ouray.

Climate

The Roosevelt-Duchesne Area has a semiarid to arid, continental climate. It is characterized by wide daily and annual variations in temperature and by well-defined seasons. The winters are generally cold, but the snowfall is light. Summers are mild, though there is an occasional hot spell.

Table 1 gives the normal temperature and precipitation for the Area. The table was compiled from records at two United States Weather Bureau stations, one at Fort Duchesne in Uintah County, and the other at Myton in Duchesne County.

The average annual precipitation varies somewhat within the Area. It is 7.02 inches at Fort Duchesne and 6.86 inches at Myton. At the town of Duchesne, however, the average annual precipitation is 9.48 inches. The amount of annual precipitation is greater at Mountain Home, which is in the northern part of the Area and is at a higher elevation.

At Fort Duchesne only 3.10 inches of precipitation was recorded in 1928. The greatest amount of annual precipitation in the Area, 13.71 inches, was recorded in 1941 at the Myton station.

At Fort Duchesne the average length of the growing season is 113 days. The average date of the last killing frost in spring is May 29, and the date of the first in fall is September 19. At Myton the average length of the growing season is 134 days. May 20 is the average date of the last killing frost in spring, and October 1, of the first in fall.

TABLE 1.—*Temperature and precipitation at two stations in the Roosevelt-Duchesne Area, Utah*

[Fort Duchesne, Uintah County, elevation, 4,991 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute Minimum	Average	Driest year (1928)	Wettest year (1941)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	20.1	61	−33	0.49	0.06	0.60	5.2
January	13.3	59	−40	.46	(3)	.94	4.4
February	20.8	65	−36	.39	.60	.23	4.0
Winter	18.1	65	−40	1.34	.66	1.77	13.6
March	35.5	79	−14	.56	(3)	.58	2.3
April	48.0	87	4	.62	(3)	1.72	.9
May	55.6	95	18	.70	.10	.96	(3)
Spring	46.4	95	−14	1.88	.10	3.26	3.2
June	64.0	101	21	.46	0	.92	0
July	71.9	104	31	.51	(3)	.21	0
August	69.9	101	31	.67	.10	1.65	0
Summer	68.6	104	21	1.64	.10	2.78	0
September	61.0	98	17	.98	.40	1.59	(3)
October	48.0	88	4	.79	1.82	3.24	.6
November	33.6	76	−19	.39	.02	.29	1.6
Fall	47.5	98	−19	2.16	2.24	5.12	2.2
Year	45.1	104	−40	7.02	3.10	12.93	19.0

[Myton, Duchesne County, elevation, 5,084 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute Minimum	Average	Driest year (1934)	Wettest year (1941)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	21.0	59	−34	0.38	0.08	0.42	4.7
January	14.7	59	−39	.33	.20	.66	4.4
February	23.6	61	−35	.32	.63	.32	3.0
Winter	19.8	61	−31	1.03	.91	1.40	12.1
March	36.7	75	−9	.41	0	.72	2.4
April	47.9	85	7	.59	.13	1.74	.8
May	57.0	92	22	.59	.17	.81	.1
Spring	47.2	92	−9	1.59	.30	3.27	3.3
June	65.2	98	29	.53	.30	1.12	(3)
July	72.1	103	32	.79	.40	1.18	0
August	70.2	99	34	.89	.23	1.40	(3)
Summer	69.2	103	29	2.21	.93	3.70	(3)
September	61.7	96	22	.89	.08	1.61	(3)
October	49.3	86	8	.76	.18	3.26	(3)
November	33.6	69	−13	.38	.82	.47	1.3
Fall	48.2	96	−13	2.03	1.08	5.34	1.3
Year	46.1	103	−39	6.86	3.22	13.71	16.7

[1] Fort Duchesne: Average temperature based on a 47-year record, through 1954; highest temperature on a 59-year record and lowest temperature on a 60-year record, through 1952. Myton: Average temperature based on a 35-year record, through 1952; highest and lowest temperatures on a 34-year record, through 1952.

[2] Fort Duchesne: Average precipitation based on a 55-year record, through 1955; wettest and driest years based on a 63-year record, in the period 1888–1952; snowfall based on a 51-year record, through 1952. Myton: Average precipitation based on a 37-year record, through 1955; wettest and driest years based on a 37-year record, in the period 1916–52; snowfall based on a 30-year record, through 1952.

[3] Trace.

Strong winds in the spring and early summer cause a high rate of evaporation and rapidly dry out the surface soil. As a result the germination of seeds and the emergence of young plants may be retarded greatly.

The climate of the Area is suitable for alfalfa, clover, small grains, corn, potatoes, and other hardy crops. It is also suitable for some of the more hardy fruits and vegetables.

Native Vegetation

The vegetation of the Roosevelt-Duchesne Area includes a wide range of species common to western arid regions. The following is a list of scientific and common names of the important plants native to the Area.

Scientific name	*Common name*
Artemisa tridentata	Common sagebrush.
Atriplex canescens	Fourwing saltbush.
A. confertifolia	Shadscale.
Bassia hyssopifolia	Alkaliweed.
Chrysothamnus lanceolatus	Rabbitbrush.
Distichlis spicata	Saltgrass.
Gutierrezia sarothrae	Snakeweed.
Hilaria jamesi	Galletagrass.
Hordeum jubatum	Wild barleygrass or foxtail.
Iva axillaris	Povertyweed.
Juniperus osteosperma	Utah juniper.
Opuntia spp	Pricklypear.
Oryzopsis hymenoides	Indian ricegrass.
Phragmites communis	Reedgrass.
Populus spp	Cottonwood.
Salicornia spp	Red samphire.
Salix spp	Willow.
Salsola kali var. *tenuifolia*	Russian-thistle.
Sarcobatus vermiculatus	Greasewood.
Shepherdia argentea	Silver buffaloberry.
Suaeda spp	Seepweed.

The dominant kinds of vegetation vary throughout the Area. Common sagebrush is the principal plant on the mesas and benches and is prevalent throughout much of the rest of the Area. Also prominent on the mesas are shadscale, rabbitbrush, fourwing saltbush, and galletagrass. In the southern part of the Area, galletagrass is especially common on the benches, where it forms a mat in many places. On the edges of the higher benches and on the steep, stony escarpments of mesas, Utah juniper is dominant. Cottonwood, willow, silver buffaloberry, and squawberry are dominant along the larger streams.

In the poorly drained saline areas, saltgrass is abundant; it grows in association with reedgrass in many of the wetter areas. Greasewood, although common throughout the Area, is dominant on the deep, fine-textured soils of the salty bottom lands, especially on those in the southern part. It generally grows either in thick patches as practically the only kind of vegetation or in scattered areas in association with shadscale, saltgrass, and seepweed. In some areas it grows along with sagebrush.

Wild barleygrass, or foxtail, has become an important invading plant in many of the pastures. It is especially prevalent in the wetter pastures. It also has invaded some of the alfalfa fields.

On the sandy soils the principal vegetation is pricklypear and other cactuses, snakeweed, fourwing saltbush, and bunchgrasses, mainly Indian ricegrass. The cleared fields that have been abandoned in many places throughout the Area have been invaded by various weeds, but mainly by Russian-thistle. Russian-thistle has also invaded much of the overgrazed rangeland. Povertyweed is abundant on idle, poorly drained land. In recent years, alkaliweed has invaded many of the abandoned saline areas. This weed makes a dense growth and often reaches heights of 2 to 3 feet.

Settlement, Organization, and Population

The part of Utah that is now known as the Roosevelt-Duchesne Area was once inhabited by the Ute Indians. The first explorers to enter that area were members of the expedition headed by Dominquez and Escalante.[3] These early explorers arrived in 1776. In 1824 General William N. Ashley and a group of trappers explored the area.

In 1861 the entire valley of the Uinta River, of which the Roosevelt-Duchesne Area is a part, was set aside by the U. S. Government for the use and occupancy of the Indians. Between 1902 and 1905, the Indians were allotted land and the rest of the area was declared surplus. In 1905 the surplus lands were opened to settlement.

Uintah County was organized in 1880, and Duchesne County was formed in 1914 from part of Wasatch County. In 1917 part of Uintah County was added to Duchesne County.

The Roosevelt-Duchesne Area had an estimated population of 10,973 in 1950. The part of the Area in Duchesne County had a population of 7,873, and that in Uintah County had a population of 3,100. Most of the people live on farms or in small villages.

Duchesne, the county seat of Duchesne County, had a population of 804 in 1950. Roosevelt, the largest town in the Area and the principal trading center, had a population of 1,628. Two other incorporated towns in Duchesne County are Myton, which had a population of 435 in 1950, and Tabiona, which had a population of 160. Small villages or community centers in Duchesne County are Hanna, Utahn, Bridgeland, Talmage, Mountain Home, Boneta, Mt. Emmons, Altonah, Upalco, Arcadia, Ioka, Montwel, Bluebell, and Neola. In Uintah County, small communities are Lapoint, Tridell, Whiterocks, Leeton, Hayden, Moffat, Fort Duchesne, Randlett, Alterra, Ballard, Avalon, and Ouray.

Transportation and Markets

The principal highway is U. S. No. 40, which runs east to west across the central part of the Area. This hard-surfaced road provides good all-weather transportation to Salt Lake City and Denver. Several secondary State highways connect most of the communities within the Area. Most of the unimproved farm roads are passable only during dry weather.

The Roosevelt-Duchesne Area is not served by railroads, but trucks transport freight between the Area and Salt Lake City. In addition some products are transported by truck to the railroads in Price and Helper and to Craig, Colo. The principal items shipped out of the Area are beef cattle, sheep, lambs, horses, wool, butterfat, honey, and small amounts of alfalfa seed and clover seed.

Mail trucks from Salt Lake City and Craig, Colo., serve the Area daily.

[3] BANCROFT, HUBERT HOWE. HISTORY OF UTAH. The Works of Hubert Howe Bancroft. v. 26, 808 pp., illus. San Francisco. 1889.

Schools

The schools in the Roosevelt-Duchesne Area are being centralized. High schools are located at Duchesne, Roosevelt, and Altonah in Duchesne County and at Alterra in Uintah County. Grade schools are maintained in the larger towns; buses transport the students to and from school.

Agriculture

The agriculture of the Roosevelt-Duchesne Area is based on the growing of alfalfa, small grains, and corn, which are used to feed livestock. In this section the more outstanding features of the agriculture in the Area are pointed out. Unless otherwise specified, the statistics used are taken from reports published by the United States Bureau of the Census.

Early Agriculture

The Roosevelt-Duchesne Area lies largely within the original Uinta Indian Reservation. In 1905, after individual land allotments were made to the Indians and areas were set aside for Indian grazing reserves, the rest of the reservation was opened to settlement. The land was allotted through drawings, and each homesteader obtained 160 acres. The allotments were taken up rapidly so that most of the Area was settled within a few years.

Apparently the virgin soil responded well during the first years of cultivation, and fairly good yields were obtained on rather poor land. Canals were built to supply irrigation water to the most accessible parts of the Area, but the land was cropped with little regard to its proper use. Soon the shallow soils became unproductive, some areas became poorly drained, and salts accumulated on the surface soil in some places. It gradually became evident that large areas were being used improperly.

Crops

Alfalfa, the principal crop in the Area, is grown on about 75 percent of the cropland. Small grains and corn are grown to a lesser extent.

Since the survey area is not a county unit, exact data on the relative importance of various crops were not available. Nevertheless, table 2, which shows the acreages of major crops for stated years in both Duchesne and Uinta Counties, is fairly representative of the Roosevelt-Duchesne Area.

Most of the alfalfa is used as feed for livestock. The Uinta Basin, of which the Roosevelt-Duchesne Area is a part, was important for the production of alfalfa seed, however, between 1921 and 1925. By 1925 nearly one-third of the total output of the State was produced in the Basin. After 1925 the production of alfalfa seed declined, and this crop is no longer important in the Roosevelt-Duchesne Area.

Livestock

Livestock, particularly beef cattle, are a major source of farm income in the Roosevelt-Duchesne Area. Table 3 gives the number of livestock for stated years. These figures apply to both Duchesne and Uintah Counties, but they indicate the importance of livestock in the Area covered by this survey.

TABLE 2.—*Acreage of principal crops and number of bearing fruit trees and grapevines in Duchesne and Uintah Counties, Utah*

Crop	Duchesne County			Uintah County		
	1939	1949	1954	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Corn for all purposes	2, 132	2, 452	2, 575	2, 388	2, 156	1, 554
Small grains threshed or combined:						
Wheat	4, 600	5, 472	2, 348	3, 921	5, 536	3, 225
Barley	2, 514	2, 375	1, 581	2, 648	2, 458	2, 664
Oats	3, 015	3, 869	2, 305	2, 861	3, 979	2, 270
All hay	25, 719	33, 845	33, 668	22, 494	23, 022	25, 690
Alfalfa and alfalfa mixtures	19, 546	20, 666	23, 645	19, 516	18, 346	20, 508
Clover, timothy, and mixed clover and grasses	2, 921	5, 435	6, 309	659	1, 980	1, 855
Small grains cut for hay	513	487	571	266	88	282
Wild hay	1, 446	4, 828	2, 875	1, 831	2, 291	2, 665
Other hay	1, 293	2, 429	268	222	317	380
Irish potatoes harvested for home use or for sale	177	[1] 145	[1] 178	153	[1] 96	[1] 47
	Number [2]	*Number* [2]	*Number*	*Number* [2]	*Number* [2]	*Number*
Apple trees	1, 680	2, 593	991	1, 504	1, 991	661
Peach trees	41	67	62	396	80	27
Pear trees	89	139	84	83	46	31
Plum and prune trees	634	575	230	785	710	53
Apricot trees	742	1, 094	430	968	1, 054	233
Grapevines	90	33	22	66	102	11

[1] Does not include acreage for farms harvesting less than 10 bags (100 pounds each).

[2] One year later than year given at head of column.

TABLE 3.—*Number of livestock on farms in Duchesne and Uintah Counties, Utah*

Livestock	Duchesne County			Uintah County		
	1940	1950	1954	1940	1950	1954
Horses and mules	[1] 4,462	3,277	2,209	[1] 4,943	4,050	2,635
Cattle and calves	[1] 23,449	28,830	37,034	[1] 17,885	31,745	33,189
Goats and kids	[2] 70	48	[3]	[2] 393	43	[3]
Hogs and pigs	[2] 4,514	2,669	1,959	[2] 4,222	3,954	2,527
Chickens	[2] 34,776	[2] 47,118	[2] 34,027	[2] 30,548	[2] 45,021	[2] 42,937
Sheep and lambs	[4] 35,431	52,436	41,670	[4] 94,718	67,868	102,739

[1] Over 3 months old. [2] Over 4 months old. [3] Not reported. [4] Over 6 months old.

Types of Farms

A study of the types of farms represented in the Uinta Basin was made by the Utah Agricultural Experiment Station.[4] Data were from farms that were well distributed throughout the Basin. About 20 percent of the farms were studied. The following list gives the types of farms and the percentage of each type as determined for a subdivision of the Uinta Basin—the Reservation Area—which is representative of the Roosevelt-Duchesne Area:

Types of farms:	*Percent of farm area*
General	47
Dairy	19
Mixed livestock	9
Beef cattle	6
Sheep	4
Part time	15

Nearly half of the farms are general farms on which no single type of farming is predominant. At the time of this study, the average acreage of cropland per farm ranged from 16.5 acres for part-time farms to 97.9 acres for ranches on which the raising of beef cattle provided the main source of income. The average acreage of idle cropland ranged from 11.1 acres on sheep ranches to 30.6 acres on general farms. On part-time farms almost twice as much land was idle as was in crops.

Although crop yields are generally low, yields on livestock farms normally are higher than those on the general or part-time farms. The higher yields on livestock farms probably result from the use of greater amounts of barnyard manure.

Tenure of Farms

Most of the farms in the Area are owned by the operator. The following statistics for the farms of Duchesne County are fairly indicative of the proportions of ownership and tenancy for the farms of the Roosevelt-Duchesne Area. Of the 892 farms in Duchesne County in 1954, 530 were operated by owners, 279 were operated by part owners, 4 were operated by managers, and 79 were operated by tenants. The number of farms operated by owners or part owners has increased since 1940, and the number of farms operated by tenants has decreased. Tenants operated 19.1 percent of the farms in 1940, as compared with 8.9 percent in 1954.

Soil Associations

The distribution of the five soil associations in the Roosevelt-Duchesne Area is shown on the generalized map in the back part of this report. Each association consists of two or more dominant soils and, as a rule, contains several other soils of lesser extent. Within each association the soils occur on the landscape in a pattern that is characteristic and recurring, although of course it is not strictly uniform. A description of each soil association in the Roosevelt-Duchesne Area follows.

1. *Naples, Billings, Fruita: Deep soils on recent alluvium.*—In addition to the Naples, Billings, and Fruita soils, this association includes soils of the Redfield, Green River, Ravola, and Navajo series. The soils occur on alluvial fans and on low terraces and valley flood plains. They are among the most arable soils in the Area. Nevertheless, some have an accumulation of salts or alkali, poor drainage, uneven topography, or a coarse-textured surface layer that makes them poorly suited or unsuited to irrigation.

2. *Mesa, Neola, Avalon: Soils of benches and mesas.*—The soils of this association have very gently sloping relief. They occur on benches and mesas, mostly on smooth slopes. The soils of the Mesa and Avalon series have strong concentrations of lime carbonate, and the Neola soils have very strongly cemented hardpans of lime carbonate.

The soils of this association are used both for crops and pasture. Under general irrigation farming, yields on the deeper soils are only moderate. The shallow soils are best suited to irrigated pasture.

3. *Ashley, Myton: Shallow soils on recent alluvium.*—This association consists of shallow soils that overlie beds of cobblestones and gravel (fig. 2). The soils occur on the flood plains of rivers and on the low terraces along rivers. In addition to the Ashley and Myton, the association includes soils of the Leeton series.

The soils of this association are used largely for irrigated or nonirrigated pasture. The slopes are smooth enough so that the soils are suitable for irrigation. During periods when streams are high, these soils absorb much of the excess water.

[4] BLANCH, GEORGE T. A STUDY OF FARM ORGANIZATION BY TYPES OF FARMS IN THE UINTA BASIN, UTAH. Utah Agr. Expt. Sta. Bul. 285. 1939.

Figure 2.—**In the foreground is an area of Myton stony sandy loam, poorly drained, 0 to 3 percent slopes, affected by salinity and having the characteristic barren surface and vegetation of greasewood; just back of the Myton soil are the Ashley soils, which are on bottom lands; in the background is Rough broken and stony land.**

4. *Shavano, Chipeta, Montwel: Moderately deep and shallow soils over bedrock.*—This association is composed of shallow and moderately deep soils, most of which have developed from weathered bedrock. In addition to the Shavano, Chipeta, and Montwel soils, it includes soils of the Pariette and Sheppard series. The soils occur mainly in nearly level to sloping areas in the uplands. Differences in the profile layers are only slightly defined in the Shavano and Chipeta soils but are well defined in the Montwel and Pariette soils. The soils of the Shavano-Sheppard complexes are similar to the Shavano soils, but they have been modified greatly by wind.

In general, the soils of this association are unsuitable for crops, but some of the deeper soils of the Montwel and Shavano series are used to grow irrigated crops.

5. *Rough lands.*—This association is made up of miscellaneous land types consisting mainly of rough, steep lands that have little or no true soil. It is by far the most extensive association, and the areas are the most widely distributed.

Some areas of Rough lands can be used for range pasture. Other large areas have no agricultural value.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

Field Study.—The soil scientist bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern, but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart, and generally they are much closer. In most soils such a boring, or hole, reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about the soil that affect its capacity to support plant growth.

Color is usually related to the amount of organic matter in soils of the same texture and clay mineralogy. The darker the surface soils, as a rule, the more organic matter they contain. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration. Unless otherwise stated, soil colors described in this report refer to air-dry soil.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers. Some samples later are checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger aggregates and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the gradient and pattern of slopes; the degree of erosion; the nature of the parent material from which the soil has formed; surface and internal drainage; and the acidity or alkalinity of the soil as measured by chemical tests.

Classification.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified by series, types, and phases.

Soil series.—Two or more soil types that differ in surface texture, but that are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which it was first mapped.

Soil type.—Soils having the same texture in the surface layers and similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, and natural drainage are examples of characteristics that may divide a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices, therefore, can be specified more easily than for soil series or yet broader groups that contain more variation.

Soil complex.—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. An example of this is Shavano-Sheppard fine sands, 2 to 7 percent slopes.

Miscellaneous land types.—Fresh stream deposits and rough, stony, and severely gullied land that have little true soil are not classified into types and series; they are

identified by descriptive names, such as Riverwash, Rough broken and stony land, and Rough gullied land, Billings soil material.

Descriptions of the Soils

The soils of the Area have developed in a semiarid to arid, continental climate. In much of the Area the native vegetation consists of desert shrubs, many of which tolerate a high concentration of soluble salts. Most of the soils are low in organic matter and nitrogen but are high in minerals. The color of the dry surface soil typically ranges from light brown to yellowish brown or very pale brown. Important characteristics of the soil series are listed in table 4.

The soils are similar to those in broad areas of Colorado and in parts of Utah that are drained by the Colorado River. Except for an area of about 18 square miles that borders the Uinta Mountains in the northern part of the Area, the soils are also similar to soils of the Great Basin in western Utah. The soils of the Area contain less organic

TABLE 4.—*Important characteristics of the soil series*

Series	Physiographic position	Parent material or substratum	Dominant native vegetation	Color of surface soil (dry)
Ashley	River flood plains	Stony alluvium deposited recently.	Cottonwood, willow, buffaloberry, and sagebrush.	Pale brown to very pale brown.
Avalon	Benches or terraces	Old alluvium	Shadscale and galletagrass	Very pale brown.
Billings	Alluvial fans and flood plains.	Moderately fine textured local alluvium.	Greasewood and shadscale	Very pale brown to light yellowish brown, pale yellow, or pale brown.
Chipeta	Upland slopes and ridges	Clay shale	Greasewood and shadscale	Very pale brown to pale brown.
Christianburg	Flood plains	Fine-textured alluvium	Greasewood and shadscale	Very pale brown to light yellowish brown.
Emmons	Alluvial fans and foot slopes	Medium-textured old alluvium.	Sagebrush, bunchgrass, and juniper.	Light reddish brown.
Fruita	Low terraces, alluvial fans, and foot slopes.	Medium- to coarse-textured old alluvium.	Sagebrush, rabbitbrush, shadscale, and prickly-pear.	Pale brown or very pale brown to light brown.
Green River	River flood plains	Recent alluvium	Cottonwood, sagebrush, rabbitbrush, greasewood, and saltgrass.	Pale brown to very pale brown.
Leeton	Alluvial flood plains	Medium to moderately fine textured old alluvium.	Grasses and scattered stands of buffaloberry.	Light brownish gray to very pale brown.
Mesa	Mesa benches and valley benches.	Medium to moderately coarse textured old alluvium.	Sagebrush, shadscale, rabbitbrush, and galletagrass.	Light brown to reddish brown.
Millard	Old alluvial fans, terraces, and flood plains.	Old stony alluvium	Sagebrush, juniper, and bunchgrasses.	Yellowish brown to dark yellowish brown.
Montwel	Upland slopes and ridges	Sandstone and shale	Sagebrush, rabbitbrush, and shadscale.	Light brown to very pale brown.
Myton	Low river terraces	Old stream alluvium	Sagebrush, rabbitbrush, and bunchgrass.	Pale brown to light brown.
Naples	Alluvial fans and flood plains.	Recent alluvium	Sagebrush, rabbitbrush, and shadscale.	Light brown to very pale brown.
Naturita	Mesa benches	Medium to moderately coarse textured old alluvium.	Sagebrush, shadscale, rabbitbrush, and galletagrass.	Light brown.
Navajo	Recent flood plains	Fine-textured alluvium	Sagebrush, greasewood, and rabbitbrush.	Light brown to brown.
Neola	High mesa benches	Medium to moderately coarse textured old alluvium.	Sagebrush	Light brown.
Pariette	Upland slopes and ridges	Clay shale	Shadscale and galletagrass	Pale brown to weak red.
Pavant	High mesa benches and old alluvial fans.	Medium-textured old alluvium.	Sagebrush, bunchgrass, and juniper.	Light brownish gray.
Ravola	Alluvial fans and flood plains.	Moderately fine to coarse textured local alluvium.	Shadscale, sagebrush, and fourwing saltbush.	Very pale brown to light yellowish brown.
Redfield	Alluvial fans and flood plains.	Recent alluvium	Sagebrush, rabbitbrush, shadscale, greasewood, bunchgrass, and saltbush.	Pale reddish brown to light brown.
Shavano	Upland slopes and ridges	Sandstone	Sagebrush, rabbitbrush, and shadscale.	Very pale brown to light brown.
Sheppard	Uplands	Wind-deposited sands derived from sedimentary rocks.	Sagebrush, greasewood, rabbitbrush, and bunchgrass.	Light red to pale red.
Tabiona	Alluvial fans and flood plains.	Medium to moderately coarse textured alluvium.	Sagebrush, rabbitbrush, bunchgrass, and cottonwood.	Reddish brown to dark reddish brown.
Tridell	Alluvial fans	Recent alluvium, much of which is stony and gravelly.	Sagebrush, juniper, squawberry, and buffaloberry.	Light brown to brownish gray.

matter and nitrogen than those in the more northerly part of Utah, where the rainfall is higher and the soils have developed mainly under grass.

Various limitations cause some of the soils within the Roosevelt-Duchesne Area to be unsuited to crops. In large areas the soils are extremely thin over cobblerock, a hardpan of lime carbonate, or bedrock. The soils in other places have unfavorable relief or have been damaged through erosion. In many areas poor drainage and the accumulation of soluble salts limit the suitability of the soils for crops.

The soils that are suitable for crops also differ greatly. The Naples, Redfield, Ravola, Green River, and other deep, medium-textured soils developed from recent alluvium are the soils best suited to general irrigation farming. Even so, large areas of all of these soils are unsuited to farming because of erosion, or poor drainage, or because soluble salts have accumulated.

The Navajo, Billings, and Christianburg soils, which also are deep and have developed from recent alluvium, are generally finer textured throughout than the Naples, Redfield, Ravola, and Green River soils. Some areas of Navajo, Billings, and Christianburg soils are well drained and are suitable for crops, but in many of the areas they are less suitable than the Naples, Redfield, Ravola, and Green River soils.

The soils of the Fruita series are deep and medium textured. They have a well-defined layer of lime in the subsoil, and generally they are more strongly sloping than the deep soils formed from recent alluvium. Some of the Fruita soils that are on strong slopes are low in organic matter and are coarse textured; as a result, they are subject to erosion.

The Mesa, Neola, and Avalon soils, which occur on the benches or mesas, have developed from old alluvium. These extensive soils are, at best, only fair for crops. They have a well-defined horizon of lime, and in the Neola soils, the lime forms a consolidated hardpan. All of these soils have a thick layer of quartzite cobblerock. In large areas the cobblerock occurs on the surface and throughout the profile.

In the Ashley and Myton series are shallow soils that overlie beds of loose cobblerock and gravel. The Ashley soils, which lie near streams, have developed from recent alluvium; the Myton soils, which are on low terraces farther back from the river channels, have formed from older alluvium and have a slight to moderate accumulation of lime in the subsoil. The Ashley and Myton soils are generally unsuited to crops, except in small areas where between 18 and 24 inches of fine soil material overlies the cobblerock.

The soils of the Chipeta, Pariette, Montwel, and Shavano series have developed from the underlying parent rock. Most of these soils are shallow. The Chipeta and Pariette soils are unsuited to crops and of little value for use as range pasture (fig. 3). The Montwel and Shavano soils generally overlie sandstone bedrock. Areas of shallow soil are nonarable, and areas of deeper soil are only fair for crops.

The Sheppard soils, developed from windblown materials, are underlain by sandstone bedrock at depths ranging from a few inches to 3 or more feet. These soils are unsuitable for crops.

Rough lands are extensive and are scattered throughout the entire Area. The following kinds of these and other miscellaneous land types occur in the Area: (1) Rough broken and stony land, characterized by highly dissected areas having exposures of shale and sandstone and by steep slopes of mesa escarpments that have a surface covering of cobblerock; (2) Rough gullied land, which has been severely gullied; four units of this land type are mapped in the Area; (3) Rough hilly land, consisting of rolling hills of shale that have a thin covering of soil in uneroded areas; (4) Rough mountainous land that comprises the steep, stony foot slopes of the Uinta Mountains; and (5) Riverwash, made up of areas of loose gravel that lies along the streams.

Figure 3.—**Sparse vegetation of horsebrush and mat saltbrush on area of Chipeta clay. Indian ricegrass occurs on the upper part of slope but is lacking on the top of the knoll.**

In the following pages the soils of the Roosevelt-Duchesne Area are described in detail. After the name of each soil is a symbol that identifies that soil on the map at the back of this report. Unless otherwise stated, the terms used to describe color refer to air-dry soil. The approximate acreage and the proportionate extent of each soil are given in table 5.

Ashley sandy loam, 0 to 3 percent slopes (Af).—This soil is developing in recent alluvium derived from quartzite and mixed sedimentary rocks, mainly sandstone. It occupies small, narrow, irregularly shaped areas on the flood plains of the larger streams. The soil is distributed mainly throughout the northern part of the Area and lies next to Ashley stony soils, 0 to 3 percent slopes.

This soil occurs only slightly above the level of the streams, and it is flooded occasionally. The drainage is somewhat excessive, but where the level of the stream is high, the soil has a high water table and drainage is restricted. Sagebrush, rabbitbrush, cottonwood, buffaloberry and similar native plants thrive on this soil.

Profile description:

0 to 10 inches, very pale brown sandy loam; weak fine granular structure; very friable when moist; strongly calcareous; appears to be low in organic matter; rapid permeability; low water-holding capacity.

10 to 30 inches, very pale brown loamy sand; single grain; very friable to loose when moist; strongly calcareous; very low in organic matter; very rapid permeability; very low water-holding capacity.

30 inches+, a mixture of loose cobblestones, gravel, and moderately calcareous sand.

TABLE 5.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Ashley sandy loam, 0 to 3 percent slopes	1,699	0.3
Ashley sandy loam, eroded, 0 to 3 percent slopes	504	.1
Ashley sandy loam, poorly drained, 0 to 3 percent slopes	800	.1
Ashley loam, 0 to 3 percent slopes	458	.1
Ashley loam, 3 to 5 percent slopes	194	(1)
Ashley loam, poorly drained, 0 to 3 percent slopes	697	.1
Ashley clay loam, 0 to 3 percent slopes	484	.1
Ashley clay loam, poorly drained, 0 to 3 percent slopes	1,717	.3
Ashley stony soils, 0 to 3 percent slopes	15,446	2.4
Avalon fine sandy loam, 0 to 3 percent slopes	4,206	.7
Avalon fine sandy loam, 3 to 5 percent slopes	703	.1
Avalon fine sandy loam, 5 to 10 percent slopes	612	.1
Avalon sandy clay loam, 0 to 3 percent slopes	1,536	.2
Avalon loamy fine sand, 0 to 3 percent slopes	714	.1
Avalon loamy fine sand, 3 to 5 percent slopes	286	(1)
Billings clay loam, 0 to 3 percent slopes	8,815	1.4
Billings clay loam, eroded, 0 to 3 percent slopes	362	.1
Billings clay loam, 3 to 5 percent slopes	660	.1
Billings clay loam, poorly drained, 0 to 3 percent slopes	2,167	.3
Billings clay loam, poorly drained, 3 to 5 percent slopes	332	.1
Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes	1,568	.2
Billings clay loam, moderately deep over shale, eroded, 0 to 3 percent slopes	126	(1)
Billings clay loam, moderately deep and deep over shale, 3 to 5 percent slopes	510	.1
Billings clay loam, moderately deep over shale, eroded, 3 to 5 percent slopes	291	(1)
Billings clay loam, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes	336	.1
Billings clay loam, moderately deep and deep over shale, poorly drained, 3 to 5 percent slopes	194	(1)
Billings clay loam, deep over gravel, 0 to 3 percent slopes	407	.1
Billings clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes	365	.1
Billings stony clay loam, moderately deep over shale, 3 to 5 percent slopes	128	(1)
Billings silty clay, 0 to 3 percent slopes	7,284	1.1
Billings silty clay, eroded, 0 to 3 percent slopes	184	(1)
Billings silty clay, 3 to 7 percent slopes	877	.1
Billings silty clay, poorly drained, 0 to 3 percent slopes	5,192	.8
Billings silty clay, very poorly drained, 0 to 3 slopes	491	.1
Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes	737	.1
Billings silty clay, moderately deep and deep over shale, 3 to 5 percent slopes	1,005	.2
Billings silty clay, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes	459	.1
Billings silty clay, deep over gravel, 0 to 3 percent slopes	831	.1
Billings silty clay, deep over gravel, poorly drained, 0 to 3 percent slopes	903	.1
Chipeta clay loam, 0 to 3 percent slopes	385	.1
Chipeta clay loam, 3 to 7 percent slopes	1,019	.2
Chipeta clay loam, poorly drained, 0 to 7 percent slopes	150	(1)
Chipeta stony clay loam, eroded, 3 to 7 percent slopes	708	.1
Chipeta sandy loam, 0 to 3 percent slopes	204	(1)
Chipeta sandy loam, 3 to 5 percent slopes	189	(1)
Chipeta stony sandy loam, 3 to 5 percent slopes	394	.1
Chipeta clay, 0 to 3 percent slopes	841	.1
Chipeta clay, 3 to 7 percent slopes	670	.1
Chipeta clay, eroded, 3 to 5 percent slopes	303	(1)
Chipeta clay, poorly drained, 0 to 7 percent slopes	152	(1)
Christianburg clay loam, 0 to 3 percent slopes	286	(1)
Christianburg clay loam, 3 to 5 percent slopes	129	(1)
Christianburg silty clay loam, 0 to 3 percent slopes	598	.1
Christianburg silty clay loam, poorly drained, 0 to 3 percent slopes	182	(1)
Emmons clay loam, 0 to 3 percent slopes	104	(1)
Emmons clay loam, 3 to 5 percent slopes	209	(1)
Emmons loam, 0 to 3 percent slopes	115	(1)
Emmons loam, 3 to 5 percent slopes	375	.1
Emmons loam, poorly drained, 0 to 5 percent slopes	230	(1)
Emmons loam, deep over gravel, 0 to 3 percent slopes	86	(1)
Emmons fine sandy loam, 0 to 3 percent slopes	226	(1)
Emmons fine sandy loam, 3 to 10 percent slopes	131	(1)
Fruita fine sandy loam, 0 to 3 percent slopes	7,022	1.1
Fruita fine sandy loam, 3 to 5 percent slopes	3,759	.6
Fruita fine sandy loam, 5 to 10 percent slopes	348	.1
Fruita fine sandy loam, hummocky, 2 to 5 percent slopes	636	.1
Fruita fine sandy loam, deep over clay, 0 to 3 percent slopes	194	(1)
Fruita fine sandy loam, deep over gravel, 0 to 3 percent slopes	1,207	.2
Fruita fine sandy loam, deep over gravel, 3 to 8 percent slopes	188	(1)
Fruita fine sandy loam, poorly drained, 0 to 3 percent slopes	1,180	.2
Fruita fine sandy loam, poorly drained, 3 to 5 percent slopes	202	(1)
Fruita fine sand, 0 to 3 percent slopes	2,552	.4
Fruita fine sand, hummocky, 2 to 5 percent slopes	1,184	.2
Fruita fine sand, 3 to 5 percent slopes	197	(1)
Fruita fine sand, 5 to 10 percent slopes	300	(1)
Fruita fine sand, deep over gravel, 0 to 8 percent slopes	1,475	.2
Fruita fine sand, poorly drained, 0 to 3 percent slopes	58	(1)
Fruita loam, 0 to 3 percent slopes	1,754	.3
Fruita loam, deep over gravel, 0 to 3 percent slopes	827	.1
Fruita loam, 3 to 7 percent slopes	1,215	.2
Fruita loam, deep over gravel, 3 to 5 percent slopes	191	(1)
Fruita loam, poorly drained, 0 to 3 percent slopes	1,064	.2
Fruita clay loam, 0 to 3 percent slopes	788	.1
Fruita clay loam, 3 to 5 percent slopes	471	.1
Fruita clay loam, deep over gravel, 0 to 3 percent slopes	246	(1)
Fruit clay loam, poorly drained, 0 to 3 percent slopes	549	.1
Fruita clay loam, poorly drained, 3 to 5 percent slopes	232	(1)
Green River clay loam, 0 to 3 percent slopes	2,992	.5
Green River clay loam, poorly drained, 0 to 3 percent slopes	4,183	.6
Green River clay loam, very poorly drained, 0 to 3 percent slopes	449	.1
Green River loam, 0 to 3 percent slopes	1,427	.2
Green River loam, poorly drained, 0 to 3 percent slopes	1,964	.3
Green River fine sandy loam, 0 to 3 percent slopes	1,719	.3
Green River fine sandy loam, poorly drained, 0 to 3 percent slopes	2,361	.4
Green River fine sandy loam, very poorly drained, 0 to 3 percent slopes	269	(1)
Green River fine sand, 0 to 3 percent slopes	1,028	.2
Green River fine sand, poorly drained, 0 to 3 percent slopes	505	.1
Green River silty clay, 0 to 3 percent slopes	1,203	.2
Green River silty clay, poorly drained, 0 to 3 percent slopes	539	.1

See footnote at end of table.

TABLE 5.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Green River silty clay, very poorly drained, 0 to 3 percent slopes	911	.1
Leeton clay loam, 0 to 3 percent slopes	2,157	.3
Leeton loam, 0 to 3 percent slopes	235	(1)
Leeton fine sandy loam, 0 to 3 percent slopes	163	(1)
Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes	10,417	1.6
Mesa fine sandy loam, moderately deep, 3 to 8 percent slopes	2,143	.3
Mesa fine sandy loam, deep, 0 to 3 percent slopes	5,050	.8
Mesa fine sandy loam, deep, 3 to 5 percent slopes	766	.1
Mesa fine sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	5,759	.9
Mesa fine sandy loam, moderately deep, poorly drained, 3 to 5 percent slopes	144	(1)
Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes	3,426	.5
Mesa sandy clay loam, moderately deep, 3 to 5 percent slopes	550	.1
Mesa sandy clay loam, deep, 0 to 3 percent slopes	525	.1
Mesa sandy clay loam, deep, 3 to 5 percent slopes	184	(1)
Mesa sandy clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	1,538	.2
Millard stony sandy loam, 0 to 3 percent slopes	2,770	.4
Millard stony sandy loam, 3 to 5 percent slopes	1,297	.2
Millard loam, poorly drained, 0 to 3 percent slopes	94	(1)
Millard loam, 3 to 5 percent slopes	430	.1
Millard loam, 5 to 10 percent slopes	131	(1)
Millard stony clay loam, 0 to 3 percent slopes	172	(1)
Millard stony clay loam, 3 to 10 percent slopes	188	(1)
Millard clay loam, 0 to 3 percent slopes	203	(1)
Millard clay loam, 3 to 7 percent slopes	193	(1)
Millard stony sand, 0 to 3 percent slopes	727	.1
Montwel sandy loam, moderately deep, 0 to 3 percent slopes	2,568	.4
Montwel sandy loam, moderately deep, 3 to 5 percent slopes	1,660	.3
Montwel sandy loam, moderately deep, 5 to 10 percent slopes	151	(1)
Montwel sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	611	.1
Montwel sandy loam, shallow, 0 to 3 percent slopes	572	.1
Montwel sandy loam, shallow, 3 to 5 percent slopes	944	.1
Montwel sandy loam, shallow, 5 to 10 percent slopes	448	.1
Montwel sand, moderately deep, 0 to 3 percent slopes	249	(1)
Montwel sand, moderately deep, 3 to 7 percent slopes	972	.2
Montwel sand, shallow, 0 to 8 percent slopes	722	.1
Montwel loam, moderately deep, 0 to 3 percent slopes	1,231	.2
Montwel loam, moderately deep, 3 to 8 percent slopes	619	.1
Montwel loam, moderately deep, poorly drained, 2 to 5 percent slopes	578	.1
Montwel loam, shallow, 0 to 3 percent slopes	320	(1)
Montwel loam, shallow, 3 to 5 percent slopes	380	.1
Montwel loam, shallow, poorly drained, 0 to 5 percent slopes	120	(1)
Montwel clay loam, moderately deep, 0 to 3 percent slopes	834	.1
Montwel clay loam, moderately deep, 3 to 5 percent slopes	238	(1)
Montwel clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	745	.1
Montwel clay loam, shallow, 0 to 3 percent slopes	67	(1)
Montwel clay loam, shallow, 3 to 5 percent slopes	173	(1)
Montwel clay loam, shallow, eroded, 5 to 10 percent slopes	170	(1)
Montwel clay, moderately deep, 0 to 3 percent slopes	257	(1)
Montwel clay, moderately deep, 3 to 5 percent slopes	150	(1)
Montwel clay, moderately deep, poorly drained, 0 to 5 percent slopes	163	(1)
Montwel clay, shallow, poorly drained, 0 to 5 percent slopes	265	(1)
Montwel clay, shallow, 0 to 3 percent slopes	773	.1
Montwel clay, shallow, 3 to 5 percent slopes	249	(1)
Myton sandy loam, 0 to 3 percent slopes	758	.1
Myton sandy loam, poorly drained, 0 to 3 percent slopes	3,286	.5
Myton stony sandy loam, 0 to 3 percent slopes	16,085	2.5
Myton stony sandy loam, 3 to 5 percent slopes	1,534	.2
Myton stony sandy loam, 5 to 10 percent slopes	229	(1)
Myton stony sandy loam, poorly drained, 0 to 3 percent slopes	13,745	2.1
Myton loam, 0 to 3 percent slopes	671	.1
Myton stony sand, 0 to 3 percent slopes	1,557	.2
Myton sand, 0 to 3 percent slopes	380	.1
Myton sand, poorly drained, 0 to 3 percent slopes	207	(1)
Myton clay loam, 0 to 3 percent slopes	753	.1
Myton clay loam, 3 to 8 percent slopes	355	.1
Myton clay loam, poorly drained, 0 to 3 percent slopes	837	.1
Myton stony clay loam, 0 to 3 percent slopes	609	.1
Myton stony clay loam, 3 to 10 percent slopes	248	(1)
Myton stony clay loam, poorly drained, 0 to 3 percent slopes	940	.1
Naples sandy clay loam, 0 to 3 percent slopes	6,281	1.0
Naples sandy clay loam, 3 to 5 percent slopes	926	.1
Naples sandy clay loam, 5 to 10 percent slopes	401	.1
Naples sandy clay loam, eroded, 2 to 8 percent slopes	167	(1)
Naples sandy clay loam, poorly drained, 0 to 3 percent slopes	2,284	.4
Naples sandy clay loam, deep over gravel, 0 to 3 percent slopes	361	.1
Naples sandy clay loam, deep over gravel, 3 to 8 percent slopes	81	(1)
Naples sandy clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes	174	(1)
Naples sandy loam, 0 to 3 percent slopes	3,173	.5
Naples sandy loam, 3 to 5 percent slopes	1,085	.2
Naples sandy loam, 5 to 10 percent slopes	302	(1)
Naples sandy loam, eroded, 2 to 10 percent slopes	279	(1)
Naples sandy loam, hummocky, 2 to 5 percent slopes	134	(1)
Naples sandy loam, poorly drained, 0 to 3 percent slopes	1,955	.3
Naples sandy loam, deep over gravel, 0 to 5 percent slopes	230	(1)
Naples sandy loam, poorly drained, 3 to 5 percent slopes	120	(1)
Naples loam, 0 to 3 percent slopes	2,752	.4
Naples loam, 3 to 5 percent slopes	620	.1
Naples loam, 5 to 10 percent slopes	215	(1)
Naples loam, eroded, 3 to 5 percent slopes	116	(1)
Naples loam, poorly drained, 0 to 5 percent slopes	1,705	.3
Naples loam, deep over gravel, 0 to 5 percent slopes	222	(1)
Naples loam, deep over gravel, poorly drained, 0 to 3 percent slopes	174	(1)
Naples loamy fine sand, 0 to 3 percent slopes	401	.1
Naples loamy fine sand, 3 to 5 percent slopes	170	(1)
Naples fine sand, poorly drained, 0 to 3 percent slopes	416	.1

See footnote at end of table.

TABLE 5.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Naples silty clay, 0 to 3 percent slopes	1, 205	. 2
Naples silty clay, 3 to 10 percent slopes	714	. 1
Naples silty clay, eroded, 2 to 8 percent slopes	39	(1)
Naples silty clay, poorly drained, 0 to 3 percent slopes	856	. 1
Naturita fine sandy loam, 0 to 3 percent slopes	13, 551	2. 1
Naturita fine sandy loam, 3 to 5 percent slopes	1, 570	. 2
Naturita fine sandy loam, 5 to 10 percent slopes	1, 001	. 2
Naturita fine sandy loam, poorly drained, 0 to 3 percent slopes	3, 366	. 5
Naturita sandy clay loam, 0 to 3 percent slopes	1, 464	. 2
Naturita sandy clay loam, very poorly drained, 0 to 3 percent slopes	273	(1)
Naturita stony fine sandy loam, 0 to 3 percent slopes	3, 555	. 6
Naturita stony fine sandy loam, 3 to 10 percent slopes	2, 223	. 3
Naturita stony fine sandy loam, poorly drained, 0 to 10 percent slopes	380	. 1
Navajo silty clay, 0 to 3 percent slopes	3, 075	. 5
Navajo silty clay, 3 to 5 percent slopes	113	(1)
Navajo silty clay, 5 to 10 percent slopes	109	(1)
Navajo silty clay, poorly drained, 0 to 3 percent slopes	1, 609	. 2
Navajo clay, 0 to 1 percent slopes	494	. 1
Neola loam, shallow, 1 to 3 percent slopes	14, 517	2. 3
Neola loam, shallow, 3 to 5 percent slopes	3, 535	. 5
Neola loam, shallow, 5 to 10 percent slopes	692	. 1
Neola loam, shallow, poorly drained, 1 to 5 percent slopes	5, 702	. 9
Neola loam, moderately deep, 1 to 3 percent slopes	6, 701	1. 0
Neola loam, moderately deep, 3 to 5 percent slopes	886	. 1
Neola loam, moderately deep, poorly drained, 1 to 3 percent slopes	1, 789	. 3
Neola stony loam, 1 to 3 percent slopes	2, 805	. 4
Neola stony loam, 3 to 5 percent slopes	712	. 1
Neola stony loam, 5 to 10 percent slopes	573	. 1
Neola sandy loam, shallow, 1 to 3 percent slopes	9, 271	1. 4
Neola sandy loam, shallow, 3 to 5 percent slopes	1, 667	. 3
Neola sandy loam, shallow, 5 to 10 percent slopes	137	(1)
Neola sandy loam, shallow, poorly drained, 1 to 3 percent slopes	753	. 1
Neola sandy loam, moderately deep, 1 to 3 percent slopes	4, 673	. 7
Neola sandy loam, moderately deep, 3 to 5 percent slopes	103	(1)
Neola sandy loam, moderately deep, poorly drained, 1 to 3 percent slopes	1, 258	1. 0
Neola stony sandy loam, 1 to 3 percent slopes	3, 008	. 5
Neola stony sandy loam, 3 to 8 percent slopes	1, 050	. 2
Neola clay loam, shallow, 2 to 5 percent slopes	237	(1)
Neola clay loam, moderately deep, 1 to 3 percent slopes	590	. 1
Pariette clay loam, moderately deep, 0 to 3 percent slopes	1, 044	. 2
Pariette clay loam, moderately deep, 3 to 5 percent slopes	920	. 1
Pariette clay loam, shallow, 2 to 5 percent slopes	431	. 1
Pariette loam, moderately deep, 0 to 3 percent slopes	281	(1)
Pariette loam, moderately deep, 3 to 5 percent slopes	1, 168	. 2
Pariette loam, shallow, 0 to 3 percent slopes	221	(1)
Pariette loam, shallow, 3 to 5 percent slopes	229	(1)
Pariette clay, moderately deep, 0 to 3 percent slopes	419	. 1
Pariette clay, shallow, 2 to 5 percent slopes	878	. 1
Pavant loam, shallow, 2 to 5 percent slopes	2, 843	. 4
Pavant loam, shallow, poorly drained, 2 to 5 percent slopes	1, 036	. 2
Pavant loam, shallow, 5 to 10 percent slopes	228	(1)
Pavant loam, moderately deep, 2 to 3 percent slopes	235	(1)
Pavant loam, moderately deep, poorly drained, 2 to 3 percent slopes	182	(1)
Pavant stony sandy loam, 2 to 5 percent slopes	2, 030	. 3
Pavant stony sandy loam, poorly drained, 2 to 5 percent slopes	133	(1)
Pavant sandy loam, shallow, 2 to 5 percent slopes	190	(1)
Pavant sandy loam, shallow, poorly drained, 2 to 5 percent slopes	121	(1)
Pavant sandy loam, moderately deep, 2 to 3 percent slopes	143	(1)
Peat, 0 to 1 percent slopes	333	. 1
Ravola sandy loam, 0 to 3 percent slopes	1, 975	. 3
Ravola sandy loam, hummocky, 0 to 3 percent slopes	478	. 1
Ravola sandy loam, duny, 2 to 8 percent slopes	797	. 1
Ravola sandy loam, 3 to 8 percent slopes	494	. 1
Ravola sandy loam, eroded, 0 to 3 percent slopes	291	(1)
Ravola sandy loam, poorly drained, 0 to 3 percent slopes	528	. 1
Ravola sandy loam, deep over gravel, 2 to 5 percent slopes	124	(1)
Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes	159	(1)
Ravola sandy loam, moderately deep and deep over shale, 3 to 5 percent slopes	304	(1)
Ravola sandy loam, moderately deep over shale, eroded, 2 to 5 percent slopes	157	(1)
Ravola stony sandy loam, 2 to 5 percent slopes	492	. 1
Ravola loam, 0 to 3 percent slopes	1, 535	. 2
Ravola loam, deep over gravel, 0 to 3 percent slopes	102	(1)
Ravola loam, moderately deep and deep over shale, 0 to 3 percent slopes	237	(1)
Ravola loam, moderately deep and deep over shale, 3 to 5 percent slopes	332	. 1
Ravola loam, moderately deep and deep over shale, poorly drained, 0 to 5 percent slopes	180	(1)
Ravola sand, 2 to 5 percent slopes	155	(1)
Ravola sand, poorly drained, 2 to 5 percent slopes	90	(1)
Redfield fine sandy loam, 0 to 3 percent slopes	3, 774	. 6
Redfield fine sandy loam, 3 to 5 percent slopes	817	. 1
Redfield fine sandy loam, eroded, 2 to 5 percent slopes	321	(1)
Redfield fine sandy loam, poorly drained, 0 to 3 percent slopes	2, 285	. 4
Redfield fine sandy loam, eroded, poorly drained, 2 to 5 percent slopes	73	(1)
Redfield loam, 0 to 3 percent slopes	1, 413	. 2
Redfield loam, 3 to 5 percent slopes	258	(1)
Redfield loam, poorly drained, 0 to 3 percent slopes	1, 811	. 3
Redfield clay loam, 0 to 3 percent slopes	2, 306	. 4
Redfield clay loam, 3 to 7 percent slopes	340	. 1
Redfield clay loam, eroded, 0 to 3 percent slopes	210	(1)
Redfield clay loam, poorly drained, 0 to 7 percent slopes	2, 875	. 4
Redfield loamy fine sand, 0 to 3 percent slopes	672	. 1
Redfield loamy fine sand, 3 to 8 percent slopes	701	. 1
Redfield loamy fine sand, poorly drained, 0 to 8 percent slopes	277	(1)
Redfield silty clay, 0 to 3 percent slopes	1, 194	. 2
Redfield silty clay, poorly drained, 0 to 3 percent slopes	2, 303	. 4
Riverwash	422	. 1
Rough broken and stony land	170, 320	26. 4
Rough gullied land, Billings soil material	639	. 1
Rough gullied land, Naples soil material	874	. 1
Rough gullied land, Navajo soil material	1, 004	. 2
Rough gullied land, Redfield soil material	361	. 1

See footnote at end of table.

TABLE 5.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Rough hilly land	28, 869	4. 5	Shavano-Sheppard fine sandy loams, 0 to 5 percent slopes	729	. 1
Rough mountainous land	8, 526	1. 3	Shavano-Sheppard fine sandy loams, poorly drained, 0 to 5 percent slopes	165	(1)
Shavano fine sandy loam, shallow, 0 to 3 percent slopes	1, 718	. 3	Sheppard fine sand, hummocky, 2 to 10 percent slopes	640	. 1
Shavano fine sandy loam, shallow, 3 to 5 percent slopes	1, 121	. 2	Sheppard fine sand, duny, 0 to 3 percent slopes	359	. 1
Shavano fine sandy loam, shallow, 5 to 10 percent slopes	7, 317	1. 1	Sheppard fine sand, duny, poorly drained, 0 to 3 percent slopes	612	. 1
Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes	2, 982	. 5	Sheppard sand, deep over gravel, hummocky, poorly drained, 0 to 3 percent slopes	396	. 1
Shavano fine sandy loam, moderately deep, 3 to 8 percent slopes	7, 054	1. 1	Tabiona fine sandy loam, 0 to 3 percent slopes	373	. 1
Shavano fine sandy loam, moderately deep, poorly drained, 0 to 5 percent slopes	1, 152	. 2	Tabiona fine sandy loam, 3 to 7 percent slopes	224	(1)
Shavano fine sandy loam, shallow, poorly drained, 0 to 10 percent slopes	271	(1)	Tabiona clay loam, 0 to 3 percent slopes	444	. 1
Shavano loam, moderately deep, 3 to 5 percent slopes	565	. 1	Tabiona clay loam, 3 to 7 percent slopes	262	(1)
Shavano loam, moderately deep, poorly drained, 0 to 5 percent slopes	149	(1)	Tabiona loam, 0 to 3 percent slopes	275	(1)
Shavano-Sheppard fine sands, 2 to 7 percent slopes	6, 612	1. 0	Tabiona loam, 3 to 10 percent slopes	176	(1)
Shavano-Sheppard fine sands, duny, 2 to 10 percent slopes	577	. 1	Tabiona loam, deep over gravel, 0 to 3 percent slopes	85	(1)
Shavano-Sheppard fine sands, poorly drained, 2 to 10 percent slopes	204	(1)	Tridell clay loam, 2 to 5 percent slopes	394	. 1
Shavano-Sheppard fine sands, dunes and rock outcrops	16, 553	2. 6	Tridell stony clay loam, 2 to 5 percent slopes	296	(1)
			Tridell loam, 2 to 5 percent slopes	149	(1)
			Tridell stony loam, 2 to 5 percent slopes	880	. 1
			Total	644, 914	100. 0

[1] Less than 0.1 percent. These soils total 1.3 percent.

In many places in the extreme northern part of the Area, the surface soil is noncalcareous and is darker in color than that of the typical profile. The darker color indicates a higher content of organic matter. The texture in the upper part of the subsoil ranges from loamy sand to loam, and in places this part of the subsoil is finer textured than the surface soil. The depth to the clean gravel substratum varies considerably; generally, the range is between 18 and about 36 inches. In places, however, the substratum occurs at greater depths.

This soil is used primarily for pasture, but much of the pasture is of low grade. About half of it contains a fairly thick stand of brush or cottonwood trees. The principal crops are alfalfa, wheat, oats, corn, and potatoes. Between 65 and 70 percent of the cropland is used for alfalfa. A small acreage is used for corn and potatoes.

Ashley sandy loam, eroded, 0 to 3 percent slopes (Ag).—Although it is in the same general areas as Ashley sandy loam, 0 to 3 percent slopes, this soil is not so well suited to agriculture. Much of it has a distinctly coarser texture than the uneroded soil. It occurs in long, narrow strips that are adjacent to the larger rivers, and many of the areas have been badly cut up by streams. All of this soil is used for pasture. The pastures are mostly unimproved and produce only a small amount of low-grade forage.

Ashley sandy loam, poorly drained, 0 to 3 percent slopes (Ah).—This soil is similar to Ashley sandy loam, 0 to 3 percent slopes. It is poorly drained, however, and much of it has a slightly darker surface soil because of the higher content of organic matter. It occupies small areas that are scattered throughout the same general localities in which Ashley sandy loam, 0 to 3 percent slopes, occurs. Some of the areas are in depressions near rivers where the water table is high. The depth to the water table fluctuates according to the height of the streams. Late in summer, when all the water is being diverted into canals to be used for irrigation, some of the areas become droughty. All of this soil is used for pasture.

Ashley loam, 0 to 3 percent slopes (Ac).—Like Ashley sandy loam, 0 to 3 percent slopes, this soil occurs on the flood plains of the larger streams. Most of it, however, is farther back from the stream. It is distributed throughout the northern part of the Area. The slopes are generally smooth, but in a few places the areas are dissected by old stream channels. The parent material was derived from quartzite and mixed sedimentary rocks, mainly sandstone but including some shale.

Occasionally, when the streams are high, this soil is flooded and there is a temporary high water table. Drainage is medium through the surface soil, but it is rapid through the gravelly subsoil. The vegetation consists mainly of grasses, sagebrush, rabbitbrush, cottonwood trees, and scattered patches of buffaloberry.

Profile description:

0 to 10 inches, very pale brown to pale brown loam; fine granular structure; strongly calcareous; low in organic matter.

10 to 24 inches, lighter colored and coarser textured material than that in the layer above; generally stratified; strongly calcareous; rapid permeability; low water-holding capacity with increasing depth; soil material becomes distinctly sandy nearer the underlying cobblestones and gravel.

The material in the 10- to 24-inch layer extends to a depth of 30 inches in many places, and in a few places it extends to a depth of 40 inches. The substratum, which occurs at variable depths, is made up of a mixture of

loose cobblestones, gravel, and sand. It is very rapidly permeable and has a very low water-holding capacity.

This soil is used for both pasture and crops. Nearly two-thirds of the acreage used for crops is in alfalfa, and about one-third is in small grains. Corn and potatoes are also grown.

Ashley loam, 3 to 5 percent slopes (Ae).—This soil is similar to Ashley loam, 0 to 3 percent slopes, but it has stronger slopes. Also it has a slightly darker surface soil because it lies near the base of the Uinta Mountains, and, therefore, it receives a greater amount of rainfall. The soil occurs on a low, sloping terrace in the extreme northern part of the Area near the Whiterocks River. The present flood plain of the river lies several feet below the level at which this soil occurs, which indicates that the river has cut to greater depths fairly recently.

In certain areas where this soil has been used for irrigation farming, there is moderate sheet erosion. This is principally in fields used for row crops where the rows have been run with the slope.

Nearly all of this soil is used for crops, which are about the same as those grown on Ashley loam, 0 to 3 percent slopes. The yields are equal to those obtained on Ashley loam, 0 to 3 percent slopes, or are slightly higher.

Ashley loam, poorly drained, 0 to 3 percent slopes (Ad).—This soil is similar to Ashley loam, 0 to 3 percent slopes, except that it occurs in slightly depressed areas where the water table is higher. Also, the surface soil is slightly darker because it contains more organic matter.

Nearly all of this soil is in pasture, mostly either brushy pasture, mainly of willow and buffaloberry or cottonwoods. Little forage is produced.

Ashley clay loam, 0 to 3 percent slopes (Aa).—This soil is developing from recent alluvium derived mainly from quartzite and mixed sedimentary rocks. It occurs in association with other Ashley soils, but in general it lies farther back from the stream. Most of it is located in the upper part of the valley of the Duchesne River, but scattered patches are along other rivers.

Except for differences in the surface layer, this soil is similar to the Ashley sandy loams and Ashley loams. Its surface layer is pale-brown light clay loam and has a fine granular structure. The subsoil varies considerably in thickness. It is stratified, lighter in color than the surface layer, and is sandy in texture near the cobblerock substratum.

In a few small areas, the surface layer is clay in texture. These areas are located along the Duchesne River, mainly northwest of Duchesne.

About one-third of this soil is used for crops. The crops are practically the same as those grown on Ashley loam, 0 to 3 percent slopes, and yields are about the same.

Ashley clay loam, poorly drained, 0 to 3 percent slopes (Ab).—This soil is similar to Ashley clay loam, 0 to 3 percent slopes. The water table is higher, however, and as a result this soil has a denser stand of vegetation. This, in turn, has caused the surface soil to be darker and to contain more organic matter. Nearly all of this soil is used for pastures, which are mostly unimproved. The forage is of low quality.

Ashley stony soils, 0 to 3 percent slopes (Ak).—These soils occur principally along the recent flood plain of the Uinta and Whiterocks Rivers, near the town of Whiterocks. Other areas lie along the Lake Fork River, extending from north of Boneta to Upalco. These soils are predominantly shallow and stony, but the degree of stoniness varies greatly. Their texture ranges from sand to clay loam. The slopes are fairly smooth but are marred by old stream channels.

Narrow patches of a deeper soil, too small to be shown separately on the soil map, are included in this mapping unit. They occur mainly near the larger streams and are subject to flooding when the streams are high.

Nearly all of this mapping unit is used for pasture, but a small part is used for crops. Most of the pasture is unimproved. Areas that are irrigated regularly produce fairly good pasture of bluegrass and white Dutch clover.

Avalon fine sandy loam, 0 to 3 percent slopes (Al).—This soil occurs on low benches or terraces near Pleasant Valley in the south-central part of the Area. A few areas are slightly undulating. The parent material was derived from quartzite and mixed sedimentary rocks, mainly very pale brown sandstone and shale.

Sheet erosion has removed some of the surface soil in the slightly undulating areas and in areas that have been overgrazed. Wind erosion has damaged some areas. Commonly, between 6 and 12 inches of windblown soil are heaped up around the bases of shadscale plants.

This soil is well drained. The native vegetation consists largely of galletagrass, shadscale, and a few patches of rabbitbrush. Russian-thistle is about the only plant growing on idle areas that were once used for crops.

Profile description:

0 to 9 inches, very pale brown fine sandy loam; medium to fine granular structure; moderately calcareous; low in organic matter; moderately permeable; fairly good water-holding capacity.

9 to 19 inches, very pale brown to light yellowish-brown clay loam; massive in place but breaks to irregularly shaped fragments when removed; firm when moist and plastic when wet; contains a moderate concentration of lime carbonate that occurs as white mottling; low in organic matter; moderately permeable; good water-holding capacity.

19 to 33 inches, very pale brown clay loam that breaks to irregularly shaped fragments; contains a strong concentration of lime carbonate and is slightly compact; moderately permeable; good water-holding capacity.

33 to 42 inches, very pale brown clay loam; massive but breaks to irregularly shaped fragments when removed; a slight concentration of lime carbonate occurs as specks; moderately permeable; good water-holding capacity.

42 to 72 inches, very pale brown sand and angular gravel containing a small amount of olive-gray fragments of shale; in virgin areas there is a slight concentration of soluble salts, and in many local spots there is a strong prismatic structure.

In places a scattering of small angular pebbles occurs on the surface of the soil. In irrigated areas the salts are rapidly leached out of the 42- to 72-inch layer.

Only about 10 percent of this soil is used for crops. About 7 percent of it is idle, and the rest is used for range pasture. Alfalfa is the most important crop, but corn and small grains are grown to a small extent. If the soil is well managed and if enough irrigation water is available, moderate to high yields can be obtained. Overgrazing of rangeland must be prevented to control sheet erosion.

Avalon fine sandy loam, 3 to 5 percent slopes (Am).—Except that it has stronger slopes, this soil is similar to Avalon fine sandy loam, 0 to 3 percent slopes. Both soils occur in the same general area. All of this soil is used for range pasture.

Avalon fine sandy loam, 5 to 10 percent slopes (An).—This soil is similar to Avalon fine sandy loam, 3 to 5 percent slopes, but it has stronger slopes. All of it is used

for grazing. Overgrazing has destroyed much of the native vegetation, and as a result this soil has been damaged by sheet and gully erosion.

Avalon sandy clay loam, 0 to 3 percent slopes (Ar).—This soil occurs on benches or terraces in close association with the Avalon fine sandy loams. All of it is located in or near Pleasant Valley.

Most of the areas are well drained, but in a few places the surface soil is puddled and infiltration is very slow. The native vegetation consists principally of galletagrass, shadscale, and rabbitbrush.

Profile description:

0 to 10 inches, very pale brown sandy clay loam; fine granular structure; hard when dry, friable when moist, and moderately plastic when wet; moderately calcareous; low in organic matter; moderate permeability; good water-holding capacity.
10 to 31 inches, very pale brown clay loam; breaks to irregularly shaped fragments; hard when dry; strongly mottled by lime carbonate; low in organic matter; slowly permeable; moderate water-holding capacity.
31 to 40 inches, very pale brown clay loam; breaks to irregularly shaped fragments; hard when dry; moderately mottled with white lime carbonate; low in organic matter; moderate permeability; moderate to good water-holding capacity.
40 to 72 inches, very pale brown loose sand and gravel containing fragments of gray angular shale; generally contains a slight concentration of soluble salts; very low in organic matter; rapid permeability; very low water-holding capacity.

One small area that occurs in a depression is poorly drained and has a clay surface soil. This area is 27 acres in size and is located at the eastern end of Pleasant Valley.

Less than one-third of this soil is used for crops, and the rest is used for grazing. The soil is used and managed in about the same way as Avalon fine sandy loam, 0 to 3 percent slopes.

Avalon loamy fine sand, 0 to 3 percent slopes (Ao).—This soil differs from Avalon fine sandy loam, 0 to 3 percent slopes, mainly in having a surface soil of loose loamy fine sand that is subject to considerable shifting by wind. It occupies benches or terraces, mostly in the eastern part of Pleasant Valley. The parent material was derived mainly from very pale brown quartzite and sandstone.

This soil is well drained. The native vegetation is composed of galletagrass, shadscale, and rabbitbrush. The areas are used for grazing, mostly as a winter range for sheep.

Avalon loamy fine sand, 3 to 5 percent slopes (Ap).—This soil is similar to Avalon loamy fine sand, 0 to 3 percent slopes, but it has stronger slopes. It occurs in the eastern part of Pleasant Valley. All of it is used for range pasture.

Billings clay loam, 0 to 3 percent slopes (Ba).—This soil occurs mainly on alluvial fans and flood plains throughout the southern part of the Area. In many places it occurs in association with Billings silty clay, 0 to 3 percent slopes, and with the soils of the Ravola series. The alluvial parent material was derived primarily from shale but included a small amount of sandstone.

This soil is well drained. The vegetation consists mainly of salt-tolerant plants, such as greasewood and shadscale.

Profile description:

0 to 13 inches, very pale brown to light yellowish-brown clay loam; fine granular structure; hard when dry, friable when moist, and plastic when wet; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
13 to 26 inches, very pale brown to pale-olive silty clay; massive; hard when dry; strongly calcareous and some segregated gypsum along cavities of roots; low in organic matter; slowly permeable; good water-holding capacity.
26 to 38 inches, this layer is similar to layer immediately above but is not so compact.
38 to 72 inches, very pale brown to pale-olive clay loam; massive; friable; moderately permeable; good water-holding capacity.

Because this soil was derived from local alluvium, its characteristics vary considerably from place to place. The stratification of the subsoil is especially variable. Most areas of the virgin soil contain light to moderate concentrations of soluble salts.

About one-third of this soil is used for crops. Approximately 75 percent of the cropped area is used for alfalfa; 20 percent, for oats, wheat, and barley; and most of the rest, for potatoes, corn, and squash. Some large irrigated areas have been abandoned because they have been damaged by waterlogging and by accumulated salts.

Billings clay loam, eroded, 0 to 3 percent slopes (Bc).—This soil has been damaged severely by erosion, which is mainly gully erosion. Many of the gullies have formed as the result of the improper use of irrigation water. The soil is not suitable for crops and is used for dryland pasture. Erosion must be controlled if the soil is to be reclaimed for irrigation farming.

Billings clay loam, 3 to 5 percent slopes (Bk).—This soil is similar to Billings clay loam, 0 to 3 percent slopes, but it occurs on stronger slopes. It requires more attention to the control of erosion. About one-third of the acreage is used for crops. The areas used for range pasture need improvement.

Billings clay loam, poorly drained, 0 to 3 percent slopes (Bb).—This soil is similar to Billings clay loam, 0 to 3 percent slopes, but it has become poorly drained. The poor drainage is the result either of overirrigation or of seepage from higher lying areas or canals. Most of this soil occurs in the south-central part of the Area. Moderate to high concentrations of salts are common. The principal vegetation is greasewood.

Areas of this soil that are severely gullied include about 71 acres in secs. 2 and 3, T. 3 S., R. 2 W., and about 23 acres in secs. 22 and 23, T. 3 S., R. 4 W. Mapped with this soil is an area of wet land, 81 acres in size and located 2 miles southwest of Myton. This area supports a thick stand of marsh vegetation.

Most of this soil is used as unimproved pasture. Studies need to be made to determine the possibility of draining a number of the areas.

Billings clay loam, poorly drained, 3 to 5 percent slopes (Bl).—This soil is similar to Billings clay loam, poorly drained, 0 to 3 percent slopes, but it is on stronger slopes. It is located northwest of Myton. All of this soil is used for pasture.

Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes (Bd).—This soil occurs throughout the south-central part of the Area. It lies next to the hills of shale. The parent material consists of material from the underlying shale and from the hills of shale.

This soil has medium surface drainage, but the internal drainage is impeded by the shale substratum. Slight to moderate concentrations of salts are common, and in local areas strong concentrations occur. The native vegetation is principally greasewood and shadscale.

Profile description:

0 to 9 inches, very pale brown to pale-yellow clay loam; fine granular structure; slightly hard to hard when dry, friable when moist; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
9 to 32 inches, very pale brown to light yellowish-brown clay loam; massive; strongly calcareous and in places some segregated gypsum along the root cavities; low in organic matter; moderate permeability.
32 to 46 inches, pale-yellow to very pale brown silty clay loam mixed with unweathered clay shale; massive; firm when moist; very low in organic matter; moderate to slow permeability.
46 inches+, pale-olive, unweathered clay shale or silty clay shale.

The shale substratum is generally at depths ranging from about 20 to 48 inches, but in a few places it occurs at a depth of 60 inches. Areas of Chipeta clay loam, 0 to 3 percent slopes, too small to map separately, are included with this mapping unit.

This soil is not well suited to crops. The use of irrigation water on this soil generally results in the transfer of soluble salts from the underlying bedrock to the soil. Nearly half of the soil is idle. The idle areas have some value for grazing because they usually have a thick cover of Russian-thistle.

Billings clay loam, moderately deep over shale, eroded, 0 to 3 percent slopes (Bf).—This soil occurs in the same general area as Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes, but it has been eroded. Because of the effects of erosion, which is principally gully erosion, this soil provides only poor grazing for livestock.

Billings clay loam, moderately deep and deep over shale, 3 to 5 percent slopes (Bm).—This soil has gently sloping relief. Most of it has been damaged by sheet erosion, and the carrying capacity is low. If erosion is controlled and other good management practices are followed, this soil will produce grass and shrubs for winter pasture.

Billings clay loam, moderately deep over shale, eroded, 3 to 5 percent slopes (Bo).—This soil is similar to Billings clay loam, moderately deep over shale, eroded, 0 to 3 percent slopes. It occurs on stronger slopes, however, and has been more severely eroded. All of this soil is used for range. It needs management to control erosion and to conserve moisture.

Billings clay loam, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes (Be).—Except for being poorly drained, this soil is similar to Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes. The poor drainage has been caused either by overirrigation or by seepage of water from higher areas or canals.

This soil occurs in small areas in the same general locality as the other Billings soils. In most of it there are moderate to strong accumulations of salt. The surface soil is moderately eroded.

This soil is best suited to salt-tolerant range plants. All of it is used for range pasture. Reclaiming this soil through artificial drainage would be difficult if not impossible.

Billings clay loam, moderately deep and deep over shale, poorly drained, 3 to 5 percent slopes (Bn).—This soil is similar to Billings clay loam, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes, but it occurs on stronger slopes. It is best suited to range. Artificial drainage probably would not be feasible.

Billings clay loam, deep over gravel, 0 to 3 percent slopes (Bg).—This soil occurs on smooth, nearly level to very gently sloping alluvial flood plains or on low river terraces. It is generally associated with the Myton soils. Most of it is in the valley of the Duchesne River. The parent material of the upper part of the profile consists of material washed from nearby areas of light-gray to very pale brown shale and sandstone. The gravelly substratum consists of quartzite and mixed sedimentary rocks transported mainly from the Uinta Mountains. The vegetation is mainly greasewood and shadscale.

In most places the surface layer and subsoil of this soil are similar to those of Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes, but coarse gravel and cobblestones occur at depths below 30 inches. In places there is a slight concentration of lime and gypsum in the subsoil and the cobblestones and gravel in the uppermost 6 to 8 inches of the substratum are coated underneath with lime.

A little more than two-thirds of this soil is used for crops, mainly alfalfa, wheat, oats, and barley. Alfalfa is grown on about 70 percent of the acreage.

Billings clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes (Bh).—This soil is similar to Billings clay loam, deep over gravel, 0 to 3 percent slopes, but it became poorly drained when adjacent higher lying areas were irrigated. Both of these soils occur in the lower part of the valley of the Duchesne River.

All of this soil is used for pasture. Before attempting to drain the soil, the areas should be examined carefully to determine if drainage is feasible.

Billings stony clay loam, moderately deep over shale, 3 to 5 percent slopes (Bla).—This soil is somewhat similar to Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes. It differs in that it has a fairly dense covering of cobblestones on the surface and is shallower over the underlying shale. Also, it generally occurs on gentle slopes at the bases of steep escarpments, and stones have washed down onto it from higher areas. A poorly drained area, 39 acres in size, is located in sec. 8, T. 3 S., R. 2 W. All of this mapping unit is used as range pasture. The carrying capacity is low.

Billings silty clay, 0 to 3 percent slopes (Bp).—This soil occurs on flood plains and is developing from recent alluvium. It is distributed more widely than the other soils of the Billings series. It occurs throughout the southern part of the Area. In addition, one fairly large area and one small area are in the northern part. The larger area, known as Clay Basin, occurs in a depression about 2 miles northeast of Altonah. The smaller area lies in the upper part of the valley of the Duchesne River. These two areas have a darker surface soil and a more strongly granular structure than is typical of this soil in the southern part of the Area. The parent material was derived from very pale brown to light olive-gray clay shale.

In most places internal drainage is slow. The vegetation consists largely of greasewood.

Profile description:

0 to 7 inches, very pale brown to pale brown silty clay; granular structure; friable when moist; strongly calcareous; low in organic matter; slowly permeable; good water-holding capacity.
7 to 48 inches, very pale brown to light yellowish-brown clay loam; massive; strongly calcareous; low in organic matter; moderate to slow permeability.

48 to 72 inches, very pale brown to light yellowish-brown clay loam; massive; strongly calcareous; moderate permeability; good water-holding capacity.

A little more than one-third of this soil is cropped, about one-fourth is idle, and the rest is used for range pasture. Approximately 65 to 70 percent of the cropland is used for alfalfa, and about 30 percent is in small grains. The soil is used and managed in about the same way as Billings clay loam, 0 to 3 percent slopes, but more care is needed in tilling it. Fall plowing is desirable because it is difficult to prepare a proper seedbed if the soil is plowed in the spring.

Billings silty clay, eroded, 0 to 3 percent slopes (Bt).—This soil occurs in association with Billings silty clay, 0 to 3 percent slopes. It is eroded to the extent that it is no longer suitable for irrigation farming. A network of deep gullies has formed, mainly as the result of irrigation. All of this soil is now used for grazing, but it may be possible to reclaim it for crops. If so, care would be necessary in irrigating it.

Billings silty clay, 3 to 7 percent slopes (By).—Except that it occurs on stronger slopes, this soil is similar to Billings silty clay, 0 to 3 percent slopes. A little less than one-third of this soil is used for crops, nearly three-fifths is pastured, and the rest is idle. All of the areas used for crops are in Clay Basin. The several small tracts that are pastured are in the south-central part of the area.

Billings silty clay, poorly drained, 0 to 3 percent slopes (Br).—This soil is similar to Billings silty clay, 0 to 3 percent slopes, except that it occurs in low-lying positions and has become poorly drained. The poor drainage has resulted mainly from irrigation water seeping from higher areas. In areas that lack artificial drainage, internal drainage is very slow and surface drainage is very slow to ponded. Most areas have a strong concentration of salts, and the vegetation is mainly greasewood. Only a small part of this soil is used for crops.

Billings silty clay, very poorly drained, 0 to 3 percent slopes (Bs).—This soil is similar to Billings silty clay, 0 to 3 percent slopes. The surface soil is much darker, however, because of the higher content of organic matter, and the subsoil appears to remain wet continuously. Most of this soil occurs in low areas near the stream in the lower part of the valley of the Duchesne River. The water table is near the surface during much of the year, and there is a growth of reedgrass, saltgrass, sedges, rushes, and other marsh plants.

Practically all of this soil is used for pasture. On two small areas improved pastures have been established.

Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes (Bu).—This soil occurs on nearly level to very gently undulating areas adjacent to the hills of clay shale. It is mostly in the southern part of the Area in the same general localities as the other Billings soils. The parent material was derived from the underlying shale bedrock and from soil material washed down from the nearby hills of clay shale.

Surface drainage is medium, but internal drainage is slow, especially in the substratum. The profile of this soil is somewhat similar to the profile described for Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes, but it differs mainly in texture.

Profile description:

0 to 8 inches, very pale brown silty clay or clay; granular structure; friable; strongly calcareous; low in organic matter; good water-holding capacity.

8 to 26 inches, very pale brown clay loam; fine blocky structure; below this layer the soil is transitional to olive-gray clay shale.

In places the surface layer is as much as 10 inches thick and the underlying layer extends to a depth of 30 inches. Depth to the clay-shale substratum ranges from 2 to nearly 6 feet. If this soil is irrigated, the salts in the substratum may move toward the surface.

About one-fourth of this soil is used for crops, one-half is pastured, and the rest is idle. The soil is poorly suited to crops and is best kept in range pasture.

Billings silty clay, moderately deep and deep over shale, 3 to 5 percent slopes (Bz).—This soil is similar to Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes, but it occurs on stronger slopes. Mapped with it is an area of 52 acres that has a surface covering of cobblestones. Practically all of this mapping unit is used for range pasture. A small part is cropped.

Billings silty clay, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes (Bv).—Except that it is poorly drained, this soil is similar to Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes. Most of it is about 2 miles northeast of Bridgeland, near the Midview Reservoir. An area of 61 acres, adjoining the reservoir on the west, is wet and marshy.

This soil has a strong concentration of salts and a sparse stand of scrubby greasewood and saltgrass. It is of low value for grazing and is unsuitable for general farming.

Billings silty clay, deep over gravel, 0 to 3 percent slopes (Bw).—This soil occurs on alluvial flood plains that are mainly between Bridgeland and Myton in the lower part of the valley of the Duchesne River. It is associated with the Myton soils and with other Billings soils. The gravelly substratum consists of quartzite and some sandstone that were transported from great distances. The parent material of the upper part of the profile was derived mainly from nearby light olive-gray to pale-brown shale.

The profile of this soil, to a depth of 30 inches, is practically identical to that of Billings silty clay, 0 to 3 percent slopes. Below that depth, the soil consists of a deep mass of loose coarse gravel and cobblestones. In most areas there is no accumulation of lime, but in a few small areas a slight concentration of lime occurs as flecks just above the substratum.

Drainage is generally good because of the cobbly and gravelly substratum. Locally, however, where the surface soil is shallow, drainage is somewhat excessive. The vegetation is mainly greasewood.

Nearly three-fifths of this soil is used for crops, mainly alfalfa, oats, wheat, and barley. Between 70 and 75 percent of the acreage in crops is used to grow alfalfa. Yields are slightly lower than on Billings silty clay, 0 to 3 percent slopes.

Billings silty clay, deep over gravel, poorly drained, 0 to 3 percent slopes (Bx).—This soil is similar to Billings silty clay, deep over gravel, 0 to 3 percent slopes. It has become poorly drained, however, mainly as the result of irrigation water seeping onto it from higher areas. It is

located to the south and west of Myton. All of the areas are highly impregnated with salts, and the vegetation consists chiefly of greasewood and saltgrass. All of this soil is used for pasture.

Chipeta clay loam, 0 to 3 percent slopes (Ce).—This soil is on low ridges to the northwest and northeast of Myton. It occurs in association with other Chipeta soils. The parent rock is shale that contains strata of sand and silt. The vegetation consists mainly of greasewood, shadscale, and some annual weeds. Concentrations of salts are common (fig. 4), especially in the subsoil.

Figure 4.—**Light-colored bare spots on irrigated area of Chipeta clay loam, 0 to 3 percent slopes, indicate an accumulation of salts. A few bushes of saltcedar grow on these spots.**

Profile description:

0 to 9 inches, very pale brown clay loam; fine granular structure; friable; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
9 to 18 inches, very pale brown silty clay; massive; strongly calcareous; low in organic matter; slow permeability; some fragments of clay shale occur in lower part of layer.
18 inches+, light olive-gray to very pale brown clay shale.

Less than one-fifth of this soil is used for crops. The soil is poorly suited to irrigation farming and is best used for pasture.

Chipeta clay loam, 3 to 7 percent slopes (Cg).—This is the most extensive of the Chipeta soils. It occurs on low ridges in the same general area as Chipeta clay loam, 0 to 3 percent slopes. Most of it is used for range pasture, but a few acres are cropped. This soil is not suitable for irrigation farming and has only a limited value for grazing.

Chipeta clay loam, poorly drained, 0 to 7 percent slopes (Cf).—This soil is similar to Chipeta clay loam, 0 to 3 percent slopes, but it is poorly drained and some of it has stronger slopes. It occurs in two areas along U. S. No. 40, one about 5 or 6 miles west and the other 2 miles north of Myton.

The height of the water table varies considerably in this soil, but it is usually within 30 inches of the surface. Some areas have an accumulation of salts on the surface and have been abandoned for general irrigation farming. These areas would be difficult, if not impossible, to reclaim.

Chipeta stony clay loam, eroded, 3 to 7 percent slopes (Cl).—This soil occurs on gentle slopes at the bases of mesa escarpments, about 5 or 6 miles west of Randlett. It has been damaged by erosion caused by floodwaters that also have washed cobblestones of quartzite and sandstone onto it from the escarpments. It is used for range pasture, but the carrying capacity is low.

Chipeta sandy loam, 0 to 3 percent slopes (Ch).—This soil occurs on low ridges, mainly east of Duchesne in the valley of the Duchesne River. It occupies small, widely separated areas in association with other Chipeta soils and with the more shallow Billings soils. The parent rock consists of clay shale that contains a few thin strata of sandstone. Shadscale is the dominant vegetation.

The surface soil has been modified by sandy overwash. It consists of very pale brown, friable sandy loam or light loam that is very friable when moist and moderately calcareous and is 8 to 10 inches thick. The subsoil extends to depths between 16 and 18 inches. It is made up of very pale brown clay loam that is hard and has a blocky structure. This layer is underlain by bedrock of Uinta shale.

This soil is used mainly for pasture, but a small part is cropped and some is idle. It is suited to pasture or to shallow-rooted crops.

Chipeta sandy loam, 3 to 5 percent slopes (Ck).—This soil is somewhat similar to Chipeta sandy loam, 0 to 3 percent slopes. It differs in that it occurs on undulating relief, has eroded slightly in places, and is generally not so deep to the bedrock of Uinta shale. It is also more likely to be damaged if it is irrigated. Most of it is used for range pasture, but a small part is cropped.

Chipeta stony sandy loam, 3 to 5 percent slopes (Cm).—This soil is on gentle slopes that are at the bases of mesa escarpments. It occurs mainly in a long, comparatively narrow strip on the northern side of the valley of the Duchesne River, about 6 miles west and slightly south of Randlett. Floodwaters have washed cobblestones onto the soil from the escarpments, and the stones now cover the surface. All of this soil is used for range pasture, which is of little value.

Chipeta clay, 0 to 3 percent slopes (Ca).—This is a shallow residual soil. It occurs mostly in the southern part of the Area, just north of the Duchesne River and northeast of Myton. The underlying parent rock is very pale brown to light olive-gray clay shale.

The vegetation is sparse. It consists mainly of stunted greasewood bushes, some shadscale, and salt-tolerant annual weeds. The soil generally has a strong concentration of salts throughout, and in many places a salt crust has formed on the surface.

Profile description:

0 to 8 inches, very pale brown clay; very sticky when wet; moderately calcareous.
8 to 18 inches, very pale brown clay; moderate blocky; moderately calcareous; low in organic matter; slow permeability; lower part of this layer consists of unweathered clay and contains a considerable amount of fragments of clay shale; underlying this horizon is unweathered clay shale.

This soil is of little agricultural value. A few small areas have been cropped, but the soil is not suited to that purpose. It is also poor for grazing. To improve grazing and to help stabilize the soil, it is necessary to seed to salt-tolerant plants and to protect the vegetation against erosion.

Chipeta clay, 3 to 7 percent slopes (Cd).—Except that it has stronger slopes, this soil is similar to Chipeta clay, 0 to 3 percent slopes, and it is in the same general area. It occurs on low ridges and hills in association with the Billings soils and with other Chipeta soils. The relief is

undulating. This soil is used only for range pasture, but the carrying capacity is extremely low.

Chipeta clay, eroded, 3 to 5 percent slopes (Cc).—This soil occurs in association with other Chipeta clays. As the result of erosion, a network of gullies has developed and the soil is practically useless for agriculture. In most of the gullies the clay shale is exposed, and on some areas nearly all the soil has been removed through sheet erosion and the shale substratum is exposed.

Chipeta clay, poorly drained, 0 to 7 percent slopes (Cb).—Most of this soil is southwest of Roosevelt. Poor drainage has caused soluble salts to accumulate on the surface and throughout the profile. This soil has been abandoned for general irrigation farming and is now idle. It would be practically impossible to reclaim it.

Christianburg clay loam, 0 to 3 percent slopes (Cn).—This is a deep, fine-textured soil that occurs on the lower parts of alluvial flood plains. Most of it is about 3½ miles north of Bridgeland. This soil has a finer textured subsoil and substratum than Billings clay loam, 0 to 3 percent slopes. The parent material was derived from light-gray or light olive-gray, calcareous Uinta shale.

Internal drainage and surface runoff are slow. In most virgin areas there is a slight to moderate concentration of salts. The vegetation consists mainly of greasewood.

Profile description:

0 to 9 inches, very pale brown clay loam; massive to weak medium granular structure; hard when dry and friable when moist.
9 to 72 inches, very pale brown to pale-olive silty clay; massive; hard when dry; strongly calcareous; fine veins of gypsum and other salts occur along root cavities.

Most of this soil is used for alfalfa, barley, and tall wheatgrass. The yields of alfalfa and barley are low, but the soil appears to be well suited to tall wheatgrass, which is grown for seed and forage.

Christianburg clay loam, 3 to 5 percent slopes (Co).—This soil has stronger slopes than Christianburg clay loam, 0 to 3 percent slopes. In a small area about 2 miles east of Mountain Home in the valley of the Lake Fork River, the surface soil is somewhat darker than that of the normal soil. All of this mapping unit is used for range pasture.

Christianburg silty clay loam, 0 to 3 percent slopes (Cp).—Except that its surface layer is silty clay loam, this soil is similar to Christianburg clay loam, 0 to 3 percent slopes. Most of it is about 1 mile north of Arcadia.

The depth to the subsoil of hard clay or silty clay varies somewhat from place to place, but generally the subsoil is within 15 inches of the surface. Moisture and air move very slowly into the clay material, and few plant roots penetrate it.

About one-half of this soil is used for crops, mainly alfalfa, but yields are low. This soil should be plowed in fall rather than in spring. A mixed cover crop of fall wheatgrass and sweetclover will improve the soil structure and permeability. The border method of irrigation is best suited to this kind of soil.

Christianburg silty clay loam, poorly drained, 0 to 3 percent slopes (Cr).—This soil occurs about 3½ miles west of Myton. It is associated with Christianburg silty clay loam, 0 to 3 percent slopes. The soil has become poorly drained, and excessive amounts of salts have accumulated in it fairly recently. Unless tile drainage is provided, an even larger acreage of the Christianburg silty clay loams will become poorly drained. The present vegetation consists of scattered greasewood bushes and alkaliweed, red samphire, and other salt-tolerant annuals.

Emmons clay loam, 0 to 3 percent slopes (Ea).—This soil occurs on high-lying alluvial fans northwest of Whiterocks. The parent material was derived from shale, sandstone, and quartzite. This soil is similar to Fruita clay loam, 0 to 3 percent slopes, except that the surface soil is considerably darker, contains more organic matter, and has a more distinct granular structure.

This soil is well drained and generally contains no excessive accumulations of salts. The vegetation consists largely of sagebrush, a scattered stand of juniper trees of moderate height, and some rabbitbrush and bunchgrass. The sagebrush grows to a height of about 3 feet, and the juniper, to a height of about 15 feet.

Profile description:

0 to 7 inches, dark reddish-brown clay loam; dark reddish brown when moist; well-defined fine granular structure; friable; slightly calcareous; high in organic matter; layer contains many worms and root casts.
7 to 13 inches, silty clay loam similar in color to layer above; moderate angular blocky structure; moderately calcareous.
13 to 21 inches, yellowish-brown light clay loam; dark yellowish brown when moist; moderate angular blocky structure; slightly calcareous.
21 to 47 inches, light yellowish-brown clay loam; yellowish brown when moist; subangular blocky and weak blocky structure; hard; strongly calcareous with some concentrations of lime carbonate that occur as flecks.
47 to 72 inches, pale-brown silt loam; brown to dark brown when moist; strongly calcareous.

In the profile just described, the subsoil is finer textured than that of most of the Emmons soils and there is less concentration of lime.

This is one of the more productive soils in the Area. About three-fourths of it is used for crops, and the rest is used for range pasture. Yields are equal to or slightly better than those obtained on Fruita clay loam, 0 to 3 percent slopes.

Emmons clay loam, 3 to 5 percent slopes (Eb).—Except that it has stronger slopes, this soil is similar to Emmons clay loam, 0 to 3 percent slopes, which occurs in the same general area. About two-fifths of it is used for crops, and the rest is used for range pasture. In irrigated areas the water must be applied carefully to prevent erosion.

Emmons loam, 0 to 3 percent slopes (Ee).—This soil lies on old alluvial fans and on foot slopes and low terraces. It occurs only near Talmage and Mountain Home in the extreme northwestern part of the Area. This soil is similar to Fruita loam, 0 to 3 percent slopes, but the surface soil is distinctly darker. Yields of crops grown on the two soils are similar.

This soil is well drained and has moderate permeability and good water-holding capacity. It is free of harmful accumulations of salts. The vegetation includes sagebrush and a scattered to moderate stand of junipers.

Emmons loam, 3 to 5 percent slopes (Eh).—Except that it has stronger slopes, this soil is similar to Emmons loam, 0 to 3 percent slopes. It occurs only in two general areas. Most of it is near Talmage and Mountain Home, and the rest lies northwest of Whiterocks. Most of the soil is used for crops. In irrigated areas the water must be applied carefully to prevent erosion.

Emmons loam, poorly drained, 0 to 5 percent slopes (Eg).—This soil occurs about 1 or 2 miles south of Mountain Home. It has become poorly drained as the result

of overirrigation and seepage of water from higher lying irrigated areas. Most of it is used for unimproved pasture.

Emmons loam, deep over gravel, 0 to 3 percent slopes (Ef).—This soil contains cobblestones and sand, but otherwise it is similar to Emmons loam, 0 to 3 percent slopes. It occurs on low terraces in association with other Emmons soils. All of this soil is used for crops.

Emmons fine sandy loam, 0 to 3 percent slopes (Ec).—Except for the fine sandy loam texture of the surface layer, this soil is similar to Emmons loam, 0 to 3 percent slopes. It occurs on old alluvial fans and foot slopes in the extreme northern part of the Area. It lies northwest of Altonah and in the vicinity of Mountain Home.

This soil has moderate permeability and good water-holding capacity. An area of 27 acres in which the subsoil is coarse textured and open, located in sec. 4, T. 1 S., R. 4 W., is mapped with this soil.

Nearly two-fifths of Emmons fine sandy loam, 0 to 3 percent slopes, is used for crops, and the rest is used for range pasture. Yields are similar to those obtained on Emmons loam, 0 to 3 percent slopes, and on Fruita fine sandy loam, 0 to 3 percent slopes.

Emmons fine sandy loam, 3 to 10 percent slopes (Ed).—Except that it has stronger slopes, this soil is similar to Emmons fine sandy loam, 0 to 3 percent slopes, with which it is associated. Under irrigation farming, however, it is more likely to be damaged by erosion. The areas of this soil northeast of Whiterocks have dominant slopes of 5 to 10 percent, whereas the areas near Mountain Home have dominant slopes of 3 to 5 percent. More than two-thirds of this soil is cropped. Most of the rest is used for range pasture.

Fruita fine sandy loam, 0 to 3 percent slopes (Fn).—This soil occurs on low stream terraces and on old alluvial fans and foot slopes throughout the Area. Most of it is in small tracts, but fairly large areas occur in the Ouray Valley (fig. 5). The parent material was derived from quartzite and mixed sedimentary rocks.

This soil is well drained and contains no harmful accumulations of soluble salts. Sagebrush is the dominant vegetation.

Profile description:

0 to 16 inches, very pale brown or light-brown fine sandy loam; medium to fine granular structure; friable when moist; strongly calcareous; low in organic matter; moderate to rapid permeability; fair water-holding capacity.

16 to 45 inches, very pale brown fine sandy loam; massive to weak medium granular structure; slightly hard when dry; moderate to strong concentration of lime carbonate distributed uniformly throughout layer; very low in organic matter; moderate permeability.

45 to 72 inches, very pale brown fine sandy loam; massive to weak granular structure; soft when dry; strongly calcareous; very low in organic matter; rapid permeability; fair water-holding capacity.

About one-fifth of this soil is used for crops, but nearly one-third of it is idle. Much of this soil is idle because of a lack of irrigation water. Alfalfa is grown on about 75 percent of the cropland, and wheat and corn are grown to a limited extent. The soil is moderately coarse textured and low in organic matter, so measures are needed to stabilize the soil and to increase the amount of organic matter. Because the water-holding capacity is limited, applications of irrigation water should be light and frequent.

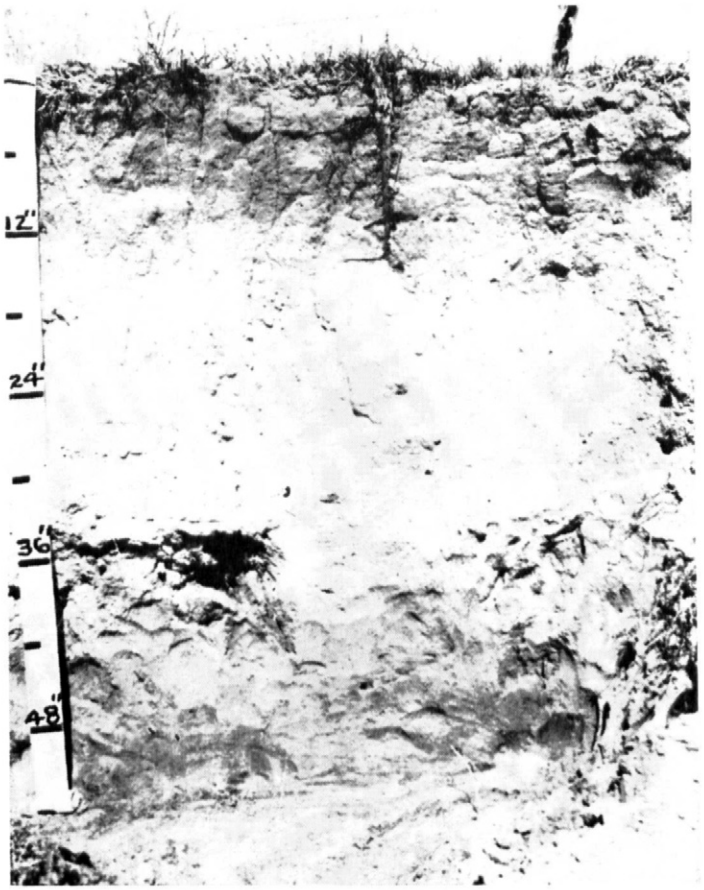

Figure 5.—**Profile of Fruita fine sandy loam, 0 to 3 percent slopes, on the bank of a canal about 2 miles north of Leota.**

Fruita fine sandy loam, 3 to 5 percent slopes (Ft).—This soil is similar to Fruita fine sandy loam, 0 to 3 percent slopes, but it has stronger slopes. It occurs throughout the Area, mostly in association with Fruita fine sandy loam, 0 to 3 percent slopes.

Only about one-tenth of this soil is used for crops. The management is somewhat similar to that of Fruita fine sandy loam, 0 to 3 percent slopes, but this soil must be irrigated more carefully to prevent erosion.

Fruita fine sandy loam, 5 to 10 percent slopes (Fw).—This soil is somewhat similar to Fruita fine sandy loam, 0 to 3 percent slopes, but it occurs on stronger slopes, the surface layer is generally thinner, and the accumulation of lime is not so thick nor so pronounced. Because of the strong slopes, this soil is not suited to general irrigation farming. Less than one-fifth of it is used for crops. Erosion can be controlled by seeding it to permanent pasture. In areas that must be cropped, the rotation should consist mainly of pasture.

Fruita fine sandy loam, hummocky, 2 to 5 percent slopes (Fs).—This soil is similar to Fruita fine sandy loam, 0 to 3 percent slopes, but the relief is hummocky because of the action of the wind. The hummocks of windblown material range in height from 3 to 5 feet. Nearly all of this soil is in the Ouray Valley. The vegetation consists mainly of rabbitbrush, sagebrush, Indian ricegrass, snakeweed, and pricklypear.

This soil is used for range pasture. If it were cleared and leveled for irrigation farming, the hazard of wind erosion would be severe. A mixed stand of alfalfa and grasses would help stabilize the soil.

Fruita fine sandy loam, deep over clay, 0 to 3 percent slopes (Fp).—This soil is similar to Fruita fine sandy loam, 0 to 3 percent slopes, but it overlies clay that occurs between depths of 36 and 60 inches. More than half of this soil occurs in a single area located in the valley of a small intermittent stream about 4 miles east of Moffat. Other small areas are in the Ouray Valley.

A small part of this soil is used for crops, but most of it is idle because of the lack of irrigation water. Even if water were available, the soil probably would become poorly drained unless underground drains were installed.

Fruita fine sandy loam, deep over gravel, 0 to 3 percent slopes (Fr).—Between depths of 36 and 60 inches, this soil consists of coarse gravel, cobblestones, and sand. Otherwise, it is similar to Fruita fine sandy loam, 0 to 3 percent slopes. Less than one-fifth of this soil is used for crops. It is less suitable for crops than Fruita fine sandy loam, 0 to 3 percent slopes.

Fruita fine sandy loam, deep over gravel, 3 to 8 percent slopes (Fv) —Except that it occurs on stronger slopes, this soil is similar to Fruita fine sandy loam, deep over gravel, 0 to 3 percent slopes. Most of this soil is used for pasture. It is managed in about the same way as Fruita fine sandy loam, 3 to 5 percent slopes.

Fruita fine sandy loam, poorly drained, 0 to 3 percent slopes (Fo).—Except that it has become poorly drained, this soil is similar to Fruita fine sandy loam, 0 to 3 percent slopes. The poor drainage is the result of overirrigation or was caused by irrigation water seeping from adjacent higher lying areas. This soil occurs in several small tracts near the junction of Dry Gulch Creek and the Uinta River. Mapped with it are a few small areas that have a stony subsoil in addition to being poorly drained. Some of this soil is used for pasture that consists mainly of saltgrass, and some of it is idle.

Fruita fine sandy loam, poorly drained, 3 to 5 percent slopes (Fu).—This soil occurs in small tracts in several widely separated parts of the Area. It has become poorly drained fairly recently. The poorly drained areas have been abandoned for irrigation farming and are used mainly for unimproved pasture. These areas can be reclaimed for cropland if a properly planned drainage system is installed.

Fruita fine sand, 0 to 3 percent slopes (Ff).—This soil is somewhat similar to Fruita fine sandy loam, 0 to 3 percent slopes, but the surface soil is sandier, and the zone of lime carbonate generally is not so pronounced nor so thick. Most of this soil occurs in the southern part of Ouray Valley. The surface soil has been shifted considerably by wind.

This soil is somewhat excessively drained. The native vegetation consists of Indian ricegrass, pricklypear, snakeweed, rabbitbrush, shadscale, and sagebrush.

Almost all of this soil is used for grazing. It is not suited to crops, because of the low water-holding capacity and low fertility. A small part has been cropped but is now idle.

Fruita fine sand, hummocky, 2 to 5 percent slopes (Fk).—This soil contains hummocks of loose fine sand, which are generally about 3 feet high. It is associated with Fruita fine sand, 0 to 3 percent slopes, and occurs in the southern part of Ouray Valley. The vegetation on the hummocks is composed mainly of pricklypear. This soil is used to a limited extent for range pasture.

Fruita fine sand, 3 to 5 percent slopes (Fl).—Except that it occurs on stronger slopes, this soil is similar to Fruita fine sand, 0 to 3 percent slopes. Both of these soils are located in the southern part of the Ouray Valley.

Fruita fine sand, 5 to 10 percent slopes (Fm).—This soil is similar to Fruita fine sand, 0 to 3 percent slopes, except that it occupies stronger slopes. It occurs in association with Fruita fine sand, 0 to 3 percent slopes, and Fruita fine sand, 3 to 5 percent slopes, in the southern part of Ouray Valley. The surface soil has been shifted by the wind, and in many places there are small accumulations of sand. All of this soil is used for grazing.

Fruita fine sand, deep over gravel, 0 to 8 percent slopes (Fh).—This soil differs from Fruita fine sand, 0 to 3 percent slopes, in having stronger slopes and a gravelly substratum. It occurs on low terraces in the Ouray Valley in the southeastern part of the Area. The relief is undulating. The depth to the stony substratum varies considerably from place to place, but in most places it is about 36 inches. All of this soil is used for range pasture.

Fruita fine sand, poorly drained, 0 to 3 percent slopes (Fg).—This soil occurs in small areas near the Pelicum Lake Reservoir in Ouray Valley. It has become poorly drained, partly because of its location, and it is doubtful if it can be drained successfully. This soil is used for unimproved pasture.

Fruita loam, 0 to 3 percent slopes (Fx).—This soil occurs on low terraces and on old alluvial fans and foot slopes. It is distributed throughout the Area, mostly in small tracts. The parent rocks are quartzite and mixed sedimentary rocks.

This soil is well drained and has no accumulations of soluble salts. The dominant vegetation consists of sagebrush and shadscale.

Profile description:

0 to 12 inches, light-brown loam; medium granular structure; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.

12 to 29 inches, pinkish-white gritty loam; friable when moist; moderately mottled with white lime; very low in organic matter; rapid permeability; low water-holding capacity.

29 to 45 inches, pinkish-white to pale-orange sandy loam; strongly mottled with white carbonate of lime; very low in organic matter; rapid permeability; low water-holding capacity.

45 to 72 inches, light-brown loamy sand; weak platy structure but breaks readily to very fine granular or single grain; low in organic matter; rapid permeability; low water-holding capacity.

Nearly half of this soil is used for crops. Alfalfa is grown on about 75 percent of the cropland, and wheat and barley are grown on about 20 percent. This soil is managed in about the same way as Fruita fine sandy loam, 0 to 3 percent slopes.

Fruita loam, deep over gravel, 0 to 3 percent slopes (Fz).—This soil has a substratum of cobblestones, coarse gravel, and sand, but otherwise it is similar to Fruita loam, 0 to 3 percent slopes. It occurs throughout the Area, mainly on low terraces. In many places it is associated with Fruita loam, 0 to 3 percent slopes. Depth to the coarse substratum ranges from 36 to 60 inches. Nearly two-fifths of this soil is used for crops, but, because of its coarse substratum, it is less suitable for general farming than Fruita loam, 3 to 7 percent slopes.

Fruita loam, 3 to 7 percent slopes (FIb).—This soil occurs on smooth alluvial fans and foot slopes and is gently undulating. The areas are small and widely scattered. Nearly two-thirds of this soil is cropped; the rest is used mainly for pasture, but a small acreage is idle. The soil is managed in about the same way as Fruita fine sandy loam, 0 to 3 percent slopes.

Fruita loam, deep over gravel, 3 to 5 percent slopes (Fla).—Except that it occurs on stronger slopes, this soil is similar to Fruita loam, deep over gravel, 0 to 3 percent slopes. About two-fifths of the acreage is used for crops. This is one of the better farming soils, but irrigation water must be applied carefully to prevent erosion.

Fruita loam, poorly drained, 0 to 3 percent slopes (Fy).—This soil occurs in small areas adjacent to, but generally lower than, areas of Fruita loam, 0 to 3 percent slopes. The water table is within 6 feet of the surface. The water table has resulted from overirrigation or from seepage from higher lying areas. There is a moderate to strong accumulation of salts. Mapped with this soil are a few areas that have a stony substratum.

Nearly all of this soil is used for pasture, but small parts are cropped or are idle. Most of the pasture is of poor quality.

Fruita clay loam, 0 to 3 percent slopes (Fa).—This soil occurs in small, widely distributed areas, generally in association with Fruita loam, 0 to 3 percent slopes. A fairly large area is located about 2½ miles northeast of Roosevelt. The parent material was derived mainly from quartzite and mixed sedimentary rocks.

This soil is well drained and generally free from harmful concentrations of salts. The vegetation consists mostly of sagebrush and shadscale.

Profile description:

0 to 20 inches, pale-brown or light-brown clay loam; fine granular structure; slightly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
20 to 37 inches, pale-brown or light-brown loam; weak granular structure; firm when moist; moderate mottling by white carbonate of lime; low in organic matter; moderate permeability; good water-holding capacity.
37 to 49 inches, very pale brown or light-brown loam; hard when dry; strongly mottled and weakly cemented with lime; very low in organic matter; moderate permeability and good water-holding capacity.
49 to 72 inches, very pale brown or light-brown sandy loam; massive; friable when moist; strongly calcareous; low in organic matter; rapid permeability; low water-holding capacity.

About three-fifths of this soil is used for crops. Alfalfa is grown on about 75 percent of the cropland, and small grains, on about 20 percent.

Fruita clay loam, 3 to 5 percent slopes (Fd).—Except for its stronger slopes, this soil is similar to Fruita clay loam, 0 to 3 percent slopes. It occurs on smooth alluvial fans and on the foot slopes of mesa escarpments. It is in the same general areas and generally occurs in association with Fruita clay loam, 0 to 3 percent slopes. This soil, however, occurs at slightly higher elevations. Erosion, caused largely by irrigation, has affected the idle areas or areas used for crops. To a lesser extent, it has affected the range pastures. About one-third of this soil is used for crops.

Fruita clay loam, deep over gravel, 0 to 3 percent slopes (Fc).—This soil is similar to Fruita clay loam, 0 to 3 percent slopes, except that its substratum is composed of cobblestones, coarse gravel, and sand. It occurs on low terraces and on foot slopes below mesa escarpments. The areas are small and widely scattered. Typically, the stony material is below the lime-carbonate layer, but in a few places the cobblestones and gravel are in the lower part of this layer. The depth to the substratum varies considerably, but in most places it is about 3 feet. About three-fifths of this soil is cropped.

Fruita clay loam, poorly drained, 0 to 3 percent slopes (Fb).—This soil occurs in depressions adjacent to areas of the higher lying Fruita clay loam, 0 to 3 percent slopes. It is poorly drained because it receives seepage from higher lying areas. Mapped with this soil are small, widely separated areas that have a stony substratum. In most places there is a slight to moderate concentration of salts. Only slightly more than one-tenth of this soil is used for crops.

Fruita clay loam, poorly drained, 3 to 5 percent slopes (Fe).—This soil occurs mainly as narrow strips on foot slopes at the bases of mesa escarpments. It has become poorly drained through seepage of irrigation water from higher lying areas, and it may not be feasible to drain the areas. This soil has a high water table and contains a moderate to strong accumulation of salts. It is used for unimproved pasture.

Green River clay loam, 0 to 3 percent slopes (Ga).—This alluvial soil occurs on the low first terraces near streams. Most of it is along the Duchesne River, between a point near Hanna in the northwestern part of the Area and Ouray in the southwestern part. The parent material was derived from quartzite and mixed sedimentary rocks, mainly sandstone and shale.

Normally, this soil is well drained, but during periods when the streams are high, a temporary high water table may develop in some of the lower areas. The native vegetation consists of many kinds of plants including sagebrush, rabbitbrush, and cottonwood trees. Greasewood, shadscale, and saltgrass grow on the areas where an excessive amount of salt has accumulated.

Profile description:

0 to 14 inches, pale-brown clay loam; fine granular structure; strongly calcareous; contains a moderate amount of organic matter; moderately permeable; good water-holding capacity.
14 to 40 inches, pale-brown clay loam; somewhat stratified; massive; strongly calcareous; contains a moderate amount of organic matter; moderate permeability; good water-holding capacity.
40 to 72 inches, very pale brown to pale brown loam and clay loam; stratified; massive; calcareous; contains a moderate amount of organic matter; moderate permeability and good water-holding capacity.

The color and the amount of organic matter in the surface soil vary. The degree of stratification in the subsoil varies considerably.

Much of this soil is used for pasture, but about one-third of it is cropped. Nearly two-thirds of the cropland is in alfalfa, and the rest is used for small grains. The large acreage of virgin soil is suitable for irrigated pasture. Much of it contains slight to moderate concentrations of salts, but if proper drainage facilities are installed, the salts can be removed readily.

Green River clay loam, poorly drained, 0 to 3 percent slopes (Gb).—This soil is similar to Green River clay loam, 0 to 3 percent slopes, but it is poorly drained and in many places it has a darker surface soil. Both of these soils occur in the same general area. The level of the water table varies considerably; it is highest early in summer

when the Duchesne River is high. During most of the year, the water table is within 6 feet of the surface. Moderate to strong concentrations of salts are common, and the vegetation consists mainly of greasewood and saltgrass.

Only a small part of the total acreage is used for crops. Adequate drainage facilities would improve this soil greatly.

Green River clay loam, very poorly drained, 0 to 3 percent slopes (Gc).—Because of the higher content of organic matter, this soil generally has a darker surface layer than Green River clay loam, 0 to 3 percent slopes, and Green River clay loam, poorly drained, 0 to 3 percent slopes. It occurs in depressions, principally in the upper part of the valley of the Duchesne River. During most of the year the soil is wet and marshy. The vegetation consists of marsh plants. The areas are used for pasture, but the forage value of the marsh plants is low.

Green River loam, 0 to 3 percent slopes (Gk).—This soil occurs on flood plains, mainly along the Duchesne River. The parent material was derived from quartzite and mixed sedimentary rocks.

This soil is well drained, but because of its location along the river, it is subject to overflow and there is a temporarily high water table. In many virgin areas the soil is high in salts, which occur especially in the subsoil. If adequate drainage is provided, the salts can be washed out readily.

Profile description:

0 to 8 inches, very pale brown to pale brown loam; granular structure; friable when moist; moderate permeability; good water-holding capacity.
8 to 27 inches, very pale brown silt loam; granular structure; friable when moist; strongly calcareous; moderate in organic matter; moderate permeability; good water-holding capacity.
27 to 41 inches, pale-brown loam; massive; friable when moist; strongly calcareous; low to moderate content of organic matter; moderate permeability; good water-holding capacity.
41 to 62 inches, very pale brown loam; massive; friable when moist; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity; gravel occurs below this layer.

About one-fifth of this soil is used for crops. The yields are about the same as those obtained on Green River clay loam, 0 to 3 percent slopes. This soil is well suited to hardy vegetables. The vegetables in home gardens produce excellent yields.

Green River loam, poorly drained, 0 to 3 percent slopes (Gl).—This soil is similar to Green River loam, 0 to 3 percent slopes, except that the water table is higher—within 6 feet of the surface during much of the year—and in most places there is a higher concentration of soluble salts. It occurs in depressions in the same general areas as Green River loam, 0 to 3 percent slopes, and generally in association with that soil.

Most of this soil is used for pasture, but a small part is cropped. Many of the pastures have stands of cottonwood trees, and in some areas there are willow trees and buffaloberry and other shrubs. Like Green River clay loam, poorly drained, 0 to 3 percent slopes, much of this soil can be improved greatly if it is irrigated carefully and drained properly to remove excess salts.

Green River fine sandy loam, 0 to 3 percent slopes (Gf).—This soil occurs on the flood plains of rivers, mostly near the main stream. Some areas, however, occur at the bends or oxbows of streams and are inaccessible and hard to irrigate. Most of this soil is located along the Duchesne River, but smaller areas lie along the Uinta River and the lower part of the Lake Fork River. The parent material was derived mainly from quartzite and sandstone.

The profile of this soil is similar to that of Green River loam, 0 to 3 percent slopes, but the uppermost 10 to 12 inches is fine sandy loam, and the subsoil consists of stratified loam and fine sandy loam. The entire profile is very friable when moist, strongly calcareous, and rapidly permeable. The water-holding capacity is fair. Most of this soil is used for grazing, but a small part is cropped.

Green River fine sandy loam, poorly drained, 0 to 3 percent slopes (Gg).—This soil is similar to Green River fine sandy loam, 0 to 3 percent slopes, but it contains more salts and the water table is higher. It occurs mainly along bends and oxbows of the Duchesne River. Most of it is used for pasture on which there is a fairly thick stand of cottonwood, willow, buffaloberry, and some native grasses.

Green River fine sandy loam, very poorly drained, 0 to 3 percent slopes (Gh).—This soil is similar to Green River fine sandy loam, poorly drained, 0 to 3 percent slopes, but it contains more organic matter and, therefore, has a darker surface layer. In addition it has a higher water table. Most of this soil is marshy, and the native vegetation consists of sedges and bulrushes. All of it is used for pasture.

Green River fine sand, 0 to 3 percent slopes (Gd).—Most of this soil occurs along the Duchesne and Green Rivers. The vegetation consists of a fairly thick stand of cottonwood, willow, and buffaloberry and other bushes.

The surface soil consists of very pale brown, loose fine sand. The subsoil is highly stratified, and in places it contains thin strata of medium- to fine-textured materials. In a few places a dark-gray stratum indicates the influence of a high water table and a rank growth of vegetation.

None of this soil is used for crops, but a small part of it has been cropped and was later abandoned. It is now used for grazing, but the plants produce only a small amount of low-grade forage.

Green River fine sand, poorly drained, 0 to 3 percent slopes (Ge).—This soil is similar to Green River fine sand, 0 to 3 percent slopes, but it occurs in lower positions along the rivers and, therefore, has a higher water table. All of it is used for grazing.

Green River silty clay, 0 to 3 percent slopes (Gm).—This soil occurs along the larger streams on flood plains of recent alluvium. The parent material was derived from mixed sedimentary and igneous rocks. In most places the internal drainage is somewhat slow.

Profile description:

0 to 11 inches, very pale brown silty clay; pale brown when moist; moderate columnar structure that breaks to hard irregular fragments; strongly calcareous; moderate content of organic matter; slowly permeable; good water-holding capacity.
11 to 27 inches, pale-brown sandy clay loam; dark brown when moist; granular structure; moderate content of organic matter.
27 to 40 inches, very pale brown sandy clay loam; pale brown when moist; massive; friable when moist; strongly calcareous; moderate permeability.
40 to 72 inches, very pale brown heavy loam; pale brown when moist; friable when moist; strongly calcareous; moderately permeable.

A few small areas that total about 25 acres in size have slopes of 3 to 7 percent. About one-fifth of this soil is used for crops, one-half is used for pasture, and the rest is idle.

Green River silty clay, poorly drained, 0 to 3 percent slopes (Gn).—This soil is similar to Green River silty clay, 0 to 3 percent slopes, except that it occurs in slight depressions on the flood plains and is poorly drained. Almost all of it is used for pasture.

Green River silty clay, very poorly drained, 0 to 3 percent slopes (Go).—Most of this soil occurs in depressions on the lower flood plains of the Duchesne River. It occurs near the present channel of the river, and much of the time the soil is wet or the water table is near the surface. The vegetation consists of reeds, saltgrass, sedges, rushes, and other marsh plants.

Leeton clay loam, 0 to 3 percent slopes (La) —This soil occurs in depressions on the flood plains of rivers. It is associated with the Myton soils. It lies south of Whiterocks and near Leeton in the valley of the Uinta River. The parent material was derived from quartzite and mixed sedimentary rocks. This soil is poorly drained, and the vegetation consists of grasses and scattered buffaloberry bushes.

Profile description:

0 to 9 inches, light brownish-gray clay loam; fine granular structure; hard when dry; strongly calcareous; moderate content of organic matter; moderate permeability; good water-holding capacity.
9 to 17 inches, very pale brown to light brownish-gray clay loam; massive; slightly hard when dry; slight accumulation of lime uniformly distributed throughout layer; low in organic matter; moderate permeability; good water-holding capacity.
17 to 36 inches, pinkish-white clay loam; massive; hard when dry; layer contains large amount of lime carbonate, most of which is marly; low in organic matter; slow permeability; moderate water-holding capacity.
36 to 72 inches, marly clay loam embedded with a mass of cobblestones and coarse gravel.

Most of this soil is in pasture, to which it is best suited. The pastures, however, are of poor quality. If good pasture management is practiced, including the seeding of proper pasture mixtures, the carrying capacity of this soil can be increased greatly.

Leeton loam, 0 to 3 percent slopes (Lc).—This soil is similar to Leeton clay loam, 0 to 3 percent slopes, except that the surface soil is coarser textured and lighter colored. Both soils occur on flood plains in the same general areas, but this soil occurs at slightly higher elevations. Even so, it has a permanently high water table.

Profile description:

0 to 9 inches, very pale brown loam; medium granular structure; friable when moist; strongly calcareous; moderate content of organic matter; moderate permeability; good water-holding capacity.
9 to 20 inches; similar to 0- to 9-inch layer but lighter in color; moderate accumulation of lime carbonate uniformly distributed throughout this layer.
20 to 36 inches, pinkish-white marly loam or clay loam; this material overlies beds of coarse gravel and cobblestones that are coated with lime and embedded in marly clay loam or silty clay.

Most of this soil is in pasture, to which it is best suited. Under good management, pasture should have a moderately high carrying capacity.

Leeton fine sandy loam, 0 to 3 percent slopes (Lb).—Except for the texture of the surface layer, this soil is similar to Leeton loam, 0 to 3 percent slopes, with which it is associated. It also occurs in association with the Myton soils. Most of it is just north of Leeton. About one-fourth of this soil is used for crops, and the rest is pastured. It is much better suited to pasture than to crops.

Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes (Ma).—This soil occurs on all the benches, or terraces, in the central and southern part of the Area. It is associated with other soils of the Mesa series and with the Naturita soils. The parent material was derived from quartzite and mixed sedimentary rocks that had been carried by streams from the Uinta Mountains. The vegetation consists mainly of shadscale, sagebrush, rabbitbrush, galletagrass, and other grasses.

In the areas south of the Duchesne River, the uppermost 4 or 5 inches of the soil is lighter in color than that in areas north of the river. South of the river, the surface soil is dominantly very pale brown to light brown, whereas north of the river it is light brown. In most places surface drainage is medium, but internal drainage is slightly restricted. In places strata of bedrock obstruct drainage through the soil.

Profile description:

0 to 9 inches, light-brown fine sandy loam; moderately well defined, medium granular structure; friable when moist; moderately to strongly calcareous; low content of organic matter; moderate permeability; good water-holding capacity.
9 to 15 inches, very pale brown to light-brown clay loam; massive; firm when moist; moderate concentration of lime carbonate uniformly distributed throughout layer; low in organic matter; moderate permeability; good water-holding capacity.
15 to 31 inches, pinkish-white clay loam; massive; firm when moist; very strong concentration of lime carbonate uniformly distributed throughout layer; very low in organic matter; moderate to slow permeability and good water-holding capacity.
31 inches+, thick bed of cobblestones and gravel; stones and gravel in upper part of layer are embedded in marly clay loam; material freer of fine material with increasing depth.

In places the material in the third layer extends to a depth of 42 inches. In these profiles the thick bed of cobblestones and gravel occurs at a depth of about 42 inches.

About one-third of this soil is used for crops, one-third is used for pasture, and the rest is idle. Most of the range pastures consist of virgin soils that are outside the areas served by irrigation canals. Many of the idle areas lie next to abandoned canals or canals that have limited supplies of irrigation water. About 65 percent of the cropland is used for alfalfa, and about 30 percent is used mainly for wheat and for some barley and oats. The rest is used for corn, potatoes, and home gardens.

Mesa fine sandy loam, moderately deep, 3 to 8 percent slopes (Mb).—This soil is somewhat similar to Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes, but it has stronger slopes. In addition, the surface layer is thinner in some places and local spots of shallow soil are common. This soil is distributed over a wide area and occurs in association with other Mesa fine sandy loams. It is used mainly for range pasture, but a small part is cropped. The best use is for permanent irrigated pasture.

Mesa fine sandy loam, deep, 0 to 3 percent slopes (Mc).—The stony substratum of this soil generally is at depths between 4½ and 6 feet, but in a few places it begins

at greater depths. Otherwise, this soil is similar to Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes. Most of it occurs on benches north and south of Myton (fig. 6). It is fairly good for general irrigation farming. Fairly good yields of alfalfa can be obtained under good management.

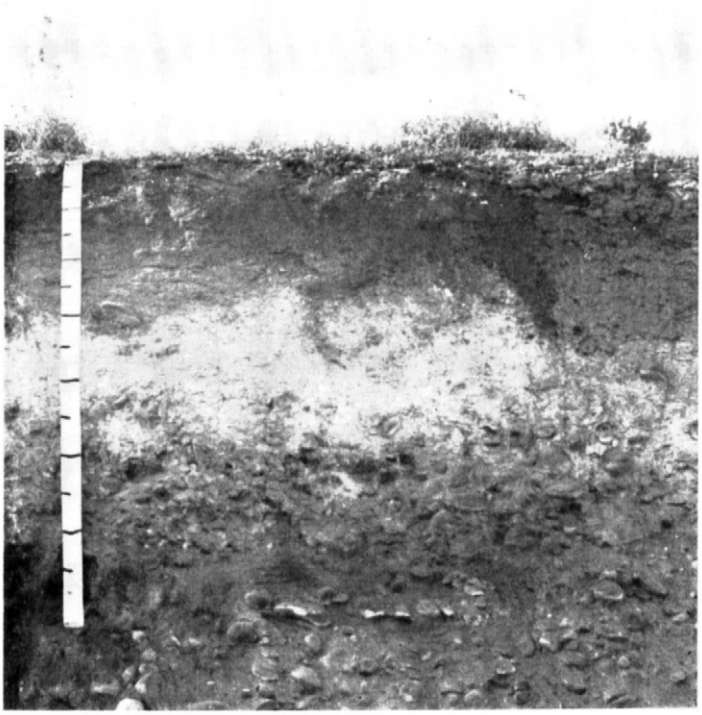

Figure 6.—**Profile of Mesa fine sandy loam, deep, 0 to 3 percent slopes, in a roadcut on Indian Bench, about 4 miles east of Roosevelt.**

Mesa fine sandy loam, deep, 3 to 5 percent slopes (Me).—This soil is similar to Mesa fine sandy loam, deep, 0 to 3 percent slopes, but it occurs on stronger slopes where the hazard of erosion is greater. Most of it is on benches north and south of Myton. Nearly two-thirds of this soil is used for crops.

Mesa fine sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes (Md).—Except for being poorly drained, this soil is similar to Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes. It occurs over wide areas in association with the other Mesa fine sandy loams. The slope of this soil is toward the south, but the underlying bedrock dips toward the north. In places where the bedrock is close to the surface, drainage is greatly restricted.

Poor drainage has resulted from irrigation and in some places from seepage from higher areas. In most places there is a moderate concentration of soluble salts and a plant cover of saltgrass and other salt-tolerant plants.

Most of this soil is used for pasture, but a small part is cropped. Areas previously used for crops, but now idle, have a cover of Russian-thistle. Much of this soil probably can be improved greatly by artificial drainage. The areas must be examined carefully to determine drainage needs.

Mesa fine sandy loam, moderately deep, poorly drained, 3 to 5 percent slopes (Mf).—This soil is similar to Mesa fine sandy loam, deep, 3 to 5 percent slopes, but it has a higher water table and contains variable amounts of salts. The depth to the water table varies from place to place and, to some extent, with the season of the year. Most of this soil is on the southern part of Indian Bench. The vegetation consists of foxtail, or wild barleygrass. Draining this soil probably is not feasible and should not be attempted unless the areas have been examined carefully.

Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes (Mg).—This soil occurs on benches, mainly on South Myton Bench. Other large areas are just south of Upalco and on the eastern part of Blue Bench. The parent material was derived from quartzite and mixed sedimentary rocks, mainly light-brown sandstone and shale. It was transported by large streams from the Uinta Mountains.

Surface drainage is medium, but internal drainage is restricted somewhat by an accumulation of lime. The principal vegetation is sagebrush and shadscale.

Profile description:

0 to 8 inches, reddish-brown sandy clay loam; weak medium platy and moderate fine granular structure; friable when moist; moderately calcareous; low content of organic matter.
8 to 14 inches, yellowish-red clay loam; weak medium angular blocky and medium to coarse granular structure; firm when moist; moderately mottled with pinkish-white lime carbonate; moderately to strongly calcareous.
14 to 35 inches, light reddish-brown marly clay loam; massive; firm when moist; weakly to moderately cemented with lime; strongly calcareous; very little organic matter.
35 inches+, layer of cobblestones and coarse gravel.

The depth to the cobblestones and coarse gravel ranges from about 20 to 36 inches. Mapped with this soil are a few small areas that have a very thin surface soil and a prismatic structure in the subsoil.

About one-third of this soil is used for crops. Alfalfa is grown on about 90 percent of the cropland, and small grains, mainly oats, are grown on about 10 percent.

Mesa sandy clay loam, moderately deep, 3 to 5 percent slopes (Ml).—Except that it has stronger slopes, this gently sloping soil is similar to Mesa sandy clay loam, deep, 0 to 3 percent slopes. Most of it occurs on South Myton Bench. All of this soil is used for range pasture.

Mesa sandy clay loam, deep, 0 to 3 percent slopes (Mk).—This soil is similar to Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes, but the cobbly substratum occurs at depths between 36 and 60 inches. In a few places the substratum lies below a depth of 60 inches. Most of this soil is on South Myton and North Myton Benches. It is somewhat better for general farming than Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes.

Mesa sandy clay loam, deep, 3 to 5 percent slopes (Mm).—This soil occurs on South Myton Bench. Erosion is more active and the carrying capacity of pasture is slightly lower than on Mesa sandy clay loam, deep, 0 to 3 percent slopes. This soil is used for range pasture.

Mesa sandy clay loam, moderately deep, poorly drained, 0 to 3 percent slopes (Mh).—This soil is similar to Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes. It has become poorly drained as a result of irrigation, and it occurs throughout a wider area. Some of this soil is in depressions that lie next to areas of Neola loam near Mt. Emmons and Altonah. Other small, widely scattered areas are on benches in the central and southern parts of

the area. These occur in depressions that receive seepage from the higher lying soils.

Millard stony sandy loam, 0 to 3 percent slopes (Mw).—This soil occurs on comparatively high alluvial fans and old river terraces in the northern part of the Area. It lies at higher elevations than the Ashley soils with which it is generally associated. Most of this soil occurs north and northwest of Whiterocks. The parent material was derived mainly from quartzite but also from some mixed sedimentary rocks.

Most of this soil has stones on the surface and throughout the profile, and, therefore, it is droughty. Virgin areas support stands of sagebrush, juniper, and scattered pinyon pines. The sagebrush is fairly dense and generally is about 2½ feet high. The stands of juniper are sparse to moderately dense, and the trees are about 15 feet high. Many areas have some rabbitbrush and a scattering of matchbrush and wheatgrass.

Profile description:

0 to 5 inches, dark yellowish-brown stony sandy loam; moderate fine granular structure; friable when moist, slightly hard when dry; noncalcareous.
5 to 15 inches, dark yellowish-brown stony sandy loam; weak fine granular structure; friable when moist, hard when dry; noncalcareous.
15 to 35 inches, yellowish-red stony sandy clay loam; weak medium subangular blocky structure; firm when moist; noncalcareous.
35 to 42 inches, reddish-brown stony clay loam; massive; firm when moist; slightly to moderately calcareous.
42 to 48 inches, grayish-brown stony sandy clay loam weakly cemented with many light-gray fragments of lime; massive; firm when moist; strongly calcareous.

Nearly all of this soil is used for range or irrigated pasture, but a small part is cropped. The soil should be seeded to suitable grasses.

Millard stony sandy loam, 3 to 5 percent slopes (Mx).—Except that it has stronger slopes, this soil is similar to Millard stony sandy loam, 0 to 3 percent slopes. Most of it occurs north and northwest of Whiterocks, and the areas are used mainly as range pasture. Mapped with this soil are a few small areas that have slopes of more than 5 percent. These areas occur northwest of Hanna.

Millard loam, poorly drained, 0 to 3 percent slopes (Mp).—This soil occurs on high-lying flood plains and alluvial fans west of Mountain Home in the northwestern part of the Area. It has become poorly drained fairly recently. To a depth of 8 inches, the surface soil is brown loam. Between depths of 8 inches and about 18 inches, the soil is somewhat finer textured than the surface soil and contains a slight concentration of calcium carbonate. Below this layer, to a depth of 36 inches, is coarse gravel and cobblestones that are coated underneath with carbonate of lime. At greater depths the cobblestones and gravel are free of lime and are coarser in texture.

Millard loam, 3 to 5 percent slopes (Mr).—This soil occurs mainly northeast of Whiterocks and in the upper part of the valley of the Duchesne River. Nearly all of it is cropped, but a few acres are used for range pasture. In some areas, especially in cultivated fields, the soil has been eroded.

Millard loam, 5 to 10 percent slopes (Ms).—Except for its stronger slopes, this soil resembles Millard loam, 3 to 5 percent slopes. It occurs mainly on smooth, undulating relief in association with Millard loam, 3 to 5 percent slopes. Nearly half of this soil is used for crops, but, because of the strong slopes and shallow depth to bedrock, it is best suited to permanent irrigated pasture or to a rotation in which the soil is in irrigated pasture much of the time.

Millard stony clay loam, 0 to 3 percent slopes (Mt).—This soil occurs on the old flood plains of rivers. The areas are northwest of Tabiona and northeast of Whiterocks. Many cobblestones occur on the surface and throughout the profile. The cobblestones are largely quartzite, but some are of sedimentary material.

The upper part of the subsoil, at depths between 8 and 18 to 24 inches, is generally finer textured, more compact, and harder than the surface soil and contains a slight to moderate concentration of lime. Between depths of 18 to 24 inches and 30 to 36 inches, the cobblestones are coated underneath with lime carbonate.

This soil is poorly suited to crops, but some areas have been cultivated. Most of it is now used for range pasture, and some parts are idle.

Millard stony clay loam, 3 to 10 percent slopes (Mu).—Except for its stronger slopes, this soil is similar to Millard stony clay loam, 0 to 3 percent slopes, and it occurs in the same general areas. This soil is on alluvial fans. About one-third of it is used for crops, and most of the rest is in range pasture.

Millard clay loam, 0 to 3 percent slopes (Mn).—Except for drainage and the clay loam texture of the surface layer, this soil is similar to Millard loam, poorly drained, 0 to 3 percent slopes. It occurs on old alluvial fans and river terraces in the same general areas as the Millard stony clay loams. The vegetation consists mainly of sagebrush and rabbitbrush.

More than half of this soil is cropped, and the rest is used for range pasture. Alfalfa is grown on between 80 and 85 percent of the cropped areas.

Millard clay loam, 3 to 7 percent slopes (Mo).—Except that it has stronger slopes, this soil is similar to Millard clay loam, 0 to 3 percent slopes. It is more likely to erode, especially if it is used for general irrigation farming. Both of these soils occur in the same general areas. This soil is used mainly for range pasture, and only a small part is cropped.

Millard stony sand, 0 to 3 percent slopes (Mv).—This soil is distinguished by its coarse-textured surface soil. It occurs in an area northeast of Whiterocks. The vegetation consists mainly of a scrubby stand of sagebrush. Many stones occur on the surface and to a depth of 6 feet.

Two small areas are fairly free of stones in the surface soil and generally to depths of 1 to 1½ feet. These total about 75 acres. All of the soil is used for range pasture.

Montwel sandy loam, moderately deep, 0 to 3 percent slopes (Mlx).—This soil lies next to areas of dissected sandstone. Most of it occurs near Montwel and in the Ouray Valley, but small tracts are scattered widely throughout the Area. The parent material was derived from the underlying sandstone and shale and from material washed from the nearby areas of rough sandstone.

Both surface runoff and internal drainage are medium. The vegetation consists mainly of sagebrush and some rabbitbrush and shadscale. The surface soil generally is slightly calcareous, but it varies considerably. Tests for free carbonates show no effervescence in some places, slight effervescence in other places, and moderate effervescence in still others.

Profile description:

0 to 25 inches, light-brown sandy loam; weak fine to medium granular structure; slightly hard when dry, friable when moist; moderately calcareous; low in organic matter; rapid permeability; low water-holding capacity.
25 to 40 inches, light-brown to very pale brown fine sandy loam; massive; firm when moist; strongly mottled with white carbonate of lime; low in organic matter; moderate permeability; low water-holding capacity.
40 inches+, light-brown to very pale brown parent material that includes partly disintegrated sandstone.

Depth to bedrock ranges from 2 to nearly 6 feet.

More than one-third of this soil is used for crops. Alfalfa is grown on about 60 percent of the cropland. Squash and beans do well, but this soil is not well suited to irrigation farming because of its sandy texture and moderate depth. If it is used continuously for crops, care must be taken to choose a suitable rotation and to fertilize properly.

Montwel sandy loam, moderately deep, 3 to 5 percent slopes (M2a).—Except that it has stronger slopes, this soil is similar to Montwel sandy loam, moderately deep, 0 to 3 percent slopes, and it occurs in the same general areas.

Montwel sandy loam, moderately deep, 5 to 10 percent slopes (M2c).—Except that it has stronger slopes, this soil is similar to Montwel sandy loam, moderately deep, 0 to 3 percent slopes, and it occurs in the same general areas. Nevertheless, because of the stronger slopes, it is generally more eroded and the pastures have a lower carrying capacity.

All of this soil is used for range pasture. Erosion is difficult to control. The carrying capacity can be improved by proper grazing, especially early in spring, and by reseeding the range pastures.

Montwel sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes (M1y).—This soil occurs in small areas adjacent to Montwel sandy loam, moderately deep, 0 to 3 percent slopes. Except for poor drainage, it resembles the adjacent soil. The poor drainage in most of the areas was caused by irrigation. The water table is high, and there is a moderate to strong concentration of soluble salts. Other small areas of Montwel sandy loam, moderately deep, 0 to 3 percent slopes, are likely to become poorly drained where the irrigation water is trapped by the underlying bedrock.

This soil is unsuitable for crops and is best used for pasture. It is very difficult to reclaim.

Montwel sandy loam, shallow, 0 to 3 percent slopes (M1w).—This soil occurs on undulating relief in the uplands and on the slopes below, generally in association with Montwel sandy loam, moderately deep, 0 to 3 percent slopes. The surface layers of these two soils are similar. This soil is considerably shallower, however. The depth to bedrock ranges from 10 to 20 inches, in most places being about 15 inches. The surface soil, which is 10 to 12 inches thick, is light-brown, friable sandy loam. This overlies sandy loam or loam containing a strong concentration of lime carbonate that extends to the bedrock.

More than one-third of this soil is used for crops, although it is poorly suited to that purpose. If the soil is irrigated, it is best used for permanent pasture.

Montwel sandy loam, shallow, 3 to 5 percent slopes (M1z).—This soil is similar to Montwel sandy loam, shallow, 0 to 3 percent slopes, but it has stronger slopes. It occurs in association with other Montwel sandy loams and has similar vegetation. Practically all of it is used for range pasture.

Montwel sandy loam, shallow, 5 to 10 percent slopes (M2b).—Except that it occurs on much stronger slopes, this soil is similar to Montwel sandy loam, shallow, 0 to 3 percent slopes. All of it is used for range pasture. Overgrazing has caused a moderate degree of erosion.

Montwel sand, moderately deep, 0 to 3 percent slopes (M1t).—This soil occurs next to areas of dissected sandstone in association with other Montwel soils. The parent material was derived from the underlying sandstone and from alluvial and windblown deposits transported from nearby areas of sandstone.

This soil is droughty, and generally it is free from harmful accumulations of salts. The vegetation consists mainly of sagebrush.

The surface soil extends to a depth of about 24 inches and consists of light-brown to light yellowish-brown loose fine sand that is very slightly calcareous and very low in water-holding capacity. The subsoil, which is at depths between 24 and 36 inches, consists of sandy loam with a strong concentration of lime carbonate that is distributed uniformly. The sandstone bedrock occurs directly below the subsoil.

Montwel sand, moderately deep, 3 to 7 percent slopes (M1v).—Except that it has stronger slopes, this soil is similar to Montwel sand, moderately deep, 0 to 3 percent slopes. It occurs in the same general areas as other Montwel soils. Nearly all of it is used for range pasture.

Montwel sand, shallow, 0 to 8 percent slopes (M1u).—Most of this soil lies next to areas of Montwel sand, moderately deep, 3 to 7 percent slopes, but it occurs at higher elevations and has uneven slopes. Generally, the accumulation of lime is not more than 10 or 12 inches below the surface and bedrock is at depths between 15 and 18 inches.

This soil is unsuited to crops. All of it is used for range pasture that provides poor grazing.

Montwel loam, moderately deep, 0 to 3 percent slopes (M1o).—This soil occurs on uplands and on the areas below in association with Montwel sandy loam, moderately deep, 0 to 3 percent slopes, and other Montwel loams. Most of it is near Montwel, but small, scattered areas occur in various parts of the Area. The parent material was derived from the underlying sandstone and shale and from material transported from the nearby areas of rough broken sandstone and shale.

Surface drainage is medium, but near the underlying bedrock, internal drainage is retarded somewhat. The vegetation consists mainly of sagebrush and rabbitbrush.

Profile description:

0 to 12 inches, light-brown loam; granular structure; friable when moist; strongly calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.
12 to 28 inches, light-brown or yellowish-red loam; firm when moist; slight concentration of lime carbonate that occurs as white specks; low in organic matter; moderate permeability; good water-holding capacity.
28 to 37 inches, yellowish-red or light-brown clay loam; firm when moist; moderate concentration of gypsum and lime carbonate; very low in organic matter; moderate permeability; moderate water-holding capacity; layer is underlain by sandstone and shale bedrock.

Nearly one-third of this soil is used for crops. It is managed in about the same way as Montwel sandy loam,

moderately deep, 0 to 3 percent slopes, but the yields are slightly higher.

Montwel loam, moderately deep, 3 to 8 percent slopes (M1s).—This gently sloping soil differs from Montwel loam, moderately deep, 0 to 3 percent slopes, in that it has stronger slopes and is generally more eroded. It occurs in the same general areas. Pastures on this soil have a low carrying capacity.

Montwel loam, moderately deep, poorly drained, 2 to 5 percent slopes (M1p).—Except for being poorly drained, this soil is similar to the adjacent Montwel loam, moderately deep, 0 to 3 percent slopes. It occurs in small, widely scattered areas and has become poorly drained fairly recently. All of this soil is used for pasture.

Montwel loam, shallow, 0 to 3 percent slopes (M1m).—This soil is similar to Montwel sandy loam, moderately deep, 0 to 3 percent slopes, but it has a finer textured surface soil and subsoil. It occupies areas adjacent to, but generally higher than, other Montwel loams. An area of 26 acres on Blue Bench has a moderate covering of cobblestones on the surface. This soil is poorly suited to crops and is used mainly for range pasture.

Montwel loam, shallow, 3 to 5 percent slopes (M1r).—Except that it has stronger slopes, this soil is similar to Montwel loam, shallow, 0 to 3 percent slopes. It occurs in association with other Montwel loams.

Montwel loam, shallow, poorly drained, 0 to 5 percent slopes (M1n).—This soil is similar to Montwel loam, shallow, 0 to 3 percent slopes, but it is poorly drained. It occurs in small areas in association with other Montwel soils. In addition to being poorly drained, this soil has a moderate to strong accumulation of soluble salts. Most of the areas are used for unimproved pasture that consists mainly of weeds and saltgrass.

Montwel clay loam, moderately deep, 0 to 3 percent slopes (M1f).—This soil lies next to areas of light-brown and pale reddish-brown shale and sandstone. The areas are small and widely scattered. They occur mainly northwest of Roosevelt and about 2 or 3 miles north of Talmage. The parent material was derived from the underlying shale and sandstone and from material transported from the nearby hills of dissected sandstone. Surface drainage is medium, but movement of water through the soil is somewhat restricted near the bedrock.

Profile description:

0 to 12 inches, light-brown or reddish-brown clay loam; medium to fine granular structure; friable when moist, hard when dry; strongly calcareous.
12 to 18 inches, light-brown to reddish-brown clay loam; moderately compact; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
18 to 36 inches, reddish-yellow clay loam; massive; moderate accumulation of lime carbonate; bedrock of clay shale or sandstone occurs at a depth of about 36 inches.

In some places the surface layer is only 10 inches thick. The amount of lime, at depths between 18 and 36 inches, ranges from a strong, uniformly distributed concentration to a slight concentration that occurs as small white specks.

Much of this soil is used for range pasture, but a large part is cropped, and some is idle. The soil is fairly well suited to small grains and is better suited to clover than to alfalfa. Irrigation water should be applied carefully to prevent the soil from becoming waterlogged, because the bedrock keeps excess water from draining off.

Montwel clay loam, moderately deep, 3 to 5 percent slopes (M1k).—This soil is similar to the associated Montwel clay loam, moderately deep, 0 to 3 percent slopes, but it has stronger slopes and is more likely to be damaged through erosion. About one-fourth of this soil is used for crops.

Montwel clay loam, moderately deep, poorly drained, 0 to 3 percent slopes (M1g).—This soil is similar to the adjacent Montwel clay loam, moderately deep, 0 to 3 percent slopes, but it occurs in depressions and the water table is higher—generally within 6 feet of the surface. In addition, there are moderate to strong concentrations of salts in most places. This soil occupies small areas that are mainly about 1 mile south of Bluebell. In these areas the soil has an accumulation of lime carbonate that is distinctly weaker than that in the typical Montwel soils.

Most of this soil is used for pasture, but a small part is cropped. In most places it would not be feasible to install artificial drainage, and so the soil is best used for pasture that is seeded to salt-tolerant plants.

Montwel clay loam, shallow, 0 to 3 percent slopes (M1e).—This soil is similar to Montwel clay loam, moderately deep, 0 to 3 percent slopes, with which it is associated. Most of it occurs at higher elevations, however, and the depth to bedrock is less, generally being between 10 and 20 inches. Most of the areas are north of Roosevelt in the northern part of the Roosevelt Valley. Less than half of this soil is used for crops.

Montwel clay loam, shallow, 3 to 5 percent slopes (M1h).—Except that it has stronger slopes, this soil is similar to Montwel clay loam, shallow, 0 to 3 percent slopes, and it occurs in the same general areas. Most of this soil is used for range pasture or is idle.

Montwel clay loam, shallow, eroded, 5 to 10 percent slopes (M1l).—This soil has undulating relief. The slopes are smooth, but the soil has become severely eroded, and a network of deep gullies has developed as the result of improper irrigation. All of this soil is used for pasture.

Montwel clay, moderately deep, 0 to 3 percent slopes (Mz).—This soil occurs in depressions, most of which are near the rolling shale hills. It occurs mainly north of Roosevelt and west of Tridell, but other small areas are widely scattered throughout the area. The parent material was derived from the underlying shale and from material transported from the shale hills.

Internal drainage is slow. The vegetation consists mainly of shadscale.

Profile description:

0 to 12 inches, brown clay that breaks to irregular fragments; hard when dry; strongly calcareous; low in organic matter; slow permeability; moderate water-holding capacity.
12 to 24 inches, clay that breaks to irregular fragments; zone of moderate concentration of lime carbonate; low in organic matter; slow permeability; moderate water-holding capacity; below this layer there is a gradual transition to the substratum of clay shale.

In some places the material in the lower layer extends to a depth of 30 inches. About one-fifth of this soil is used for crops, but it is poorly suited to general farming and is best used for range pasture.

Montwel clay, moderately deep, 3 to 5 percent slopes (M1d).—Except that it has stronger slopes, this soil is similar to Montwel clay, moderately deep, 0 to 3 percent slopes, and it occurs in the same general areas. All of it is used for range pasture, but the forage is of low value.

Montwel clay, moderately deep, poorly drained, 0 to 5 percent slopes (M1b).—This soil occurs north of Roosevelt

in the Roosevelt Valley. It is poorly drained, and salts have accumulated on the surface. It is suited only to pasture of salt-tolerant plants.

Montwel clay, shallow, poorly drained, 0 to 5 percent slopes (M1a).—This soil occurs in the northern part of Roosevelt Valley in association with Montwel clay, moderately deep, poorly drained, 0 to 5 percent slopes. It has been abandoned for crops and is used only for unimproved pasture.

Montwel clay, shallow, 0 to 3 percent slopes (My).—Most of this soil occurs on low hills on which outcrops of shale are common. To depths of 6 to 8 inches, the surface soil is hard clay. This overlies similar material that contains a moderate accumulation of lime carbonate. In most places the lime carbonate extends slightly into the substratum of clay shale.

Most of this soil is used for range pasture, but a small part is idle. It is unsuited to crops and is best kept in range.

Montwel clay, shallow, 3 to 5 percent slopes (M1c).—This soil is similar to the associated Montwel clay, shallow, 0 to 3 percent slopes, but it has stronger slopes. Both of these soils occur in the same general areas. This soil is unsuited to crops and is used for range pasture.

Myton sandy loam, 0 to 3 percent slopes (M2l).—This soil occurs on low river terraces, principally in the northern part of the Area. It is widely scattered throughout the Area and occupies small, irregular patches. Most of this soil occurs at slightly higher elevations than the Ashley soils. The parent material was derived from quartzite and mixed sedimentary rocks. Underlying this soil are beds of comparatively clean cobblestones and gravel.

This soil is well drained. The vegetation consists mainly of sagebrush, rabbitbrush, and bunch grasses. Many areas that are slightly alkali have a fairly thick stand of greasewood.

Profile description:

0 to 8 inches, pale-brown to light-brown sandy loam; friable when moist; strongly calcareous; fair water-holding capacity.
8 to 18 inches, light-brown to very pale brown sandy loam to light loam; a slight concentration of lime carbonate that occurs as small specks.
18 to 36 inches, light-brown to very pale brown loam or clay loam embedded with coarse gravel and cobblestones that are coated underneath with lime.
36 inches+, beds of loose cobblestones, coarse gravel, and sand.

In a few places the second layer occurs at depths between 8 and 24 inches, and the third layer occurs at depths between 24 and 36 inches.

Most of this soil is used for pasture, some is cropped, and a small part is idle. Some of the pastures are irrigated. The principal crops are alfalfa, oats, wheat, and barley, but corn and potatoes are grown to some extent. The soil must be fertilized to produce even moderate yields. In places pastures do well if enough irrigation water is available.

Myton sandy loam, poorly drained, 0 to 3 percent slopes (M2m).—This soil is similar to Myton sandy loam, 0 to 3 percent slopes, but it has become poorly drained because of the seepage of irrigation water from higher areas. The areas are scattered widely throughout the county. Large areas of this soil occur northwest of Ioka, and others are northwest of Upalco.

This soil has a high water table during the summer. It has a thick cover of sedges, wiregrass, and other grasses that furnish a fair amount of grazing. Some areas are free of salts and alkali, but others have strong concentrations.

Myton stony sandy loam, 0 to 3 percent slopes (M2s).—This soil occurs in association with other Myton soils and with the soils of the Ashley series. It is near the larger rivers. The largest area, which is several thousand acres in size, is located east of Neola in the upper part of the valley of the Uinta River. This soil is generally on old, low terraces just above the Ashley soils, which are nearer the river. The parent rock consisted mainly of quartzite and some mixed sedimentary rocks.

Most of this soil has been cleared and is now covered with sod-forming grasses. In a number of small, uncleared areas there is a fair stand of sagebrush.

Profile description:

0 to 8 inches, pale-brown to light-brown stony sandy loam to loam containing many cobblestones of quartzite and sandstone; moderately calcareous; moderate to low in organic matter; rapidly permeable.
8 to 18 inches, clay loam with a slight concentration of lime that occurs as specks; cobblestones, which take up much of the space, are coated underneath with lime.

In places the cobblestones form a thick, loose covering on the surface of the soil. In the northern part of the Area, where this soil merges with the Millard soils, the surface soil is noncalcareous. In some areas the lower layer extends downward to depths between 24 and 30 inches. Below this layer the stones and pebbles have no coating of lime carbonate and the clay loam is transitional to sandy loam and sand.

This soil is used mainly for pasture, but a few small areas have been used for crops, mainly alfalfa. Tillage is extremely difficult or impossible because of the many cobblestones, and the areas are suitable only for pasture. Because the soil is droughty, frequent, light applications of irrigation water are needed to keep the grass in good condition.

Myton stony sandy loam, 3 to 5 percent slopes (M2u).—This soil is similar to Myton stony sandy loam, 0 to 3 percent slopes, but it has stronger slopes. Most of it occurs near the larger rivers in the north-central part of the area. This soil is near the Uinta Mountains in an area where the amount of annual precipitation is higher than normal. As a result it is darker than the typical soils of the area. The surface soil is pale brown when dry and brown when moist. The vegetation consists of a scattered stand of sagebrush and juniper.

Much of this soil is used for range pasture. It is not well suited to irrigated pasture, because of the hazard of erosion and the difficulty in applying irrigation water evenly.

Myton stony sandy loam, 5 to 10 percent slopes (M2v).—Except for its stronger slopes, this soil is similar to Myton stony sandy loam, 3 to 5 percent slopes. It occurs in small, widely scattered tracts in the general areas occupied by the other Myton soils. This soil is used mainly for grazing.

Myton stony sandy loam, poorly drained, 0 to 3 percent slopes (M2t).—This soil is similar to Myton stony sandy loam, 0 to 3 percent slopes, but it has become poorly drained as the result of irrigation. Most of the areas are small. They are generally in slight depressions that are adjacent to areas of Myton stony sandy loam, 0 to 3 percent slopes. All of this soil is used for pasture.

Myton loam, 0 to 3 percent slopes (M2g).—This soil occupies small, irregularly shaped patches on low terraces along the larger rivers in the northern part of the Area. It occurs in association with other soils of the Myton series. The soil material, which was derived from quartzite and mixed sedimentary rock, has been transported by rivers from the Uinta Mountains. This soil is well drained.

Profile description:

0 to 8 inches, light-brown to pale-brown gritty loam; friable when moist; calcareous.
8 to 18 inches, heavy clay loam containing a slight concentration of lime carbonate.
18 to 30 inches, strongly calcareous clay loam embedded with coarse gravel and cobblestones that are coated underneath with lime.
30 inches+, soil material that is distinctly coarser than that in layer immediately above; the gravel and cobblestones are free of lime.

In places the material in the third layer extends to a depth of 36 inches. Most of this soil is used for irrigated pasture or range, and only a small part is cropped. It is managed in about the same way as Myton sandy loam, 0 to 3 percent slopes.

Myton stony sand, 0 to 3 percent slopes (M2r).—Except that the surface soil is coarser textured, this soil is similar to Myton stony sandy loam, 0 to 3 percent slopes. All of it occurs on low terraces in the valley of the Uinta River near the Uinta and Whiterocks Rivers. It is at higher elevations than the Ashley soils, and the slopes are ridgy and uneven. This soil is covered mainly by a scrubby stand of sagebrush, and it is used for range pasture.

Myton sand, 0 to 3 percent slopes (M2h).—The subsoil and substratum of this soil are similar to those described for Myton sandy loam, 0 to 3 percent slopes, but the texture of the surface soil differs. To depths between 12 and 18 inches, this soil consists of light-brown, calcareous, loose sand. The areas are small and lie next to larger areas of Myton stony sand, 0 to 3 percent slopes. A few small patches of stony soil have been included with this soil.

About one-fifth of this soil is used for crops, but much of the acreage previously cropped is now idle. The areas are poorly suited to irrigation farming.

Myton sand, poorly drained, 0 to 3 percent slopes (M2k).—Except for being poorly drained, this soil is similar to Myton sand, 0 to 3 percent slopes. It occurs about 1 mile east of Leeton and is in the same general area as Myton stony sand, 0 to 3 percent slopes, and Myton sand, 0 to 3 percent slopes. During most of the year, the water table is near the surface. All of this soil is used for pasture.

Myton clay loam, 0 to 3 percent slopes (M2d).—This soil occurs on smooth terraces of old rivers in association with other Myton soils. Like the other Myton clay loams, it is distributed throughout the valleys of the larger rivers. The parent rock consists of quartzite and mixed sedimentary rocks. This soil is well drained. The vegetation is mainly sagebrush and rabbitbrush.

Profile description:

0 to 6 inches, pale-brown clay loam; platy structure; firm when moist; weakly calcareous; moderate content of organic matter; moderate permeability; good water-holding capacity.
6 to 15 inches, pale-brown clay loam that breaks to irregular fragments; strongly calcareous; very slight concentration of lime occurs as mottling; low in organic matter; moderate permeability; good water-holding capacity.
15 to 28 inches, pale-brown clay loam; massive; strongly calcareous; lime carbonate occurs as specks; low in organic matter; moderate permeability; good water-holding capacity.
28 to 36 inches, light-brown clay loam embedded with coarse gravel and cobblestones that are coated underneath with lime.
36 inches+, soil material that is coarser textured than that in layer immediately above; coarse gravel and stones free of coating of lime.

Nearly two-thirds of this soil is cropped, and most of the rest is used for range pasture. Alfalfa, which is grown on between 80 and 85 percent of the cropland, is the principal crop. Wheat and barley are also grown. Under good management, fair yields are obtained.

Myton clay loam, 3 to 8 percent slopes (M2f).—Except that it has stronger slopes, this soil is similar to Myton clay loam, 0 to 3 percent slopes. Both soils occur in the same general areas. Only a small part of this soil is cropped.

Myton clay loam, poorly drained, 0 to 3 percent slopes (M2e).—This soil is similar to Myton clay loam, 0 to 3 percent slopes, but it has become poorly drained as the result of seepage from higher lying irrigated areas. Most of it occurs in the northern part of the Area, but small, scattered patches are in the upper part of the valley of the Duchesne River. During much of the year, the water table is high. Consequently, most of this soil is affected by salts and alkali. All of the areas are used for pasture.

Myton stony clay loam, 0 to 3 percent slopes (M2n).—This soil lies along rivers on low, smooth terraces. It occurs in the same general areas as Myton clay loam, 0 to 3 percent slopes, and other Myton soils. Most of this soil has been cleared, but the vegetation probably consisted mainly of sagebrush.

The surface layer and the subsoil of this soil differ from those described for Myton clay loam, 0 to 3 percent slopes. Many cobblestones occur on the surface and throughout the surface layer, which ranges from 8 to 10 inches in thickness. Normally, the subsoil is between depths of 8 to 10 inches and 18 to 24 inches, but in a few places it extends to a depth of 30 inches. It is finer, harder, and more compact than the surface soil, and it contains slight to moderate concentrations of lime carbonate. Between depths of 18 to 24 inches and 36 inches are cobblestones and gravel that are coated underneath with lime carbonate.

Even though it is poorly suited to crops, nearly one-third of this soil is used for that purpose. The principal crop is alfalfa. Because tillage is practically impossible, this soil is used for pasture after the stand of alfalfa has run out. The areas are best suited to pasture seeded to improved pasture mixtures.

Myton stony clay loam, 3 to 10 percent slopes (M2p).—Except for its stronger slopes, this soil is similar to Myton stony clay loam, 0 to 3 percent slopes. It occurs in an area near Myton in the valley of the Duchesne River. About one-fifth of this soil is used for crops.

Myton stony clay loam, poorly drained, 0 to 3 percent slopes (M2o).—This soil occurs in depressions in association with the slightly higher lying Myton stony clay loam, 0 to 3 percent slopes, and Myton stony sandy loam, 0 to 3 percent slopes. The areas are near Myton. Most of them have become waterlogged and impregnated with salts as the result of irrigation. In some places the water table is near the surface and there is a thick stand

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of sedges, tules, and other marsh plants. In places where the water table is lower, the vegetation consists mainly of saltgrass and the soil contains harmful accumulations of salts and alkali.

Naples sandy clay loam, 0 to 3 percent slopes (Nm).—This soil is one of the best agricultural soils in the Area. It occurs on smooth alluvial fans and flood plains throughout the central part of the Area. Fairly large tracts are located in the Roosevelt Valley, just east of Roosevelt, and in Hancock Cove, about 1 mile west of Roosevelt. In many places this soil is associated with Naples loam, 0 to 3 percent slopes. The parent material was derived from quartzite and light-brown sandstone and shale. In most areas there is a considerable degree of textural stratification in the subsoil.

This soil is well drained and generally is free from harmful accumulations of salts. The native vegetation is mainly shadscale and sagebrush.

Profile description:

0 to 11 inches, light-brown sandy clay loam; medium to fine granular structure; friable when moist; calcareous; low content of organic matter; moderate permeability; good water-holding capacity.

11 to 33 inches, light-brown to very pale brown fine sandy loam; massive to weak medium granular structure; friable when moist; low in organic matter; moderate to rapid permeability; low to moderate water-holding capacity.

33 to 61 inches, light-brown silty clay loam; granular structure; slightly hard when dry, friable when moist; calcareous; low in organic matter; moderate permeability; good water-holding capacity.

61 to 72 inches, light-brown fine sandy loam; massive; calcareous; low in organic matter; rapid permeability; moderate to low water-holding capacity.

About three-fifths of this soil is used for crops. Between 70 and 75 percent of the cropland is in alfalfa. Most of the rest is used to grow wheat, oats, and barley.

Naples sandy clay loam, 3 to 5 percent slopes (Ns).—This soil is similar to Naples sandy clay loam, 0 to 3 percent slopes, with which it is generally associated, but it occurs on stronger slopes. About two-thirds of this soil is used for crops, and the rest is pastured.

Naples sandy clay loam, 5 to 10 percent slopes (Nu).—Nearly all of this soil is near Tabiona in the upper part of the valley of the Duchesne River. More than two-thirds of it is used for crops. The rest is used for range pasture, which lies in areas above those served by irrigation ditches.

Naples sandy clay loam, eroded, 2 to 8 percent slopes (Nr).—This soil occurs on alluvial fans. The areas are small and scattered. They have been severely eroded, and many gullies have formed. As a result this soil is unsuitable for irrigation farming. Nearly all of it is used for range pasture, but corn is grown on a few acres.

Naples sandy clay loam, poorly drained, 0 to 3 percent slopes (Nn).—Except for being poorly drained, this soil is similar to Naples sandy clay loam, 0 to 3 percent slopes. The water table is within 6 feet of the surface; in some areas it is very near the surface during part of the year. Most areas have a strong concentration of soluble salts (fig. 7). Although most of this soil has been cultivated, the areas are now idle and have a cover of povertyweed, alkaliweed, and other weeds, or a growth of greasewood. Only a small acreage is still cropped.

Naples sandy clay loam, deep over gravel, 0 to 3 percent slopes (No).—This soil differs from Naples sandy clay loam, 0 to 3 percent slopes, in that the substratum, consisting of gravel and cobblestones, occurs at a depth of about 3 feet. Most of this soil is either in the upper part of the valley of the Duchesne River or around the Pelican Lake Reservoir. In some small areas the surface soil consists of reddish-brown to light-brown silty clay. More than two-thirds of the total area is cropped, about one-fifth is idle, and the rest is in range pasture.

Figure 7.—**A white crust of salt and a vegetation of greasewood are characteristic of this area of Naples sandy clay loam, poorly drained, 0 to 3 percent slopes, which is in the lower part of Hancock Cove.**

Naples sandy clay loam, deep over gravel, 3 to 8 percent slopes (Nt).—This soil occupies small, scattered areas on smooth alluvial fans. The surface soil has been moderately eroded. The substratum, which generally is at depths below about 3 feet, is composed of gravel, sand, and cobblestones. Most of this soil is used for crops, some is in range pasture, and a few acres are idle.

Naples sandy clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes (Np).—This inextensive soil is similar to Naples sandy clay loam, deep over gravel, 0 to 3 percent slopes, but it has become poorly drained as the result of overirrigation. In addition to being poorly drained, it has moderate to strong concentrations of salts. Most of this soil occurs northeast of Myton and in the Ouray Valley. Less than one-fifth of it is used for crops.

Naples sandy loam, 0 to 3 percent slopes (Nv).—This soil occurs throughout the central part of the Area, generally in association with Naples loam, 0 to 3 percent slopes. The parent material was derived from quartzite and light-brown sandstone and shale. The soil is well drained and is free of harmful accumulations of soluble salts.

Profile description:

0 to 17 inches, light-brown or very pale brown sandy loam; granular structure; friable when moist; calcareous; low in organic matter; rapid permeability; fair water-holding capacity.

17 to 27 inches, very pale brown or light-brown loamy fine sand; massive; very friable when moist; slightly calcareous; very low in organic matter; rapid permeability; low water-holding capacity.

27 to 46 inches, pale-brown or light-brown silty clay loam; massive; hard when dry; calcareous; low in organic matter; moderate permeability; good water-holding capacity.

46 to 72 inches, light-brown loamy sand; single grain; very friable when moist and soft when dry; very low in organic matter; rapid permeability; low water-holding capacity.

This soil has a considerable degree of textural stratification. The thickness and the arrangement of the layers vary widely from place to place.

More than one-third of this soil is used for crops, mainly alfalfa and small grains. Alfalfa is grown on more than 80 percent of the cropland. This soil can be improved by increasing the content of organic matter, which, in turn, will increase the water-holding capacity.

Naples sandy loam, 3 to 5 percent slopes (N1a).—Except that it has stronger slopes, this soil is similar to Naples sandy loam, 0 to 3 percent slopes, and it occurs in the same general areas. In some of the irrigated areas, however, the soil has eroded because of the practice of running irrigation furrows up and down the slope.

Naples sandy loam, 5 to 10 percent slopes (N1c).—Except for its stronger slopes, this soil is similar to Naples sandy loam, 0 to 3 percent slopes. It occurs in scattered areas, mostly in the upper part of the valley of the Duchesne River. About one-fourth of this soil is used for crops.

Naples sandy loam, eroded, 2 to 10 percent slopes (Nz).—Because of erosion, mainly gully erosion, this soil is unsuitable for irrigation farming. It occurs in small, scattered areas, mostly in the upper part of the valley of the Duchesne River. Nearly all of it is in range pasture, but a few acres are cropped.

Naples sandy loam, hummocky, 2 to 5 percent slopes (Ny).—As much as 50 percent of the surface of this undulating soil consists of hummocks of loose loamy fine sand. The hummocks are scattered in an irregular pattern. They are generally 3 to 6 feet in height, but a few are higher. The areas between the hummocks were formed from windblown sandy loams and are similar to areas of Naples sandy loam, 0 to 3 percent slopes. All of this soil is used for range pasture, but the carrying capacity is extremely low.

Naples sandy loam, poorly drained, 0 to 3 percent slopes (Nw).—This soil is similar to Naples sandy loam, 0 to 3 percent slopes. It has become poorly drained, however, mainly as the result of overirrigation or seepage from higher lying areas. It occurs on smooth flood plains. The areas are west of Roosevelt in Hancock Cove, northeast of Myton, and east and west of Randlett. The soil contains moderate to strong concentrations of salts. Nearly all of it is used for pasture.

Naples sandy loam, deep over gravel, 0 to 5 percent slopes (Nx).—This soil differs from Naples sandy loam, 0 to 3 percent slopes, in that it has a gravelly substratum beginning at a depth of about 3 feet. The areas are bordered on one side by other Naples sandy loams and on the opposite side by stony Myton soils. The slopes are smooth. A small area has slopes of 5 to 10 percent. About half of the total acreage is used for crops.

Naples sandy loam, poorly drained, 3 to 5 percent slopes (N1b).—This soil occurs in the valley of the Duchesne River north of Duchesne and also about 2 miles east of Upalco. Because it is poorly drained, it is no longer used for crops. This soil is permeable, however, and probably could be reclaimed if it were drained properly.

Naples loam, 0 to 3 percent slopes (Nb).—Except for the texture of the surface layer, this soil is similar to Naples sandy loam, 0 to 3 percent slopes. It occurs on alluvial fans and flood plains throughout the central and northern parts of the Area. The parent material was derived from quartzite and light-brown sandstone and shale. In many places the subsoil and substratum are stratified. This soil is well drained.

About three-fourths of this soil is used for crops. About 80 percent of the cropland is in alfalfa. The rest is used mainly to grow wheat, although some oats and barley are grown. The yields of alfalfa are slightly higher on this soil than on Naples sandy loam, 0 to 3 percent slopes.

Naples loam, 3 to 5 percent slopes (Nf).—This soil has stronger slopes than Naples loam, 0 to 3 percent slopes, but otherwise the two soils are similar. Most of the areas are fairly small. They are in the same general areas as the Naples sandy loams and other Naples loams. About half of this soil is cropped.

Naples loam, 5 to 10 percent slopes (Nh).—Except that it has stronger slopes, this soil is similar to Naples loam, 0 to 3 percent slopes. Most of it occurs in the upper part of the valley of the Duchesne River. About one-half is in crops, one-fifth is in pasture, and the rest is idle.

Naples loam, eroded, 3 to 5 percent slopes (Ng).—This inextensive soil occurs in widely separated areas. It has been affected by gully erosion and is no longer suitable for irrigation farming. Nearly all of it is used for range pasture, but the pastures are of extremely poor quality.

Naples loam, poorly drained, 0 to 5 percent slopes (Nd).—Most of this soil occurs in depressions, generally in association with Naples loam, 0 to 3 percent slopes. This soil has become poorly drained fairly recently because of irrigation, but the soil profile has been altered but little. Nevertheless, salts have accumulated, especially in the surface soil.

Most of this soil is used for pasture. Many of the areas contain moderate to strong concentrations of salts, and saltgrass is the dominant vegetation.

Naples loam, deep over gravel, 0 to 5 percent slopes (Ne).—This soil is similar to Naples loam, 0 to 3 percent slopes, except that it has a gravelly, stony layer at depths ranging between 36 and 60 inches. It occurs on smooth flood plains in a few small areas. Most of this soil is used for crops.

Naples loam, deep over gravel, poorly drained, 0 to 3 percent slopes (Nc).—Except that it has become poorly drained because of overirrigation, this soil is similar to Naples loam, 0 to 3 percent slopes. It occurs on flood plains in association with Naples loam, deep over gravel, 0 to 5 percent slopes. The two areas of this soil occur north and northeast of Ioka. They contain moderate to strong concentrations of salts. This soil has been cultivated previously, but it is no longer used for crops.

Naples loamy fine sand, 0 to 3 percent slopes (Nk).—This soil occurs adjacent to streams, mostly northwest of Ioka. The parent material was derived principally from light-brown sandstone. The soil is somewhat excessively drained; internal drainage is very rapid. The native vegetation consists mainly of sagebrush.

From the surface to depths ranging from 36 to 42 inches, the soil is light-brown, loose, light loamy fine sand or fine sand. In most places there is considerable textural stratification in the subsoil and substratum. The substratum is generally stratified with loam, clay loam, and loamy sand.

About 60 percent of this soil is used for crops. The principal crop is alfalfa.

Naples loamy fine sand, 3 to 5 percent slopes (Nl).—Except that it has slightly stronger slopes, this soil is similar to Naples loamy fine sand, 0 to 3 percent slopes. Both soils occur in the same general areas. Most of this soil is idle, but about one-third is used for range pasture, and a small part is cropped.

Naples fine sand, poorly drained, 0 to 3 percent slopes (Na).—This soil occurs in somewhat depressed, low-lying areas. It has a high water table and contains a moderate accumulation of salts. All of it is used for pasture. If drainage can be improved, it probably would be feasible to reclaim this soil for crops.

Naples silty clay, 0 to 3 percent slopes (N1d).—Most of this soil is in depressions. It occurs on alluvial flood plains that are mainly in the upper part of the valley of the Duchesne River and in the Roosevelt Valley northeast of the town of Roosevelt. Much of it is used for crops.

Throughout the profile, this soil is generally a uniform light brown. The surface soil is fairly compact and cloddy. The subsoil is somewhat stratified and open but is generally medium textured and moderately permeable. Thin lenses of material of different textures give the subsoil a distinct platy appearance.

Naples silty clay, 3 to 10 percent slopes (N1g).—Except for its stronger slopes, this soil is similar to Naples silty clay, 0 to 3 percent slopes. Both soils occur in the same general areas. Some of this soil is used for crops, but a large part is idle.

Naples silty clay, poorly drained, 0 to 3 percent slopes (N1e).—This soil is similar to Naples silty clay, 0 to 3 percent slopes. The water table is higher, however, usually within 6 feet of the surface, and in most places there are strong concentrations of soluble salts. Some areas have been cropped, but the soil is unsuitable for cultivation and should be used only for pasture.

Naples silty clay, eroded, 2 to 8 percent slopes (N1f).—This soil occurs in small, widely separated areas. It has been affected by gully erosion and is unsuitable for crops. The gullying has resulted mainly from improper irrigation. Nearly all of this soil is used for range pasture.

Naturita fine sandy loam, 0 to 3 percent slopes (N1h).—This soil occupies extensive areas on the benches in the central and southern parts of the Area. Most of it lies next to areas of Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes, but it is nearer the outer rims of the benches. The vegetation consists largely of sagebrush, shadscale, rabbitbrush, and galletagrass.

Profile description:

0 to 5 inches, brown to light-brown fine sandy loam; moderate granular structure; slightly hard when dry and friable to very friable when moist; calcareous; low to moderate content of organic matter and plant nutrients; fair water-holding capacity.

5 to 10 inches, heavy loam to clay loam that is slightly lighter in color and lower in organic matter than the surface layer; has many white flecks and splotches of limy material; contains a few round pebbles.

10 to 14 inches, white, light clay loam that is slightly cemented with lime; contains many round quartzite and some sandstone pebbles and cobblestones.

14 to 24 inches, pinkish-gray sandy loam, cobblestones, and pebbles that are slightly cemented with lime.

24 inches +, loose, round pebbles, cobblestones, and sand; material is so porous that it holds only a small amount of moisture.

The substratum of cobblestones and gravel generally begins at depths ranging from 8 to 19 inches. The accumulation of lime carbonate is almost entirely in the substratum. To depths between 2 and 3 feet, and in a few places to greater depths, the cobblestones and gravel are coated with lime.

In many places the surface soil contains a few cobblestones that interfere with cultivation and add to the expense of clearing the land. About one-fourth of this soil is used for crops. Yields of alfalfa are lower than those obtained on Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes. This soil is poorly suited to general farming, but it can be used for crops if it is cultivated along with areas of more productive soils.

Naturita fine sandy loam, 3 to 5 percent slopes (N1l).—This soil is similar to the associated Naturita fine sandy loam, 0 to 3 percent slopes, but it occurs on stronger slopes. In addition there is a greater variation in the depth to the substratum of cobblestones and gravel. Nearly all of this soil is used for range pasture.

Naturita fine sandy loam, 5 to 10 percent slopes (N1m).—This soil occupies smooth sloping areas, but otherwise it is similar to Naturita fine sandy loam, 3 to 5 percent slopes. All of it is used for range pasture.

Naturita fine sandy loam, poorly drained, 0 to 3 percent slopes (N1k).—This soil is similar to Naturita fine sandy loam, 0 to 3 percent slopes, but it has a high water table and generally has slight to moderate concentrations of soluble salts. It occurs in small patches on the benches in the central part of the Area.

All of this soil is in pasture of poor quality. Many areas probably can be reclaimed for cropland by draining the soil and removing the salts, but this should not be attempted without technical assistance.

Naturita sandy clay loam, 0 to 3 percent slopes (N1n).—This soil differs mainly from Naturita fine sandy loam, 0 to 3 percent slopes, in having a surface layer of sandy clay loam. Both soils occur in the same general areas. In both of them the stony subsoil begins at depths ranging from 8 to 18 inches. Most of the accumulation of calcium carbonate is in the subsoil, which consists of compact silty clay embedded with stones; the stones and soil material are covered with lime carbonate.

In two areas of this soil, the surface layer consists of silty clay or clay. These areas, located on Blue Bench northeast of Duchesne, occur as long, narrow strips that are slightly lower than the surrounding areas, and they form natural drainageways.

Most of this soil is used for pasture, a small part is cropped, and some is idle.

Naturita sandy clay loam, very poorly drained, 0 to 3 percent slopes (N1o).—This soil occurs in depressions in association with the Neola soils. The areas are east and southeast of Altonah. The water table is at or near the surface during much of the year, but the soil is generally free of excessive accumulations of salts. The high water table has resulted from seepage from higher areas and from the Lake Fork Canal No. 1. All of this soil is in pasture of fair quality.

Naturita stony fine sandy loam, 0 to 3 percent slopes (N1p).—Most of this soil occurs on the extreme outer rims of mesas in association with Naturita fine sandy loam, 0 to 3 percent slopes. In most places the surface of the soil has a moderate to thick covering of cobblestones of quartzite and sandstone. The entire profile consists of a mass of cobblestones embedded in the fine sandy loam or loam surface soil and in the clay loam subsoil. In

most places the zone of calcium carbonate begins at depths of 6 to 8 inches and extends to depths of 30 to 36 inches; the stones have a heavy coating of lime carbonate.

This soil is unsuited to farming, even though some of it has been cropped. Most of the areas are now idle, and only a few acres are used for crops.

Naturita stony fine sandy loam, 3 to 10 percent slopes (N1s).—Except that it occurs on stronger slopes, this soil is similar to Naturita stony fine sandy loam, 0 to 3 percent slopes. Both of these soils are on the outer rims of the benches. Because of its strong slopes, this soil has been used but little for crops. It is best kept in range pasture.

Naturita stony fine sandy loam, poorly drained, 0 to 10 percent slopes (N1r).—This soil occurs in association with other poorly drained Naturita soils in widely separated parts of the Area. Poor drainage may have been caused by overirrigating the adjacent cropland. Most of the poorly drained spots have a slight to moderate accumulation of salts.

Navajo silty clay, 0 to 3 percent slopes (N1u).—This deep soil occurs throughout the Area on the lower, more nearly level parts of recent flood plains. Most of the slopes are less than 1 percent. The soil has formed on recent alluvium of clay or silty clay that was derived from quartzite and mixed sedimentary rocks, principally soft shale from nearby areas.

Surface drainage and internal drainage are slow. The vegetation consists largely of sagebrush, greasewood, and rabbitbrush.

Profile description:

0 to 13 inches, light-brown to brown clay or silty clay; coarse granular structure; strongly calcareous; low content of organic matter; slow permeability; good water-holding capacity.
13 to 27 inches, light-brown clay; blocky structure; hard when dry; strongly calcareous; low in organic matter; slow permeability; good water-holding capacity.
27 to 72 inches, light-brown clay; massive; hard when dry; calcareous; low in organic matter; slow permeability; good water-holding capacity.

The color of the surface soil in places is pale brown.

About half of this soil is used for crops. About 50 percent of the cropland is in alfalfa; 45 percent is in small grains; and the rest is in potatoes, corn, and squash. This soil should be plowed in the fall because of the difficulty in preparing a good seedbed in the spring. The careful use of irrigation water is needed to prevent waterlogging.

Navajo silty clay, 3 to 5 percent slopes (N1w).—This soil is similar to Navajo silty clay, 0 to 3 percent slopes, but it has stronger slopes, and in some eroded areas the surface soil is thinner. The areas that have been irrigated and used for crops are eroded. Most of this soil is in the upper part of the valley of the Duchesne River.

Navajo silty clay, 5 to 10 percent slopes (N1x).—This inextensive soil occurs in the upper part of the valley of the Duchesne River. More than half of it is used for range pasture, and the rest is cropped. It is poorly suited to irrigated crops, however, because of the hazard of erosion; permanent irrigated pasture is likely the best use.

Navajo silty clay, poorly drained, 0 to 3 percent slopes (N1v).—Except for being poorly drained, this soil is similar to the associated Navajo silty clay, 0 to 3 percent slopes. It has a higher water table as the result of seepage of irrigation water from surrounding areas. The content of salts is moderate to high, and the principal vegetation on virgin soil is greasewood.

Most of this soil is used for unimproved pasture. It would be very difficult to reclaim the areas for cropland.

Navajo clay, 0 to 1 percent slopes (N1t).—This soil occurs in a basin in Ouray Valley. It is practically useless for agriculture. The parent material was derived from quartzite and sedimentary rocks. This soil is naturally poorly drained, and it receives drainage water from surrounding areas. Much of the water remains on the surface until it evaporates. The water table is nearly always within 6 feet of the surface, although its height fluctuates. The content of soluble salts is high. The vegetation consists of small annual atriplex plants.

The surface soil, to a depth of about 24 inches, is light-brown, hard, massive clay. The subsoil, between depths of 24 and 72 inches, is similar to the surface soil.

Neola loam, shallow, 1 to 3 percent slopes (N2a).—This gently undulating soil is underlain by a well-defined hardpan of lime. It occurs throughout the northern part of the Area on the high benches or mesas. The parent material was derived from quartzite and various kinds of sedimentary rocks transported by streams from the Uinta Mountains.

Although the soil is well drained, the lime hardpan causes slow internal drainage. The principal vegetation is sagebrush, most of which is scrubby.

Profile description:

0 to 10 inches, light-brown loam; moderate medium to fine granular structure; friable when moist; moderately calcareous; low content of organic matter.
10 to 16 inches, light-brown loam; massive; contains moderate concentration of lime carbonate; weakly cemented.
16 to 30 inches, pink hardpan of lime carbonate; indurated; embedded with a mass of quartzite cobblestones and coarse gravel.
30 inches +, cobblestones and gravel weakly cemented with lime.

In places cobblestones occur on the surface. The depth to the lime hardpan ranges from 12 to 20 inches. In some places the uppermost 2 or 3 inches of the lime hardpan is broken into small angular fragments.

A large part of this soil is cropped, and an equal proportion is used for pasture, part of which is irrigated. About 75 or 80 percent of the cropland is in alfalfa, and most of the rest is used for small grains. The yields are low. This soil is poorly suited to crops and can be used best as irrigated pasture. If good management is practiced, pastures of mixed grass and clover will provide good forage. Irrigation water should be applied frequently and in small amounts.

Neola loam, shallow, 3 to 5 percent slopes (N2e).—This soil is similar to Neola loam, shallow, 1 to 3 percent slopes, but it has stronger slopes and in some places the surface soil is thinner. Most of it is near Talmage in the northwestern part of the Area. Most of this soil is used for irrigated or dryland pasture, a small part is cropped, and some is idle.

Neola loam, shallow, 5 to 10 percent slopes (N2g).—This soil is similar to Neola loam, shallow, 1 to 3 percent slopes, but it has stronger slopes and a thinner surface soil. Both soils occur in the same general areas. This soil is more eroded than Neola loam, shallow, 1 to 3 percent slopes, and Neola loam, shallow, 3 to 5 percent slopes, and the carrying capacity of pasture is somewhat lower.

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Galletagrass and bluegrass once covered much of this soil, but they have almost disappeared because of overgrazing. Sagebrush and a few annual weeds are now the dominant plants. All of this soil is used for range pasture.

Neola loam, shallow, poorly drained, 1 to 5 percent slopes (N2d).—Most of this soil occurs in depressions in the same general areas as Neola loam, shallow, 1 to 3 percent slopes. A high water table has resulted from excessive irrigation or seepage from canals. In many places there are slight to moderate concentrations of salts.

Nearly all of this soil is in pasture of poor quality. Many areas can be improved greatly through careful irrigation. It may be possible to reclaim many areas for cropland, but technical assistance is needed to determine if artificial drainage is feasible.

Neola loam, moderately deep, 1 to 3 percent slopes (N2b).—Almost all of this soil occurs near the center of a mesa. It is surrounded by Neola loam, shallow, 1 to 3 percent slopes, which is closer to the rim of the mesa. Relief is gently undulating. The native vegetation consists mainly of sagebrush and some native bunch grasses.

The surface soil, to a depth of about 12 inches, is light-brown, calcareous loam that has a medium to fine granular structure. Between depths of 12 and about 30 inches is pale-brown, slightly compact loam or clay loam containing a moderate to strong accumulation of lime carbonate. This layer overlies a hardpan of lime carbonate that is strongly cemented and is more difficult to break than the quartzite cobblestones embedded in it. Some variation occurs in the thickness of the surface layer and in the thickness of the soil just above the hardpan.

About three-fifths of this soil is used for crops. It is managed in about the same way as Neola loam, shallow, 1 to 3 percent slopes, but it is more suitable for general farming and produces higher yields.

Neola loam, moderately deep, 3 to 5 percent slopes (N2f).—This soil is similar to Neola loam, moderately deep, 1 to 3 percent slopes, but it has stronger slopes, and there is greater variation in the thickness of the surface soil and in the depth to the hardpan. Both soils occur in the same general areas. Less than one-third of this soil is used for crops.

Neola loam, moderately deep, poorly drained, 1 to 3 percent slopes (N2c).—Except for being poorly drained, this soil is similar to the associated Neola loam, moderately deep, 1 to 3 percent slopes. It has become poorly drained fairly recently, and in most places there is an accumulation of salts. Most of this soil is used for pasture.

Neola stony loam, 1 to 3 percent slopes (N2r).—This is a very shallow soil made up mainly of quartzite cobblestones. It occurs on the outer rims of mesas, mainly in association with Neola loam, shallow, 1 to 3 percent slopes. To a depth of at least 6 feet, there is a continuous mass of cobblestones mixed with a small amount of fine soil material. In most places a calcareous hardpan occurs at depths of 6 to 8 inches and extends to depths of 24 to 30 inches; in this hardpan the cobblestones are strongly cemented in a calcareous matrix.

Alfalfa has been unsuccessful on small areas of this soil. Nearly all of the areas are used for range pasture, but a small part is used for crops and some is idle. This soil is unsuited to crops and is of low value as rangeland.

Neola stony loam, 3 to 5 percent slopes (N2s).—Except for its stronger slopes, this gently undulating soil is similar to Neola stony loam, 1 to 3 percent slopes. It occurs on smooth slopes in association with Neola loam, shallow, 1 to 3 percent slopes. This soil is used for range pasture.

Neola stony loam, 5 to 10 percent slopes (N2t).—This soil is similar to Neola stony loam, 1 to 3 percent slopes, with which it is generally associated, but it has stronger slopes. All of the areas are used for range pasture. This soil is less suitable for grazing than Neola stony loam, 1 to 3 percent slopes, and Neola stony loam, 3 to 5 percent slopes, because it is more strongly sloping, is more eroded, and has slightly lower carrying capacity.

Neola sandy loam, shallow, 1 to 3 percent slopes (N2h).—This soil has an indurated lime hardpan. Most of it is in the northern part of the Area. It occurs on high mesas in association with Neola loam, shallow, 1 to 3 percent slopes. The parent material was derived from quartzite and sedimentary rocks, mainly sandstone transported by streams from the Uinta Mountains. Drainage is restricted by the lime hardpan. The soil is droughty because it is shallow and moderately coarse textured.

The depth to the hardpan ranges from 10 to 20 inches, in most places being about 12 inches. The surface soil of light-brown, friable sandy loam extends almost to the hardpan.

Most of this soil is used for irrigated pasture or range pasture, but a small part is cropped. It should be managed in about the same way as Neola loam, shallow, 1 to 3 percent slopes.

Neola sandy loam, shallow, 3 to 5 percent slopes (N2n).—This soil is similar to Neola sandy loam, shallow, 1 to 3 percent slopes, but it has stronger slopes, and in places the surface soil is thinner. Both soils occur in the same general areas. Most of the areas are used for pasture.

Neola sandy loam, shallow, 5 to 10 percent slopes (N2p).—Except that it has stronger slopes and a thinner surface layer in most places, this soil is similar to Neola sandy loam, shallow, 1 to 3 percent slopes. It occurs in small patches in widely separated parts of the Area. Mapped with this soil are small areas of Neola stony sandy loam that have slopes of 5 to 10 percent. All of this mapping unit is used for range pasture.

Neola sandy loam, shallow, poorly drained, 1 to 3 percent slopes (N2k).—Except for being poorly drained, this soil is similar to Neola sandy loam, shallow, 1 to 3 percent slopes. The soils occur in the same general areas, but this soil occupies depressions that receive seepage from adjacent irrigated areas. Poor drainage has developed since irrigation was begun.

Most of this soil is used for unimproved pasture. In wet areas the pastures are of poor quality; many consist entirely of foxtail or wild barleygrass. Drainage could be improved greatly by using underground drains and by irrigating more carefully in adjacent areas.

Neola sandy loam, moderately deep, 1 to 3 percent slopes (N2l).—Except for its sandier surface layer, this soil is similar to Neola loam, moderately deep, 1 to 3 percent slopes. It occurs extensively on high benches, mostly on Whiterocks Bench east and southeast of Whiterocks.

The surface soil, to a depth of 10 or 12 inches, is light-brown, friable sandy loam. The subsoil, which extends to depths of 30 to 36 inches, is light-brown to pale-brown loam

or clay loam; the content of lime increases with increasing depth until the hardpan is reached. In most places the hardpan is 24 to 30 inches thick and generally contains many quartzite cobblestones that are strongly cemented. About three-fifths of this soil is used to grow crops.

Neola sandy loam, moderately deep, 3 to 5 percent slopes (N2o).—This soil is similar to Neola sandy loam, moderately deep, 1 to 3 percent slopes, but it has gently sloping relief. Both soils occur in the same general areas. Most of the slopes are smooth. About three-fifths of this soil is used for crops.

Neola sandy loam, moderately deep, poorly drained, 1 to 3 percent slopes (N2m).—This soil is similar to Neola sandy loam, moderately deep, 1 to 3 percent slopes, with which it is associated, but it occurs in slight depressions and receives seepage from surrounding areas. Most of the pastured areas are wet, and the forage is of poor quality.

Neola stony sandy loam, 1 to 3 percent slopes (N2u).—Except for its coarser textured surface layer, this very gently undulating soil (fig. 8) is similar to Neola stony loam, 1 to 3 percent slopes. Both soils occupy the outer rims of high benches. Nearly all of this soil is used for irrigated pasture or range.

Figure 8.—**Profile of Neola stony sandy loam, 1 to 3 percent slopes. The soil material in the upper part of the profile is light brown and stony. It is underlain by a white, stony hardpan that is cemented with lime and is about 3 feet thick. Below this is the weakly cemented substratum. The vegetation on this soil consists of galletagrass, sagebrush, and juniper.**

Neola stony sandy loam, 3 to 8 percent slopes (N2v).—Except that it has stronger slopes, this soil is similar to Neola stony sandy loam, 1 to 3 percent slopes. It is used for range pasture.

Neola clay loam, shallow, 2 to 5 percent slopes (N1z).—This soil is similar to Neola loam, shallow, 1 to 3 percent slopes, but it has stronger slopes and a finer textured surface soil. The texture of the surface soil ranges from clay loam to silty clay loam. This soil occurs in small areas on benches and mesas along the upper part of Deep Creek north of Lapoint.

Neola clay loam, moderately deep, 1 to 3 percent slopes (N1y).—This soil is similar to Neola loam, moderately deep, 1 to 3 percent slopes, except for the texture of its surface layer, which ranges from clay loam to silty clay loam. Most of this soil is used for range pasture. Some is idle, and crops are grown on a few acres.

Pariette clay loam, moderately deep, 0 to 3 percent slopes (Pc).—This soil occurs in areas that are intermediate in elevation between the higher benches and mesas and the areas of alluvial soils of the valley bottoms. Most of it is in the Pleasant Valley, but small areas lie north of Bridgeland near the Midview Reservoir and also northeast of Myton. Part of the parent material was derived from varicolored clay shale transported from nearby areas, and part of it, from the underlying substratum of clay shale. The bedrock contains a considerable amount of soluble salts, and most areas of virgin soil contain slight to moderate concentrations of salts.

Surface runoff is generally medium, but in places it is rapid. Drainage channels are common. Internal drainage is restricted by the shale bedrock. The vegetation consists mainly of galletagrass and shadscale.

Profile description:

0 to 8 inches, pale-brown to weak-red clay loam; granular structure; firm when moist; moderately calcareous; low in organic matter; moderate permeability; good water-holding capacity.

8 to 21 inches, pinkish-white silty clay loam that breaks to fragments of irregular shapes and sizes; hard when dry; high in lime carbonate; very low in organic matter; slow permeability; moderate water-holding capacity.

21 to 34 inches, pale-brown to weak-red silty clay with white mottling of lime; massive; hard when dry; very low in organic matter; slow permeability; moderate water-holding capacity.

34 inches+, pale-brown to dark reddish-brown clay shale; massive; contains a large amount of gypsum.

The depth to the shale substratum ranges from 18 to 36 inches.

Most of this soil is in range pasture, some is cropped, and the rest is idle. Yields of crops are very low, and the areas are probably best used for pasture.

Pariette clay loam, moderately deep, 3 to 5 percent slopes (Pe).—This soil is similar to Pariette clay loam, moderately deep, 0 to 3 percent slopes, but it has stronger slopes, a thinner surface soil in some places, and a greater variation in the depth to shale bedrock. Both soils occur in the same general areas. Practically all of this soil is used for range pasture, but a small part is idle.

Pariette clay loam, shallow, 2 to 5 percent slopes (Pd).—This soil is similar to Pariette clay loam, moderately deep, 0 to 3 percent slopes. It has stronger slopes, however,

and the depth to shale bedrock is much less, or from 10 to 20 inches. Both soils occur in the same general areas.

To a depth of about 5 inches, the surface soil is pale-brown to weak-red, firm, granular clay loam containing a scattering of fine angular pebbles that are dark colored and highly polished. Beneath the surface layer is a strong concentration of calcium carbonate that extends to the bedrock. In many places lime carbonate has penetrated slightly into the shale bedrock.

This soil is used for range pasture. In most places the vegetation is scanty and the pasture is of poor quality.

Pariette loam, moderately deep, 0 to 3 percent slopes (Pg).—This soil is similar to Pariette clay loam, moderately deep, 0 to 3 percent slopes, except that the texture of the surface soil ranges from loam to fine sandy loam. In addition most areas lie at higher elevations and the slopes are less uniform. Both of these soils occur in the same general areas. Nearly all of this soil is used for range pasture, but crops are grown on a few acres.

Pariette loam, moderately deep, 3 to 5 percent slopes (Pk).—Except for its stronger slopes and thinner surface layer, this soil is similar to Pariette loam, moderately deep, 0 to 3 percent slopes. All of this soil is used for range pasture.

Pariette loam, shallow, 0 to 3 percent slopes (Pf).—All of this soil is in the Pleasant Valley. The surface soil ranges from loam to fine sandy loam in texture. It is underlain by a dense accumulation of lime carbonate that extends to the unweathered bedrock of clay shale. Depth to the bedrock ranges from 10 to 29 inches. All of this soil is used for range pasture.

Pariette loam, shallow, 3 to 5 percent slopes (Ph).—Except for its stronger slopes, this soil is similar to Pariette loam, shallow, 0 to 3 percent slopes. All of it is in the Pleasant Valley. It is used for range pasture.

Pariette clay, moderately deep, 0 to 3 percent slopes (Pa).—This soil occurs in depressions, mainly in nearly level areas. Most of it is in the Pleasant Valley. It is associated with Pariette clay loam, moderately deep, 0 to 3 percent slopes.

Profile description:

0 to 14 inches, brown clay mottled with lime carbonate; slightly compact; low in organic matter; slow permeability; moderate water-holding capacity.

14 to 36 inches, light-brown to brown clay; massive; contains a slight concentration of lime carbonate and a strong concentration of crystals of gypsum; this layer is transitional to the substratum of soft clay shale.

The content of salts ranges from moderate to strong. All of this soil is used for grazing, but because of the high content of salts, the vegetation is sparse and of poor quality.

Pariette clay, shallow, 2 to 5 percent slopes (Pb).—This undulating soil is in the eastern part of the Pleasant Valley. In many places there are outcrops of stones and shale bedrock, and the depth to shale bedrock exceeds 12 inches in only a few places. All of this soil is used for grazing.

Pavant loam, shallow, 2 to 5 percent slopes (Pn).—This gently sloping soil occurs on the higher mesas and the old alluvial fans. The parent material was derived from quartzite and mixed sedimentary rocks transported from the foothills and the Uinta Mountains. The vegetation consists largely of sagebrush and juniper of moderate height, but pinyon pine grows at the higher elevations.

In most profile characteristics this soil resembles Neola loam, shallow, 3 to 5 percent slopes, but it has a higher content of organic matter and a darker surface soil. The surface soil consists of light brownish-gray loam with a moderate very fine granular structure; in uncultivated areas the surface layer is slightly calcareous. A hardpan begins at depths ranging from about 10 to 20 inches. In the lower part of the hardpan and below it is a thick mass of coarse gravel and cobblestones. The hardpan and the coarse material reduce the water-holding capacity and restrict the root zone of plants. As a result this soil is low in productivity.

Nearly three-fourths of this soil is used for crops. About 75 percent of it is in alfalfa, and most of the rest is used for small grains. This soil, however, is best used for irrigated pasture. Light, frequent applications of water are necessary because of the low water-holding capacity and the hazard of poor drainage. If the soil is planted to suitable grasses and clovers and managed carefully, the pastures will produce satisfactory yields.

Pavant loam, shallow, poorly drained, 2 to 5 percent slopes (Po).—Except that it has become poorly drained and has a high water table, this soil is similar to Pavant loam, shallow, 2 to 5 percent slopes. Poor drainage has developed mainly because of excessive irrigation and the lack of adequate drainage facilities. Most of this soil occurs in depressions near Talmage and Mountain Home. All of it is used for pasture, but the vegetation is of poor quality and the carrying capacity is low.

Pavant loam, shallow, 5 to 10 percent slopes (Pp).—Except for its stronger slopes, this soil is similar to Pavant loam, shallow, 2 to 5 percent slopes, and it occurs in the same general areas. It is not well suited to irrigation farming but can be used for permanent pasture.

Pavant loam, moderately deep, 2 to 3 percent slopes (Pl).—This soil occurs on mesas. It lies well back from the rims of the mesas and is surrounded by shallow Pavant soils that are on slopes of 2 to 3 percent. The vegetation consists mainly of sagebrush, but there is some bunchgrass.

The surface soil, which extends to depths of 10 to 12 inches, is light brownish-gray loam that is moderately to strongly calcareous. Below this is brown, slightly calcareous loam or clay loam that is underlain by a hardpan of pure lime. Embedded in the hardpan are cobblestones, mainly of quartzite. The cobblestones can be broken more easily with a hammer than can the calcareous matrix.

Much of this soil is used for crops, but some is idle. Yields are better than on the shallower Pavant soils.

Pavant loam, moderately deep, poorly drained, 2 to 3 percent slopes (Pm).—This soil lies southwest and southeast of Mountain Home. It has become poorly drained fairly recently and has been abandoned for general irrigation farming. Reclaiming this soil for use as cropland would be difficult, and it should not be attempted without technical assistance.

Pavant stony sandy loam, 2 to 5 percent slopes (Pu).—Most of this shallow, stony soil is near Mountain Home and Talmage. It lies along the outer rims of the mesas. Cobblestones, mainly of quartzite, lie on the surface and occur in large amounts to a depth of 6 or more feet. A hardpan of calcium carbonate generally is between depths of 6 to 8 inches and 24 to 30 inches. Within the hardpan the cobblestones are strongly cemented. Nearly all of

this soil is used as range pasture, but a small part is cropped.

Pavant stony sandy loam, poorly drained, 2 to 5 percent slopes (Pv).—This soil occurs in the northern part of Whiterocks Bench and near Mountain Home. It is poorly drained as the result of overirrigation.

Pavant sandy loam, shallow, 2 to 5 percent slopes (Ps).—This shallow soil has a strongly cemented, calcareous hardpan. It occurs in association with Pavant loam, shallow, 2 to 5 percent slopes, in the extreme northern part of the Area on a high mesa north and east of Whiterocks. The parent material was derived from quartzite and mixed sedimentary rocks.

This soil has a well-defined hardpan underlain by cobblestones or other coarse materials. The water-holding capacity is low, and the soil is very droughty.

The surface soil is light brownish-gray, friable sandy loam. In most places this is underlain by soil that contains a moderate concentration of lime carbonate and is just above the strongly cemented hardpan. Depth to the hardpan ranges from 10 to 20 inches, but in most places it is about 12 inches.

More than two-thirds of this soil is cropped. Some of it is in pasture, and the rest is idle.

Pavant sandy loam, shallow, poorly drained, 2 to 5 percent slopes (Pt).—Except that it is poorly drained and has a high water table, this soil is similar to Pavant sandy loam, shallow, 2 to 5 percent slopes. Poor drainage has developed through irrigation. This soil occurs in depressed areas. It is used for unimproved pasture, but the carrying capacity is low.

Pavant sandy loam, moderately deep, 2 to 3 percent slopes (Pr).—Except for the texture of the surface layer, this gently sloping soil is similar to Pavant loam, moderately deep, 2 to 3 percent slopes. It occurs in an area north and east of Whiterocks. The vegetation consists of rabbitbrush, sagebrush, and matchbrush, and juniper of moderate height. A profile of this soil is shown in figure 9.

Profile description of a virgin soil:

0 to 7 inches, light brownish-gray sandy loam; brownish gray when moist; very fine granular structure; strongly calcareous.

7 to 14 inches, light yellowish-brown fine sandy loam; light yellowish brown to yellowish brown when moist; granular structure; strongly calcareous; contains many light-gray fragments of the underlying calcareous hardpan.

14 to 19 inches, light yellowish-brown sandy loam; brown when moist; granular structure; very strongly calcareous; cemented with many nodules of lime, but more weakly cemented than overlying material.

19 to 60 inches, yellowish-white hardpan of lime that contains a large amount of gravel and cobblestones; yellowish gray when moist.

60 to 80 inches, weakly cemented loamy sand, cobblestones, and gravel; slightly calcareous.

Bedrock of shale and sandstone occurs at depths ranging from 10 to 16 feet.

Most of this soil is used for crops, some is pastured, and the rest is idle. Even under good management, it is only fairly productive.

Peat, 0 to 1 percent slopes (Pw).—This organic soil occurs in depressions just west of Whiterocks. The areas are kept wet by springs that flow continuously; they are used only for pasture. The vegetation consists of a rank growth of sedges, reeds, and other marsh plants.

Figure 9.—**Profile of Pavant sandy loam, moderately deep, 2 to 3 percent slopes. The material in the upper part of the profile is friable and granular and contains a moderate amount of organic matter. This is underlain by a white hardpan of strongly cemented lime. The vegetation is rabbitbrush.**

The peat is made up of a mass of dark organic material in which many parts of plants can be recognized. In places the peat is only 3 or 4 inches thick, but in other places it is 4 or more feet thick. It is underlain by cobblestones of quartzite.

Ravola sandy loam, 0 to 3 percent slopes (Rh).—This soil occurs on alluvial fans and flood plains in the southern part of the Area, mainly in the lower part of the valley of the Duchesne River. In many places it occurs in association with Billings clay loam, 0 to 3 percent slopes, but most of it lies at slightly higher elevations. The parent material was derived from nearby areas of light-gray to very pale brown sandstone and shale.

Most of this soil is well drained, but certain areas are somewhat droughty. The vegetation, which is mainly greasewood and shadscale, indicates that the soil contains soluble salts. In almost all of the well-drained areas, however, the content of salts is low.

In most places the soil is stratified throughout; in some places it is highly stratified. In certain areas, however, the texture throughout the entire profile is uniform to a depth of 6 feet. The texture of the subsoil and substratum varies considerably, but it is generally finer than that of the surface soil.

Profile description:

0 to 10 inches, very pale brown sandy loam; medium to fine granular structure; very friable when moist; calcareous; low in organic matter; rapid permeability; fair water-holding capacity.
10 to 17 inches, light yellowish-brown loam; massive to weak medium granular structure; calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.
17 to 72 inches, very pale brown clay loam; massive; calcareous; low in organic matter; moderate permeability; good water-holding capacity.

Only about one-fifth of this soil is used for crops. Between 75 and 80 percent of the cropland is in alfalfa, and the rest is used for small grains. If properly managed, this soil will produce good yields. Because it is low in organic matter, the rotation should include a crop that is plowed under for green manure.

Ravola sandy loam, hummocky, 0 to 3 percent slopes (Rn).—Most of this soil lies east of Myton in the valley of the Duchesne River. The areas are distinctly hummocky. The hummocks, which are 1 to 3 feet high, are made up of loose material that is single grained. All of this soil is used for range pasture.

Ravola sandy loam, duny, 2 to 8 percent slopes (Rr).—This soil occurs in the same general areas as Ravola sandy loam, hummocky, 0 to 3 percent slopes, and the two soils are similar. This soil has stronger slopes, however, and the individual hummocks and dunes are much higher, ranging from 3 to 6 or more feet in height. Some of them have been stabilized somewhat by vegetation. All of this soil is used for range pasture, but because of the meager cover of plants, the carrying capacity is low.

Ravola sandy loam, 3 to 8 percent slopes (Rt).—This soil occurs in the same part of the Area as Ravola sandy loam, 0 to 3 percent slopes, and generally the two soils are associated. The soil has been affected by sheet and gully erosion and also by wind erosion. Most of it is used for range pasture, some is cropped, and a small part is idle.

Ravola sandy loam, eroded, 0 to 3 percent slopes (Rm).—This soil occurs between Ouray and Duchesne in the lower part of the valley of the Duchesne River. It has eroded to the extent that a network of gullies has formed. As a result this soil is unsuitable for crops and is of little value for grazing.

Ravola sandy loam, poorly drained, 0 to 3 percent slopes (Rk).—This soil occurs in small, widely separated tracts, mainly in the lower part of the valley of the Duchesne River. This soil has become poorly drained because of irrigation. In addition moderate to strong concentrations of soluble salts have accumulated. All of this soil is used for pasture.

Ravola sandy loam, deep over gravel, 2 to 5 percent slopes (Ro).—The profile of this soil is similar to that of Ravola sandy loam, 0 to 3 percent slopes, except that the substratum contains stones and gravel at depths between 36 and 60 inches. Both of these soils occur in the same general areas, but most of this soil is at higher elevations. Most of the acreage is used for range pasture, but a few acres are cropped.

Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes (Rl).—This soil occurs in the same general areas as Ravola sandy loam, 0 to 3 percent slopes. It occurs in the southern part of the Area, mainly in small tracts in association with Chipeta sandy loam, 0 to 3 percent slopes. Most of it lies below and near the bases of areas of rough broken land but at higher elevations than the Billings, Ravola, and Green River soils, which have formed on recent alluvium. The parent material of this soil was derived from nearby areas of light olive-gray to very pale brown sandstone and shale and from the underlying bedrock of sandstone and shale.

To a depth of about 12 inches, the surface soil is very pale brown to pale-olive, friable, calcareous sandy loam that has a medium to fine granular structure. The subsoil, between depths of 12 and 30 to 36 inches, generally is somewhat finer textured than the surface soil; in places there is a slight concentration of lime carbonate. This layer is transitional to the substratum of unweathered clay shale.

About half of this soil is used for range pasture. A large part is idle, and only a few acres are cropped.

Ravola sandy loam, moderately deep and deep over shale, 3 to 5 percent slopes (Rs).—This soil is similar to Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes, but it has stronger slopes and is more eroded. The soils occur in the same general areas. All of this soil is used for pasture.

Ravola sandy loam, moderately deep over shale, eroded, 2 to 5 percent slopes (Rp).—This undulating to gently sloping soil occurs in small areas in the lower part of the valley of the Duchesne River. Sheet erosion has washed away most of the surface soil, and the vegetation is sparse. Depth to the bedrock of unweathered clay shale ranges from 20 to 36 inches.

Ravola stony sandy loam, 2 to 5 percent slopes (Ru).—This soil has a moderate to thick covering of cobblestones on the surface, but otherwise it is similar to Ravola sandy loam, 0 to 3 percent slopes. It occurs on narrow foot slopes at the bases of escarpments along the southern margin of the lower part of the valley of the Duchesne River. An area about 5 miles east of Myton extends more than 4 miles along the base of an escarpment; in most places this area is less than 250 feet wide. It is covered with stones that have rolled down from the steep slopes of the escarpment. All of this soil is used for range pasture.

Ravola loam, 0 to 3 percent slopes (Ra).—This soil occurs on flood plains in the lower part of the valley of the Duchesne River. It also occurs on smooth alluvial fans on the outer margins of the valley. In many places it is associated with the Billings clay loams. The parent material was derived from nearby areas of light olive-gray and very pale brown sandstone and shale.

This soil is well drained and is free from harmful accumulations of salts. The vegetation consists mainly of shadscale and greasewood.

This soil is similar to Ravola loam, 0 to 3 percent slopes. Because it occurs on alluvial fans and flood plains, it is either stratified or is of uniform texture throughout.

Profile description of a stratified soil:

0 to 23 inches, very pale brown to pale-olive loam; fine granular structure; slightly hard when dry, friable when moist; calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.
23 to 34 inches, very pale brown to light yellowish-brown loam; weak granular structure; friable when moist; calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.

34 to 72 inches, very pale brown to light yellowish-brown loam; calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.

Almost half of this soil is used for crops, a large part is in range pasture, and some is idle. Most of the idle areas are below abandoned canals, and the range pastures are above the present canals.

An estimated 85 percent of the cropland is used for alfalfa (fig. 10), and the rest is in small grains, corn, and potatoes. The alfalfa is used in the fall and in winter to fatten cattle for market. Under good management this soil should produce high yields of suitable crops. It is used and managed in about the same way as Ravola sandy loam, 0 to 3 percent slopes.

Figure 10.—**Alfalfa growing on Ravola loam, 0 to 3 percent slopes, about 5 miles south of Roosevelt. In the field in the background, the alfalfa has been cut for hay. The two fields are separated by a lateral drain.**

Ravola loam, deep over gravel, 0 to 3 percent slopes (Rc).—This soil is similar to Ravola sandy loam, deep over gravel, 2 to 5 percent slopes, except that the slopes are not so strong and the texture of the surface soil is loam instead of sandy loam. It occurs in two areas, one about 9 miles east and the other about 1 mile southwest of Myton. Nearly all of this soil is used for range pasture, but a few acres are cropped.

Ravola loam, moderately deep and deep over shale, 0 to 3 percent slopes (Rb).—Except for the texture of the surface layer, this soil is somewhat similar to Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes. It occurs in association with Chipeta sandy loam, 0 to 3 percent slopes. Most of this soil is used for range pasture.

Ravola loam, moderately deep and deep over shale, 3 to 5 percent slopes (Re).—This soil is similar to Ravola loam, moderately deep and deep over shale, 0 to 3 percent slopes, but it has stronger slopes and much of it has been eroded. It occurs in the same general areas as Ravola loam, 0 to 3 percent slopes.

Ravola loam, moderately deep and deep over shale, poorly drained, 0 to 5 percent slopes (Rd).—Some of this poorly drained soil occurs near the Midview Reservoir in the vicinity of Red Cap. Other areas are about 5 miles northeast of Myton. This soil is associated with the Chipeta and Billings soils. Poor drainage has developed recently. In addition to a high water table, the soil has a concentration of salts in the surface soil. All the areas are used for unimproved pasture. It would be difficult to reclaim this soil for use as cropland.

Ravola sand, 2 to 5 percent slopes (Rf).—This soil occurs on alluvial slopes in the lower part of the valley of the Duchesne River. Most of it occurs in association with Ravola sandy loam, 0 to 3 percent slopes. The parent material, derived mainly from light-gray and very pale brown sandstone, was transported to its present location by both wind and water.

Water moves very rapidly downward through the surface soil and the upper part of the subsoil; it moves at a considerably slower rate through the lower part of the subsoil and the substratum, which in many places are composed of finer textured materials. The vegetation consists mainly of rabbitbrush and fourwing saltbrush.

The surface soil, which extends to a depth of 12 inches, is very pale brown, moderately calcareous, loose sand. The subsoil and substratum vary widely from place to place but generally are finer textured, slightly compact, and in some areas contain light concentrations of gypsum crystals.

This soil is poorly suited to general farming. Its best use is for range pasture.

Ravola sand, poorly drained, 2 to 5 percent slopes (Rg).—This soil occurs in a single area that is about 2½ miles east and 1½ miles south of Myton. Poor drainage apparently has developed through seepage of water from an adjacent canal that occurs at a higher elevation. The vegetation consists mainly of saltgrass.

Redfield fine sandy loam, 0 to 3 percent slopes (Rz).—This soil occurs on alluvial fans and flood plains throughout the Area. Most of it is in the east-central part of the Area, but smaller tracts are scattered throughout the west-central part. The parent material was derived from quartzite and mixed sedimentary rocks, mainly reddish-brown sandstone and shale.

This soil is well drained, and only a few areas contain harmful accumulations of salts. The vegetation consists of many kinds of plants including sagebrush, rabbitbrush, fourwing saltbush, shadscale, greasewood, and bunch grasses.

Profile description:

0 to 13 inches, light-brown to reddish-brown fine sandy loam; granular structure; friable when moist; calcareous; low in organic matter; moderately rapid permeability; fair water-holding capacity.

13 to 35 inches, light-brown to reddish-brown loam; weak granular structure; friable when moist; calcareous; low in organic matter; moderate permeability; moderate water-holding capacity.

35 to 47 inches, light-brown to reddish-brown fine sandy loam; massive; calcareous; low in organic matter; moderately rapid permeability; fair water-holding capacity.

About one-third of this soil is cropped. Approximately three-fourths of the cropland is used for alfalfa; one-fifth is used for small grains; and the rest is used for corn, potatoes, and miscellaneous crops. Yields range from poor to good. The continuous use for alfalfa and small grains without applying fertilizer has greatly reduced the natural fertility of some areas of this soil.

Redfield fine sandy loam, 3 to 5 percent slopes (R1d).—This soil is similar to Redfield fine sandy loam, 0 to 3 percent slopes, with which it is generally associated. It has stronger slopes, however, and occurs at higher elevations.

Less than one-fifth of this soil is used for crops. If properly managed, it will produce high yields of crops and good range pasture. Irrigation water must be applied carefully to prevent erosion. Control of erosion also is necessary on range pasture.

Redfield fine sandy loam, eroded, 2 to 5 percent slopes (R1b).—Most of this soil occurs in small areas. It is associated with Redfield fine sandy loam, 0 to 3 percent slopes. It has been damaged severely through gully erosion and is almost worthless for general irrigation farming. All of this soil is used for range pasture.

Redfield fine sandy loam, poorly drained, 0 to 3 percent slopes (R1a).—Except for being poorly drained, this soil is similar to Redfield fine sandy loam, 0 to 3 percent slopes, and the two soils occur in the same general areas. Poor drainage has developed fairly recently through overirrigation or seepage from higher lying canals or irrigated fields. In some places the poor drainage has been caused by dikes in the underlying bedrock that have greatly restricted or stopped the movement of water. Harmful concentrations of salts have accumulated in the soil.

This soil is used mainly for unimproved pasture. It would not be feasible to drain many of the areas for use as cropland.

Redfield fine sandy loam, eroded, poorly drained, 2 to 5 percent slopes (R1c).—This poorly drained soil occurs near Roosevelt, along Montes Creek near the Montes Reservoir. Poor drainage probably has been caused through seepage from the reservoir. This soil is used for unimproved pasture.

Redfield loam, 0 to 3 percent slopes (R1e).—This soil occurs on alluvial fans and flood plains. It is associated with Redfield fine sandy loam, 0 to 3 percent slopes, but it lies at slightly lower elevations. The largest tract is in the east-central part of the Area. The parent material was derived from quartzite and mixed sedimentary rocks, mainly reddish-brown sandstone and shale. Sagebrush and rabbitbrush are the dominant plants.

Except for the texture of the surface layer, this soil is similar to Redfield fine sandy loam, 0 to 3 percent slopes. It is reddish brown to light brown throughout. Below the surface layer the soil is more or less stratified and generally is not compact; in places, however, the subsoil is slightly compact.

About three-fourths of this soil is used for crops. Between 70 and 75 percent of the cropland is in alfalfa. Most of the rest is used to grow small grains, but corn, potatoes, and other crops are also grown. Yields on this soil are higher than on Redfield fine sandy loam, 0 to 3 percent slopes.

Redfield loam, 3 to 5 percent slopes (R1g).—Except that it is on stronger slopes and generally has a thinner surface layer, this soil is similar to Redfield loam, 0 to 3 percent slopes, with which it is associated. About half of it is used for range pasture, nearly one-third is cropped, and the rest is idle.

Redfield loam, poorly drained, 0 to 3 percent slopes (R1f).—Except for being poorly drained, this soil is similar to Redfield loam, 0 to 3 percent slopes. Most of it is in the northern part of Roosevelt Valley, 3 or 4 miles north of Roosevelt. The water table is high, and in most places there is a moderate to strong concentration of salts. The vegetation is mainly greasewood.

Most of this soil is used for unimproved range pasture. Through careful irrigation and proper artificial drainage, the salts can be leached out and much of the soil can be reclaimed for irrigation farming.

Redfield clay loam, 0 to 3 percent slopes (Rv).—This soil occurs on smooth alluvial flood plains. Most of it is in the same general areas as Redfield loam, 0 to 3 percent slopes, but it occurs at slightly lower elevations. The most extensive area is northwest of Lapoint. Scattered areas occur near Fort Duchesne and in the upper part of the valley of the Duchesne River. The parent material was derived from quartzite and mixed sedimentary rocks, mainly reddish-brown to light reddish-brown shale and sandstone. The soil is well drained and has good water-holding capacity.

This soil has a finer textured surface layer and subsoil than Redfield loam, 0 to 3 percent slopes. It is light reddish brown to light brown throughout. Textural stratification is common. Calcium carbonate, which constitutes between 10 and 15 percent of the soil mass, is distributed uniformly throughout the profile.

More than three-fourths of this soil is used for crops. Between 65 and 70 percent of the cropland is in alfalfa, and most of the rest is used for small grains. Potatoes, corn, and home gardens occupy a small acreage. Yields of alfalfa and small grains are about the same as those obtained on Redfield loam, 0 to 3 percent slopes.

Redfield clay loam, 3 to 7 percent slopes (Ry).—Except that it has stronger slopes, this soil is similar to Redfield clay loam, 0 to 3 percent slopes. Because of the stronger slopes, the hazard of erosion is much greater and more care is needed in applying irrigation water. About half of this soil is used for crops.

Redfield clay loam, eroded, 0 to 3 percent slopes (Rw).—This soil is similar to Redfield clay loam, 0 to 3 percent slopes, except that it has been affected by gully erosion. Most of it occurs in small areas adjacent to areas of Redfield clay loam, 0 to 3 percent slopes. All of it is used for grazing.

Redfield clay loam, poorly drained, 0 to 7 percent slopes (Rx).—Except that it is poorly drained, this soil is similar to Redfield clay loam, 0 to 3 percent slopes. Both of these soils occur in the same general areas, but this soil lies on smooth slopes at lower elevations. The water table is high, and in most places there is a moderate to strong concentration of salts. Most of this soil is used for unimproved pasture.

Redfield loamy fine sand, 0 to 3 percent slopes (R1h).—This soil occurs on nearly level to gently sloping alluvial fans. As a rule it lies at higher elevations than Redfield fine sandy loam, 0 to 3 percent slopes, with which it is associated. Most of it is near Fort Duchesne. Smaller areas are in the upper part of the valley of the Duchesne River and in the extreme northern part of Blue Bench. The parent material was derived mainly from nearby areas of light reddish-brown sandstone.

This soil is somewhat excessively drained. It is free of harmful accumulations of salts and alkali. The native vegetation consists mainly of sagebrush, rabbitbrush, and Indian ricegrass.

Light reddish-brown loamy fine sand extends from the surface to depths ranging from 20 to 36 inches. The underlying material is stratified with finer textured material, generally loam and fine sandy loam. The soil is

low in organic matter, rapidly permeable, and low in water-holding capacity.

More than one-third of this soil is used for crops. Alfalfa is grown on 80 to 85 percent of the cropland, but yields are low. The content of organic matter needs to be increased greatly. Light, but frequent, applications of irrigation water are necessary.

Redfield loamy fine sand, 3 to 8 percent slopes (R1l).—Except that it has stronger slopes, this soil is similar to Redfield loamy fine sand, 0 to 3 percent slopes. It occurs on the smooth higher parts of the alluvial fans, generally in association with Redfield loamy fine sand, 0 to 3 percent slopes. Most of this soil is used for range pasture. It is poorly suited to irrigated crops. If it is irrigated, it should be kept in permanent pasture.

Redfield loamy fine sand, poorly drained, 0 to 8 percent slopes (R1k).—This soil is similar to Redfield loamy fine sand, 0 to 3 percent slopes, but the water table is generally within 6 feet of the surface. Also in some places there is a slight to moderate concentration of salts. In addition some of the slopes are stronger. All of this soil lies below the southern end of Indian Bench.

Poor drainage in this soil has been caused by seepage from canals and from the higher lying irrigated fields. Underdrainage should be feasible in many places, but careful investigation should be made before attempting it.

Redfield silty clay, 0 to 3 percent slopes (R1m).—This soil differs from Redfield clay loam, 0 to 3 percent slopes, in that it is more compact and has a finer textured surface soil. It is light reddish brown throughout. In places the subsoil contains noticeable amounts of gypsum. In some areas the subsoil is open and sandy, but in most places it is medium textured and moderately permeable.

Because the areas are low lying and nearly level, both surface runoff and internal drainage are slow. Nevertheless, if properly managed, this soil is fairly well suited to general farm crops.

Redfield silty clay, poorly drained, 0 to 3 percent slopes (R1n).—This soil is similar to Redfield silty clay, 0 to 3 percent slopes, but it has a high water table, which developed recently. It also contains an accumulation of salts. This soil occurs on bottom lands and receives seepage from higher lying areas. It would be difficult to reclaim it, through artificial drainage, for use as cropland.

Riverwash (R1o).—This miscellaneous land type consists of beds of mixed sand and gravel that occur in small areas at the bends of rivers. The areas are subject to overflow when the streams are high. This land type supports little or no vegetation and has no agricultural value.

Rough broken and stony land (R1p).—This miscellaneous land type occupies steep mesa escarpments and areas of rough broken land. It is by far the most extensive mapping unit in the Roosevelt-Duchesne Area. It constitutes one of the most conspicuous features on the landscape. The areas on the escarpments are generally covered with a mass of quartzite cobblestones, but some areas of sandstone contain sand dunes and hummocks.

Much of this land type is devoid of vegetation and has no value for grazing. Nevertheless, some tracts on escarpments in the northern part of the Area have a fairly good cover of plants. Areas that receive seepage from irrigation canals also have a fairly thick cover of grass.

Rough gullied land, Billings soil material (R1s).—This miscellaneous land type has been damaged severely through gully erosion and is no longer suitable for crops. Before the areas became eroded, they were occupied by soils similar to the Billings clay loams and Billings silty clays. This land type is of meager value for grazing.

Rough gullied land, Naples soil material (R1t).—This miscellaneous land type occurs as long, narrow strips that have been damaged severely through gullying. On both sides of the gullies are narrow areas that are practically useless for agriculture. The areas of this land type are widely scattered.

Rough gullied land, Navajo soil material (R1u).—This miscellaneous land type is made up of large gullies that occur in long, narrow strips. It also includes the narrow strips on both sides of the gullies. All of this land type, even the strips above the gullies, is of little or no agricultural value, but the gullies serve as drainageways for the adjacent Navajo soils.

Rough gullied land, Redfield soil material (R1v).—This miscellaneous land type occurs in narrow strips at relatively low elevations. Before they became eroded, the areas were similar to those occupied by the Redfield fine sandy loams, loams, and clay loams. Because of the large gullies, this land type is useless for crops and provides only meager grazing.

Rough hilly land (R1r).—Most of this miscellaneous land type occurs on rolling hills of shale that generally have a thin covering of soil. The most extensive tracts are in the central and southern parts of the Area. Very shallow and shallow soils that overlie sandstone bedrock are common. In many eroded areas, bedrock of shale or sandstone is exposed. The slope varies greatly. Most of the areas have slopes of between 5 and 10 percent, but slopes of 10 to 20 percent are also common.

The vegetation consists primarily of a sparse stand of desert shrubs, principally shadscale and greasewood, and a scattered stand of bunch grasses. The carrying capacity of pasture is low.

Rough mountainous land (R1w).—This miscellaneous land type occupies two areas on the steep slopes of the Uinta Mountains. One area lies next to the upper part of the valley of the Duchesne River, and the other is north of Lapoint along the upper part of Grouse Creek. The soil is medium textured and has formed in place. Depth of the soil and the number of rock outcrops vary considerably.

Most of this land type has a thick cover of plants because the rainfall is greater than that in the lower lying areas. All of the areas are used for pasture, but many of them have been overgrazed.

Shavano fine sandy loam, shallow, 0 to 3 percent slopes (Sa).—This soil occurs in the uplands on sites intermediate in elevation between the low-lying alluvial soils and the soils on high mesas. It occupies smooth slopes in the central and northern parts of the Area. The parent material was derived largely from the underlying sandstone bedrock.

This soil is generally well drained. The vegetation consists principally of sagebrush, rabbitbrush, and shadscale.

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Profile description:

0 to 9 inches, light-brown to very pale brown fine sandy loam; fine granular structure; moderately calcareous; low in organic matter; moderately rapid permeability; fair water-holding capacity.
9 to 15 inches, light-brown to brown sandy clay loam; strongly calcareous; low in organic matter; moderate permeability; good water-holding capacity.
15 inches +, light-brown to very pale brown sandstone bedrock.

In a few places a small amount of segregated lime occurs between the soil material and the underlying bedrock.

Most of this soil is used for range pasture, but a small part is cropped. Alfalfa is grown on about 80 percent of the cropland, and most of the rest is used for small grains. Because it is shallow, this soil is not well suited to general irrigation farming. In areas that must be cropped, it is necessary to control erosion, increase the content of organic matter, and include pasture crops in the rotation.

Shavano fine sandy loam, shallow, 3 to 5 percent slopes (Se).—Except that it has stronger slopes, this soil is similar to Shavano fine sandy loam, shallow, 0 to 3 percent slopes. In many small spots there are outcrops of bedrock. Most of this soil is in range pasture. It is poorly suited to general irrigation farming and is best kept in range.

Shavano fine sandy loam, shallow, 5 to 10 percent slopes (Sg).—This soil, the most extensive in the Shavano series, is similar to Shavano fine sandy loam, shallow, 0 to 3 percent slopes, but it has stronger slopes and has been affected more by erosion.

The areas are not suitable for crops, and nearly all of them are used for range pasture. The number of palatable pasture plants has been reduced by overgrazing and the subsequent erosion, and the carrying capacity of pasture is low. Shadscale, sagebrush, and annual weeds are the dominant forage plants. Galletagrass was once prevalent, but it has been eliminated in some areas and the stand has been reduced greatly in others. The range can be improved by reseeding, reducing grazing, and controlling erosion. If this soil is irrigated, it is best to seed a suitable pasture mixture.

Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes (Sb).—Most of this soil occurs in association with Shavano fine sandy loam, shallow, 0 to 3 percent slopes, but it is generally in depressions. The parent material consists of alluvium and material derived from the underlying bedrock.

The surface soil, which generally extends to a depth of 12 inches, is light-brown to very pale brown, moderately calcareous fine sandy loam. This overlies strongly calcareous loam or sandy clay loam, which extends to a depth of about 36 inches. Sandstone bedrock underlies this material.

Less than one-third of this soil is used for crops. Between 70 and 75 percent of the cropland is in alfalfa. The rest is used for small grains. This soil is managed in about the same way as Shavano fine sandy loam, shallow, 0 to 3 percent slopes, but because its profile is thicker, it is more suitable for farming.

Shavano fine sandy loam, moderately deep, 3 to 8 percent slopes (Sf).—This soil is similar to Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes, but it has stronger slopes and has been affected more by erosion. In addition, the thickness of the profile is more variable; in some small areas the soil is shallow, but in others it is deep.

Plants on this soil produce a smaller amount of palatable forage than similar plants on Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes. Control of erosion and improvement of range are the principal management needs.

Shavano fine sandy loam, moderately deep, poorly drained, 0 to 5 percent slopes (Sc).—This soil is similar to Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes. It is poorly drained, however, and in most places the water table is within 6 feet of the surface. Poor drainage has resulted from overirrigation and through seepage from the adjacent irrigated areas. As a result of the poor drainage, the soil contains moderate to strong accumulations of salts. This soil occurs in widely scattered areas. Most of it lies next to areas of Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes, but this soil generally occurs at somewhat lower elevations.

Most of this soil is used for unimproved pasture. The pastures are wet, and artificial drainage is not practical in most places. If suitable mixtures are seeded, pastures on this soil do fairly well.

Shavano fine sandy loam, shallow, poorly drained, 0 to 10 percent slopes (Sd).—This soil occurs in association with other Shavano soils in several widely separated areas. It has a high water table, and salts have accumulated in the soil. As a result, the areas are unsuited to irrigation farming.

Shavano loam, moderately deep, 3 to 5 percent slopes (Sh).—Except for its stronger slopes and the loam texture of its surface layer, this soil is similar to Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes. It occurs in the same general areas as the other Shavano soils. The degree of erosion varies. Most areas are moderately eroded, but some small areas are severely eroded. About half of this soil is used for irrigated crops.

Shavano loam, moderately deep, poorly drained, 0 to 5 percent slopes (Sk).—This soil is similar to Shavano loam, moderately deep, 3 to 5 percent slopes. It has a high water table, however, and contains an accumulation of soluble salts. In addition some areas are more nearly level. This soil has become poorly drained fairly recently as the result of irrigation. Most of this soil is near Bluebell, where it occupies a few small areas that are adjacent to large areas of Shavano loam, moderately deep, 3 to 5 percent slopes. The areas are generally wet and are used mainly for pasture.

Shavano-Sheppard fine sands, 2 to 7 percent slopes (Sl).—This complex consists of small areas of Shavano and Sheppard soils that are so intermingled they cannot be shown separately on the soil map. The soils occur in uplands in the same general areas as the other Shavano soils.

Both of these soils overlie sandstone bedrock, but the depth to bedrock varies greatly from place to place. In most areas the loose sands of the Sheppard soil extend to the bedrock. In areas of Shavano soils, however, there is a zone of finer textured, strongly calcareous material just above the bedrock; in small areas this layer is light colored and is mottled with calcium carbonate. (For a discussion of similar soils, see the descriptions of Shavano fine sandy loam, shallow, 0 to 3 percent slopes, and Sheppard fine sand, hummocky, 2 to 10 percent slopes.)

These soils have been eroded somewhat by the wind. In areas of deep soil, the vegetation consists mainly of

sagebrush and rabbitbrush, but in areas of shallow soil, the vegetation is mainly juniper and sagebrush.

Most of the areas are used for range pasture, but a small acreage is cropped. The soils are unsuited to crops and are poorly suited to pasture.

Shavano-Sheppard fine sands, duny, 2 to 10 percent slopes (Sn).—This complex is similar to Shavano-Sheppard fine sands, 2 to 7 percent slopes. Wind erosion has been more active, however, and as a result sand dunes have accumulated to heights of 3 to 12 feet. Some of the dunes have been practically stabilized by vegetation, but others are being shifted continually by wind. All of the areas are in range pasture of low carrying capacity.

Shavano-Sheppard fine sands, poorly drained, 2 to 10 percent slopes (Sm).—This complex occupies a number of small areas; some are about 1 mile south of Moffat, and others are about 1 mile south of Bluebell. Poor drainage has developed fairly recently through the overirrigation of adjacent areas. It probably would not be feasible to install artificial drainage in these soils. All of the areas are used for range pasture.

Shavano-Sheppard fine sands, dunes and rock outcrops (So).—This complex is characterized by dunes of wind-blown or wind-drifted material and by outcrops of rock. The dunes range from 3 to 6 feet in height, and many of them are partly stabilized. These soils occur on dissected slopes in rolling areas of the uplands. All of the areas are used for range pasture. Because of the sparse cover of plants, the rangeland is of low value.

Shavano-Sheppard fine sandy loams, 0 to 5 percent slopes (Sp).—Except for the texture of the surface layer, this complex is similar to Shavano-Sheppard fine sands, 2 to 7 percent slopes. It occurs at fairly high elevations, about 3 miles south of Bluebell. The areas are small. They have been altered greatly through the action of wind, and the slopes are ridgy.

The surface layer of the Shavano soil extends to a depth of 12 or 14 inches. It consists of light-brown, slightly calcareous fine sandy loam. This layer overlies strongly calcareous, fine-textured material that generally extends to a depth of 3 feet; in some small areas there are light-colored mottles of calcium carbonate that become more pronounced near the underlying sandstone bedrock. Except for the texture of the surface layer, the profile of the Sheppard soil is similar to that described for Sheppard fine sand, hummocky, 2 to 10 percent slopes. Only about one-fourth of this soil is used for crops.

Shavano-Sheppard fine sandy loams, poorly drained, 0 to 5 percent slopes (Sr).—This poorly drained complex occurs in one area about 3 miles north of Upalco. Before it became poorly drained, it was used for irrigated crops. Now it is used as unimproved pasture of saltgrass and weeds. Installing artificial drainage would be difficult and expensive.

Sheppard fine sand, hummocky, 2 to 10 percent slopes (Su).—This soil occurs in association with Naples, Redfield, and other Shavano soils. The hummocks of sand that are scattered irregularly over the surface range from 3 to 6 feet in height. The soil is only partly stabilized.

The surface soil, which extends to a depth of about 12 inches, is light reddish-brown fine sand that is neutral or slightly calcareous. Below a depth of 12 inches is light reddish-brown to pink, calcareous fine sand that varies little with increasing depth and extends to a depth of more than 6 feet.

The vegetation consists of sagebrush, greasewood, rabbitbrush, and a sparse stand of bunch grasses. All of this soil is used for range pasture, but it provides scant forage.

Sheppard fine sand, duny, 0 to 3 percent slopes (Ss).—Most of this soil lies northeast of Ioka along Big Sand Wash. It consists of dunes of deep, loose sand that are shifted about by the wind. The dunes are more than 6 feet high and have only a scant covering of vegetation. This soil provides poor grazing.

Sheppard fine sand, duny, poorly drained, 0 to 3 percent slopes (St).—This poorly drained soil occurs in one large area about 1 mile north of Ioka. It lies on both sides of Big Sand Wash. All of it is used for unimproved pasture.

Sheppard sand, deep over gravel, hummocky, poorly drained, 0 to 3 percent slopes (Sv).—Nearly all of this hummocky soil occurs about 2 miles northwest of Ioka along Big Sand Wash. Poor drainage has developed fairly recently. In addition to having a high water table, the soil contains an accumulation of salts. The soil is composed of light-brown, loose sand that overlies beds of gravel and cobblestone. The thickness of the sand ranges from 2 to about 4 feet.

All of this soil is used for range pasture. Much of it probably could be reclaimed for crops by installing proper underdrainage. Before attempting to drain the soil, however, a careful study should be made to see whether drainage would be feasible.

Tabiona fine sandy loam, 0 to 3 percent slopes (Tc).—This soil occurs on recent alluvial fans and flood plains. It has formed from material derived largely from quartzite, sandstone, and shale. Most of it is in an area northwest of Whiterocks, but smaller areas occur near Altonah and Mountain Home.

This soil is well drained and generally does not contain harmful concentrations of soluble salts. Permeability is moderately rapid, and the water-holding capacity is fair. The vegetation consists mainly of sagebrush and rabbitbrush.

In many characteristics this soil is similar to the Naples fine sandy loams and the Redfield fine sandy loams. Its surface soil is darker and contains more organic matter, however, and the soil has a distinct granular structure. The following is a profile description that is typical of this soil in most respects, although the soil described is somewhat coarser textured than most areas of Tabiona fine sandy loam, 0 to 3 percent slopes, and the water-holding capacity is slightly lower.

Profile description:

0 to 7 inches, reddish-brown fine sandy loam; dark reddish brown when moist; moderate fine granular structure; friable when moist; calcareous.
7 to 15 inches, light reddish-brown loam; reddish brown when moist; fine granular structure; strongly calcareous.
15 to 28 inches, reddish-yellow loamy sand; massive; soft; moderately calcareous.
28 to 60 inches, reddish-yellow fine sandy loam; weak medium to fine granular structure; very friable when moist; moderately calcareous.

More than one-third of this soil is used for crops, nearly three-fifths is in range pasture, and a small part is idle. The soil is easy to till and is suitable for many

kinds of crops. Yields are high if the soil is properly managed.

Tabiona fine sandy loam, 3 to 7 percent slopes (Td).—Except that it has stronger slopes, this soil is similar to Tabiona fine sandy loam, 0 to 3 percent slopes. The soils occur in the same general areas. Most of this soil is used for range pasture, but a few acres are cropped. Because of the strong slopes, irrigation water should be applied carefully to prevent erosion. Grass seeded with alfalfa will help stabilize the soil.

Tabiona clay loam, 0 to 3 percent slopes (Ta).—This soil occurs on low terraces just above the rivers in the extreme northern part of the Area. Most of it is in the upper part of the valley of the Duchesne River. Some areas are near Tabiona, and others are north and east of Whiterocks along Deep Creek. The parent material was derived from quartzite, sandstone, and shale. Except for the texture of the surface layer, this soil has a profile similar to that of Tabiona fine sandy loam, 0 to 3 percent slopes.

Both surface runoff and internal drainage are medium. The vegetation includes sagebrush and rabbitbrush, and in areas along the upper part of Deep Creek there are cottonwoods.

Nearly two-thirds of this soil is used for range pasture, about one-third is cropped, and a few acres are idle. A larger part of this soil could be used for irrigation farming, but most of it lies too far north of the irrigation ditch.

Tabiona clay loam, 3 to 7 percent slopes (Tb).—Except that it has stronger slopes, this soil is similar to Tabiona clay loam, 0 to 3 percent slopes. It occupies areas northwest of Whiterocks and one area northwest of Tabiona.

The soil is moderately permeable, and in most places the water-holding capacity is good. Some erosion has occurred, especially in the cropped areas. In four small areas, which, combined, total 20 acres, the subsoil is rather coarse and gravelly. One area is in section 12, another is in section 14, the third is in section 4, T. 1 S., R. 8 W., and the fourth is in section 33, T. 1 N., R. 8 W.

About three-fourths of this soil is used for irrigated crops. The rest is in range pasture.

Tabiona loam, 0 to 3 percent slopes (Te).—This soil is similar to Tabiona fine sandy loam, 0 to 3 percent slopes, except for the texture of the surface layer. It occurs on alluvial fans and flood plains, mostly northwest of Tabiona. Most of it lies some distance back from the Duchesne River and at elevations well above the stream. The parent material was derived from quartzite and light-brown sandstone and shale. Much of the soil is stratified from the subsurface soil down into the deeper part of the substratum. Surface runoff and internal drainage are medium.

Most of this soil is used for range pasture. Only a small part is cropped, but the crops produce high yields. The yields are about the same or slightly higher than those obtained on Emmons loam, 0 to 3 percent slopes.

Tabiona loam, 3 to 10 percent slopes (Tg).—This soil is similar to Tabiona loam, 0 to 3 percent slopes, but it has stronger slopes. Also in many eroded areas the surface layer is thinner. Most of this soil lies northwest of Tabiona.

About half of this soil is used for range pasture. Because of the strong slopes, it is subject to erosion if it is left bare or if it is used for irrigation farming.

Tabiona loam, deep over gravel, 0 to 3 percent slopes (Tf).—This soil occurs in an area north of Talmage. To a depth of about 3 feet, the profile is similar to that of Tabiona loam, 0 to 3 percent slopes. At this depth, layers of stones and gravel occur that are thick enough to limit the water-holding capacity. As a result this soil is more droughty and less suitable for irrigation farming than Tabiona loam, 0 to 3 percent slopes. About half of the acreage is cropped. The rest is used for range pasture.

Tridell clay loam, 2 to 5 percent slopes (Th).—This soil occurs on a high-lying alluvial fan that is northwest of Whiterocks and near Farm Creek. The parent material was derived from quartzite and mixed sedimentary rocks. The vegetation consists mainly of sagebrush and juniper. The soil is well drained.

Profile description:

0 to 6 inches, pale-brown clay loam; brown when moist; platy structure; firm when moist; slightly calcareous; moderate content of organic matter; moderate permeability; good water-holding capacity.

6 to 15 inches, pale-brown clay loam that breaks to fragments of irregular size and shape; strongly calcareous; very slight concentration of lime occurs as mottling; moderate content of organic matter; moderate permeability; good water-holding capacity.

15 to 28 inches, pale-brown clay loam that breaks to fragments of irregular size and shape; strongly calcareous; lime carbonate occurs as specks; moderate content of organic matter; moderate permeability; good water-holding capacity.

28 to 36 inches, light-brown clay loam embedded with coarse gravel and cobblestones that are coated underneath with lime.

36 inches +, soil material that is coarser textured than that in the 28- to 36-inch layer and that is embedded with coarse gravel and cobblestones that have no coating of lime.

Much of this soil is used for crops, some is in range pasture, and a small part is idle. The soil is fairly well suited to crops. It is well suited to improved irrigated pasture.

Tridell stony clay loam, 2 to 5 percent slopes (Tl).—This soil occurs in association with other Tridell soils on the high-lying alluvial fan that is northwest of Whiterocks. Many cobblestones occur throughout the profile. Underlying the surface soil, between depths of 8 to 10 and 18 to 24 inches, is soil material that is somewhat finer textured and more strongly calcareous than that of the surface layer. A layer of cobblestones and gravel occurs between depths of 18 to 24 and 36 inches.

The many cobblestones in the surface layer interfere greatly with cultivation, and the cobblestones and gravel throughout the profile limit the water-holding capacity and cause the soil to be droughty. As a result, this soil is poorly suited to irrigated crops. However, some areas that are not so stony are used for crops. Most of this soil is used as range pasture.

Tridell loam, 2 to 5 percent slopes (Tk).—This very gently sloping soil is similar to Tridell stony loam, 2 to 5 percent slopes, with which it is associated, except that it has no stones on or near the surface. It occurs in small, scattered patches on the smooth flood plains of Farm Creek. Small areas in which the texture is finer than typical are mapped with this soil. In these areas the soil materials have been sorted by streams. Most of this soil is used for range pasture, but a large part is cropped.

Tridell stony loam, 2 to 5 percent slopes (Tm).—This soil is on a large, high alluvial fan that lies along Farm Creek northwest of Whiterocks. Stones and gravel occur on the surface and throughout the profile. The parent

material was derived mainly from quartzite and to a lesser extent from mixed sedimentary rocks, principally sandstone and shale.

This soil is droughty. The vegetation includes many kinds of plants, principally sagebrush, squawberry, pinyon pine, juniper, and buffaloberry.

Profile description:

0 to 8 inches, dark gray to very dark gray stony loam; black when moist; moderate fine granular structure; friable when moist; slightly calcareous.
8 to 14 inches, gray gravelly clay loam; dark gray to very dark gray when moist; granular structure; the large aggregates are easily broken to very fine grains; hard when dry, friable when moist; strongly calcareous.
14 to 27 inches, pale-brown stony sandy loam; dark brown when moist; massive; very strongly calcareous; much of this layer is made up of stones, gravel, and sand.
27 to 38 inches, very pale brown sandy loam; pale brown when moist; massive; strongly calcareous.
38 to 50 inches, very pale brown gravelly sandy loam; pale brown when moist; contains a large proportion of stones and gravel; the finer soil material is strongly calcareous.

This soil is unsuited to cultivation because of the stones and gravel. Only a few acres are cropped.

Capability Groups of Soils

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs and limitations of the soils, the risks of damage to them, and also their response to management.

The broadest grouping, the land capability class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils (none in the Roosevelt-Duchesne Area) are those that have the widest range of use and the least risk of damage. They are level or nearly level, productive, generally well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use. These need even more careful management.

In class IV are soils that have greater natural limitations than those in class III but that can be cultivated for some crops under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops but that can be used for pasture or range, for woodland, or for wildlife.

Class V soils (none in the Roosevelt-Duchesne Area) are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep, or droughty, or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops seeded.

Class VII soils provide only poor to fair yields of forage or forest products and have characteristics that limit them severely for these uses.

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, as wildlife habitats, or for scenery.

SUBCLASSES: The dominant kinds of limitations within soils of each of the eight general classes are shown by subclasses. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means excess water that retards plant growth or interferes with cultivation; and "s" shows that the soils are shallow, droughty, stony, usually low in fertility, or of very coarse or very fine texture. In some parts of the country there is another subclass, "c", for the soils that are limited chiefly by a climate that is too cold or too dry.

The soils of the Roosevelt-Duchesne Area have been grouped in the following capability classes and subclasses:

Class II.—Soils that have some limitations that reduce the choice of plants or require some conservation practices.
- Subclass IIe.—Soils that are likely to erode if not protected.
- Subclass IIw.—Soils in which excess water restricts the choice of crops or requires some corrective measures. (Most of these soils can be improved through adequate drainage and proper application of water.)
- Subclass IIs.—Soils that have moderate limitations because of unfavorable depth, texture, or moisture-holding capacity.

Class III.—Soils that have severe limitations that reduce the choice of plants or require special conservation practices, or both.
- Subclass IIIe.—Sloping soils that will erode if not protected.
- Subclass IIIw.—Soils severely limited by excess water. (Most of these soils can be improved through adequate drainage and proper application of water.)
- Subclass IIIs.—Soils severely limited because of unfavorable texture, depth, salt content, or moisture-holding capacity.

Class IV.—Soils that have very severe limitations that restrict the choice of plants or require very careful management, or both.
- Subclass IVe.—Soils that will erode if not protected.
- Subclass IVw.—Soils that have very severe limitations because of excess water.
- Subclass IVs.—Soils very severely limited because of unfavorable depth, texture, salt content, or moisture-holding capacity.

Class VI.—Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to permanent cover.
- Subclass VIe.—Shallow soils that are highly susceptible to erosion.

Subclass VIw.—Soils that have severe limitations for pasture plants or trees because of excess water.

Subclass VIs.—Soils moderately limited for pasture plants or trees because of unfavorable depth, texture, stoniness, or salt content.

Class VII.—Soils that have very severe limitations and are unsuited to cultivation.

Subclass VIIe.—Soils subject to severe erosion if not protected.

Class VIII.—Soils not suitable for the production of crops, grasses, or woody plants.

Subclass VIIIe.—Soils subject to severe erosion.

Subclass VIIIs.—Soils that have unfavorable texture.

The capability subclass of each of the soils of the Roosevelt-Duchesne Area follows:

	Capability subclass
Ashley sandy loam, 0 to 3 percent slopes	IIIs.
Ashley sandy loam, eroded, 0 to 3 percent slopes	IVe.
Ashley sandy loam, poorly drained, 0 to 3 percent slopes	IIIw.
Ashley loam, 0 to 3 percent slopes	IIIs.
Ashley loam, 3 to 5 percent slopes	IIIe.
Ashley loam, poorly drained, 0 to 3 percent slopes	IIIw.
Ashley clay loam, 0 to 3 percent slopes	IIIs.
Ashley clay loam, poorly drained, 0 to 3 percent slopes	IIw.
Ashley stony soils, 0 to 3 percent slopes	VIIs.
Avalon fine sandy loam, 0 to 3 percent slopes	IIe.
Avalon fine sandy loam, 3 to 5 percent slopes	IIIe.
Avalon fine sandy loam, 5 to 10 percent slopes	IVe.
Avalon sandy clay loam, 0 to 3 percent slopes	IIe.
Avalon loamy fine sand, 0 to 3 percent slopes	IIe.
Avalon loamy fine sand, 3 to 5 percent slopes	IIIe.
Billings clay loam, 0 to 3 percent slopes	IIs.
Billings clay loam, eroded, 0 to 3 percent slopes	IIIe.
Billings clay loam, 3 to 5 percent slopes	IIIe.
Billings clay loam, poorly drained, 0 to 3 percent slopes	IIw.
Billings clay loam, poorly drained, 3 to 5 percent slopes	IIIw.
Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes	IIIs.
Billings clay loam, moderately deep over shale, eroded, 0 to 3 percent slopes	IVe.
Billings clay loam, moderately deep and deep over shale, 3 to 5 percent slopes	IIIs.
Billings clay loam, moderately deep over shale, eroded, 3 to 5 percent slopes	IVe.
Billings clay loam, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes	IIIw.
Billings clay loam, moderately deep and deep over shale, poorly drained, 3 to 5 percent slopes	IIIw.
Billings clay loam, deep over gravel, 0 to 3 percent slopes	IIs.
Billings clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes	IIw.
Billings stony clay loam, moderately deep over shale, 3 to 5 percent slopes	VIIs.
Billings silty clay, 0 to 3 percent slopes	IIIs.
Billings silty clay, eroded, 0 to 3 percent slopes	IIIs.
Billings silty clay, 3 to 7 percent slopes	IIIs.
Billings silty clay, poorly drained, 0 to 3 percent slopes	IIIw.
Billings silty clay, very poorly drained, 0 to 3 percent slopes	VIw.
Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes	IIIs.
Billings silty clay, moderately deep and deep over shale, 3 to 5 percent slopes	IIIs.
Billings silty clay, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes	IIIw.
Billings silty clay, deep over gravel, 0 to 3 percent slopes	IIIs.
Billings silty clay, deep over gravel, poorly drained, 0 to 3 percent slopes	IIIw.
Chipeta clay loam, 0 to 3 percent slopes	IVs.
Chipeta clay loam, 3 to 7 percent slopes	IVs.
Chipeta clay loam, poorly drained, 0 to 7 percent slopes	VIw.
Chipeta stony clay loam, eroded, 3 to 7 percent slopes	VIIs.
Chipeta sandy loam, 0 to 3 percent slopes	IVs.
Chipeta sandy loam, 3 to 5 percent slopes	IVs.
Chipeta stony sandy loam, 3 to 5 percent slopes	VIIs.
Chipeta clay, 0 to 3 percent slopes	IVs.
Chipeta clay, 3 to 7 percent slopes	IVs.
Chipeta clay, eroded, 3 to 5 percent slopes	VIIe.
Chipeta clay, poorly drained, 0 to 7 percent slopes	VIw.
Christianburg clay loam, 0 to 3 percent slopes	IVs.
Christianburg clay loam, 3 to 5 percent slopes	IVs.
Christianburg silty clay loam, 0 to 3 percent slopes	IVs.
Christianburg silty clay loam, poorly drained, 0 to 3 percent slopes	IVw.
Emmons clay loam, 0 to 3 percent slopes	IIs.
Emmons clay loam, 3 to 5 percent slopes	IIIe.
Emmons loam, 0 to 3 percent slopes	IIe.
Emmons loam, 3 to 5 percent slopes	IIIe.
Emmons loam, poorly drained, 0 to 5 percent slopes	IIIw.
Emmons loam, deep over gravel, 0 to 3 percent slopes	IIe.
Emmons fine sandy loam, 0 to 3 percent slopes	IIe.
Emmons fine sandy loam, 3 to 10 percent slopes	IIIe.
Fruita fine sandy loam, 0 to 3 percent slopes	IIs.
Fruita fine sandy loam, 3 to 5 percent slopes	IIIe.
Fruita fine sandy loam, 5 to 10 percent slopes	IVe.
Fruita fine sandy loam, hummocky, 2 to 5 percent slopes	VIIe.
Fruita fine sandy loam, deep over clay, 0 to 3 percent slopes	IIIs.
Fruita fine sandy loam, deep over gravel, 0 to 3 percent slopes	IIIs.
Fruita fine sandy loam, deep over gravel, 3 to 8 percent slopes	IIIs.
Fruita fine sandy loam, poorly drained, 0 to 3 percent slopes	IIw.
Fruita fine sandy loam, poorly drained, 3 to 5 percent slopes	IIIw.
Fruita fine sand, 0 to 3 percent slopes	IIIs.
Fruita fine sand, hummocky, 2 to 5 percent slopes	VIIe.
Fruita fine sand, 3 to 5 percent slopes	IIIs.
Fruita fine sand, 5 to 10 percent slopes	IVe.
Fruita fine sand, deep over gravel, 0 to 8 percent slopes	IIIs.
Fruita fine sand, poorly drained, 0 to 3 percent slopes	IIIw.
Fruita loam, 0 to 3 percent slopes	IIe.
Fruita loam, deep over gravel, 0 to 3 percent slopes	IIe.
Fruita loam, 3 to 7 percent slopes	IIIe.
Fruita loam, deep over gravel, 3 to 5 percent slopes	IIIe.
Fruita loam, poorly drained, 0 to 3 percent slopes	IIw.
Fruita clay loam, 0 to 3 percent slopes	IIs.
Fruita clay loam, 3 to 5 percent slopes	IIIe.
Fruita clay loam, deep over gravel, 0 to 3 percent slopes	IIs.
Fruita clay loam, poorly drained, 0 to 3 percent slopes	IIw.
Fruita clay loam, poorly drained, 3 to 5 percent slopes	IIIw.
Green River clay loam, 0 to 3 percent slopes	IIs.
Green River clay loam, poorly drained, 0 to 3 percent slopes	IIw.
Green River clay loam, very poorly drained, 0 to 3 percent slopes	VIw.
Green River loam, 0 to 3 percent slopes	IIe.
Green River loam, poorly drained, 0 to 3 percent slopes	IIw.
Green River fine sandy loam, 0 to 3 percent slopes	IIs.
Green River fine sandy loam, poorly drained, 0 to 3 percent slopes	IIw.
Green River fine sandy loam, very poorly drained, 0 to 3 percent slopes	VIw.
Green River fine sand, 0 to 3 percent slopes	IIIs.
Green River fine sand, poorly drained, 0 to 3 percent slopes	IIIw.
Green River silty clay, 0 to 3 percent slopes	IIIs.
Green River silty clay, poorly drained, 0 to 3 percent slopes	IIIw.
Green River silty clay, very poorly drained, 0 to 3 percent slopes	VIw.
Leeton clay loam, 0 to 3 percent slopes	IIw.
Leeton loam, 0 to 3 percent slopes	IIw.
Leeton fine sandy loam, 0 to 3 percent slopes	IIw.
Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes	IIs.
Mesa fine sandy loam, moderately deep, 3 to 8 percent slopes	IIIe.
Mesa fine sandy loam, deep, 0 to 3 percent slopes	IIe.
Mesa fine sandy loam, deep, 3 to 5 percent slopes	IIIe.
Mesa fine sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	IIw.

	Capability subclass
Mesa fine sandy loam, moderately deep, poorly drained, 3 to 5 percent slopes	IIIw.
Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes	IIs.
Mesa sandy clay loam, moderately deep, 3 to 5 percent slopes	IIIe.
Mesa sandy clay loam, deep, 0 to 3 percent slopes	IIe.
Mesa sandy clay loam, deep, 3 to 5 percent slopes	IIIe.
Mesa sandy clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	IIw.
Millard stony sandy loam, 0 to 3 percent slopes	VIs.
Millard stony sandy loam, 3 to 5 percent slopes	VIs.
Millard loam, poorly drained, 0 to 3 percent slopes	IIIw.
Millard loam, 3 to 5 percent slopes	IIIs.
Millard loam, 5 to 10 percent slopes	IVe.
Millard stony clay loam, 0 to 3 percent slopes	VIs.
Millard stony clay loam, 3 to 10 percent slopes	VIs.
Millard clay loam, 0 to 3 percent slopes	IIIs.
Millard clay loam, 3 to 7 percent slopes	IIIs.
Millard stony sand, 0 to 3 percent slopes	VIs.
Montwel sandy loam, moderately deep, 0 to 3 percent slopes	IIIs.
Montwel sandy loam, moderately deep, 3 to 5 percent slopes	IIIs.
Montwel sandy loam, moderately deep, 5 to 10 percent slopes	IVe.
Montwel sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	IIIw.
Montwel sandy loam, shallow, 0 to 3 percent slopes	IVs.
Montwel sandy loam, shallow, 3 to 5 percent slopes	IVs.
Montwel sandy loam, shallow, 5 to 10 percent slopes	VIIe.
Montwel sand, moderately deep, 0 to 3 percent slopes	IVs.
Montwel sand, moderately deep, 3 to 7 percent slopes	IVs.
Montwel sand, shallow, 0 to 8 percent slopes	IVs.
Montwel loam, moderately deep, 0 to 3 percent slopes	IIIs.
Montwel loam, moderately deep, 3 to 8 percent slopes	IIIs.
Montwel loam, moderately deep, poorly drained, 2 to 5 percent slopes	IIIw.
Montwel loam, shallow, 0 to 3 percent slopes	IVs.
Montwel loam, shallow, 3 to 5 percent slopes	IVs.
Montwel loam, shallow, poorly drained, 0 to 5 percent slopes	IVw.
Montwel clay loam, moderately deep, 0 to 3 percent slopes	IIIs.
Montwel clay loam, moderately deep, 3 to 5 percent slopes	IIIs.
Montwel clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	IIIw.
Montwel clay loam, shallow, 0 to 3 percent slopes	IVs.
Montwel clay loam, shallow, 3 to 5 percent slopes	IVs.
Montwel clay loam, shallow, eroded, 5 to 10 percent slopes	VIIe.
Montwel clay, moderately deep, 0 to 3 percent slopes	IVs.
Montwel clay, moderately deep, 3 to 5 percent slopes	IVs.
Montwel clay, moderately deep, poorly drained, 0 to 5 percent slopes	IVw.
Montwel clay, shallow, poorly drained, 0 to 5 percent slopes	IVw.
Montwel clay, shallow, 0 to 3 percent slopes	IVs.
Montwel clay, shallow, 3 to 5 percent slopes	VIIe.
Myton sandy loam, 0 to 3 percent slopes	IVs.
Myton sandy loam, poorly drained, 0 to 3 percent slopes	IVw.
Myton stony sandy loam, 0 to 3 percent slopes	VIIs.
Myton stony sandy loam, 3 to 5 percent slopes	VIIs.
Myton stony sandy loam, 5 to 10 percent slopes	VIIs.
Myton stony sandy loam, poorly drained, 0 to 3 percent slopes	VIIw.
Myton loam, 0 to 3 percent slopes	IIs.
Myton stony sand, 0 to 3 percent slopes	VIIs.
Myton sand, 0 to 3 percent slopes	IVs.
Myton sand, poorly drained, 0 to 3 percent slopes	IVw.
Myton clay loam, 0 to 3 percent slopes	IIs.
Myton clay loam, 3 to 8 percent slopes	IIs.
Myton clay loam, poorly drained, 0 to 3 percent slopes	IIIw.
Myton stony clay loam, 0 to 3 percent slopes	VIIs.
Myton stony clay loam, 3 to 10 percent slopes	VIIs.
Myton stony clay loam, poorly drained, 0 to 3 percent slopes	VIIw.
Naples sandy clay loam, 0 to 3 percent slopes	IIe.
Naples sandy clay loam, 3 to 5 percent slopes	IIIe.
Naples sandy clay loam, 5 to 10 percent slopes	IVe.
Naples sandy clay loam, eroded, 2 to 8 percent slopes	IVe.
Naples sandy clay loam, poorly drained, 0 to 3 percent slopes	IIw.
Naples sandy clay loam, deep over gravel, 0 to 3 percent slopes	IIe.
Naples sandy clay loam, deep over gravel, 3 to 8 percent slopes	IIIe.
Naples sandy clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes	IIw.
Naples sandy loam, 0 to 3 percent slopes	IIs.
Naples sandy loam, 3 to 5 percent slopes	IIIe.
Naples sandy loam, 5 to 10 percent slopes	IVe.
Naples sandy loam, eroded, 2 to 10 percent slopes	IVe.
Naples sandy loam, hummocky, 2 to 5 percent slopes	VIIe.
Naples sandy loam, poorly drained, 0 to 3 percent slopes	IIw.
Naples sandy loam, deep over gravel, 0 to 5 percent slopes	IIs.
Naples sandy loam, poorly drained, 3 to 5 percent slopes	IIIw.
Naples loam, 0 to 3 percent slopes	IIe.
Naples loam, 3 to 5 percent slopes	IIIe.
Naples loam, 5 to 10 percent slopes	IVe.
Naples loam, eroded, 3 to 5 percent slopes	IIIe.
Naples loam, poorly drained, 0 to 5 percent slopes	IIIw.
Naples loam, deep over gravel, 0 to 5 percent slopes	IIe.
Naples loam, deep over gravel, poorly drained, 0 to 3 percent slopes	IIw.
Naples loamy fine sand, 0 to 3 percent slopes	IIIs.
Naples loamy fine sand, 3 to 5 percent slopes	IIIe.
Naples fine sand, poorly drained, 0 to 3 percent slopes	IVw.
Naples silty clay, 0 to 3 percent slopes	IIIs.
Naples silty clay, 3 to 10 percent slopes	IIIs.
Naples silty clay, poorly drained, 0 to 3 percent slopes	IVw.
Naples silty clay, eroded, 2 to 8 percent slopes	IVe.
Naturita fine sandy loam, 0 to 3 percent slopes	IIIs.
Naturita fine sandy loam, 3 to 5 percent slopes	IIIs.
Naturita fine sandy loam, 5 to 10 percent slopes	IVe.
Naturita fine sandy loam, poorly drained, 0 to 3 percent slopes	IVw.
Naturita sandy clay loam, 0 to 3 percent slopes	IIIs.
Naturita sandy clay loam, very poorly drained, 0 to 3 percent slopes	VIw.
Naturita stony fine sandy loam, 0 to 3 percent slopes	VIIs.
Naturita stony fine sandy loam, 3 to 10 percent slopes	VIIs.
Naturita stony fine sandy loam, poorly drained, 0 to 10 percent slopes	VIIw.
Navajo silty clay, 0 to 3 percent slopes	IIIs.
Navajo silty clay, 3 to 5 percent slopes	IIIs.
Navajo silty clay, 5 to 10 percent slopes	IVe.
Navajo silty clay, poorly drained, 0 to 3 percent slopes	IVw.
Navajo clay, 0 to 1 percent slopes	IIIs.
Neola loam, shallow, 1 to 3 percent slopes	IVs.
Neola loam, shallow, 3 to 5 percent slopes	IVs.
Neola loam, shallow, 5 to 10 percent slopes	VIIe.
Neola loam, shallow, poorly drained, 1 to 5 percent slopes	IVw.
Neola stony loam, 1 to 3 percent slopes	VIIs.
Neola stony loam, 3 to 5 percent slopes	VIIs.
Neola stony loam, 5 to 10 percent slopes	VIIs.
Neola loam, moderately deep, 1 to 3 percent slopes	IIIs.
Neola loam, moderately deep, 3 to 5 percent slopes	IIIs.
Neola loam, moderately deep, poorly drained, 1 to 3 percent slopes	IVw.
Neola sandy loam, shallow, 1 to 3 percent slopes	IVs.
Neola sandy loam, shallow, 3 to 5 percent slopes	IVs.
Neola sandy loam, shallow, 5 to 10 percent slopes	VIIe.
Neola sandy loam, shallow, poorly drained, 1 to 3 percent slopes	IVw.
Neola sandy loam, moderately deep, 1 to 3 percent slopes	IIIs.
Neola sandy loam, moderately deep, 3 to 5 percent slopes	IIIs.
Neola sandy loam, moderately deep, poorly drained, 1 to 3 percent slopes	IVw.
Neola stony sandy loam, 1 to 3 percent slopes	VIIs.
Neola stony sandy loam, 3 to 8 percent slopes	VIIs.
Neola clay loam, shallow, 2 to 5 percent slopes	IVs.

	Capability subclass
Neola clay loam, moderately deep, 1 to 3 percent slopes	IIIs.
Pariette clay loam, moderately deep, 0 to 3 percent slopes	IIIs.
Pariette clay loam, moderately deep, 3 to 5 percent slopes	IIIs.
Pariette clay loam, shallow, 2 to 5 percent slopes	IVs.
Pariette loam, moderately deep, 0 to 3 percent slopes	IIIs.
Pariette loam, moderately deep, 3 to 5 percent slopes	IIIs.
Pariette loam, shallow, 0 to 3 percent slopes	IVs.
Pariette loam, shallow, 3 to 5 percent slopes	IVs.
Pariette clay, moderately deep, 0 to 3 percent slopes	IVs.
Pariette clay, shallow, 2 to 5 percent slopes	IVs.
Pavant loam, shallow, 2 to 5 percent slopes	IVs.
Pavant loam, shallow, poorly drained, 2 to 5 percent slopes	IVw.
Pavant loam, shallow, 5 to 10 percent slopes	VIe.
Pavant loam, moderately deep, 2 to 3 percent slopes	IIIs.
Pavant loam, moderately deep, poorly drained, 2 to 3 percent slopes	IVw.
Pavant stony sandy loam, 2 to 5 percent slopes	VIs.
Pavant stony sandy loam, poorly drained, 2 to 5 percent slopes	VIw.
Pavant sandy loam, shallow, 2 to 5 percent slopes	IVs.
Pavant sandy loam, shallow, poorly drained, 2 to 5 percent slopes	IVw.
Pavant sandy loam, moderately deep, 2 to 3 percent slopes	IIIs.
Peat, 0 to 1 percent slopes	VIw.
Ravola sandy loam, 0 to 3 percent slopes	IIe.
Ravola sandy loam, hummocky, 0 to 3 percent slopes	VIIe.
Ravola sandy loam, duny, 2 to 8 percent slopes	VIIe.
Ravola sandy loam, 3 to 8 percent slopes	IIIe.
Ravola sandy loam, eroded, 0 to 3 percent slopes	IIIe.
Ravola sandy loam, poorly drained, 0 to 3 percent slopes	IIw.
Ravola sandy loam, deep over gravel, 2 to 5 percent slopes	IIIe.
Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes	IIIs.
Ravola sandy loam, moderately deep and deep over shale, 3 to 5 percent slopes	IIIs.
Ravola sandy loam, moderately deep over shale, eroded, 2 to 5 percent slopes	IVe.
Ravola stony sandy loam, 2 to 5 percent slopes	VIIs.
Ravola loam, 0 to 3 percent slopes	IIe.
Ravola loam, deep over gravel, 0 to 3 percent slopes	IIe.
Ravola loam, moderately deep and deep over shale, 0 to 3 percent slopes	IIIs.
Ravola loam, moderately deep and deep over shale, 3 to 5 percent slopes	IIIs.
Ravola loam, moderately deep and deep over shale, poorly drained, 0 to 5 percent slopes	IVw.
Ravola sand, 2 to 5 percent slopes	IIIs.
Ravola sand, poorly drained, 2 to 5 percent slopes	IVw.
Redfield fine sandy loam, 0 to 3 percent slopes	IIe.
Redfield fine sandy loam, 3 to 5 percent slopes	IIIe.
Redfield fine sandy loam, eroded, 2 to 5 percent slopes	IIIe.
Redfield fine sandy loam, poorly drained, 0 to 3 percent slopes	IIw.
Redfield fine sandy loam, eroded, poorly drained, 2 to 5 percent slopes	IVw.
Redfield loam, 0 to 3 percent slopes	IIe.
Redfield loam, 3 to 5 percent slopes	IIIe.
Redfield loam, poorly drained, 0 to 3 percent slopes	IIw.
Redfield clay loam, 0 to 3 percent slopes	IIs.
Redfield clay loam, 3 to 7 percent slopes	IIIe.
Redfield clay loam, eroded, 0 to 3 percent slopes	IIIe.
Redfield clay loam, poorly drained, 0 to 7 percent slopes	IVw.
Redfield loamy fine sand, 0 to 3 percent slopes	IIs.
Redfield loamy fine sand, 3 to 8 percent slopes	IIIe.
Redfield loamy fine sand, poorly drained, 0 to 8 percent slopes	IVw.
Redfield silty clay, 0 to 3 percent slopes	IIIs.
Redfield silty clay, poorly drained, 0 to 3 percent slopes	IVw.
Riverwash	VIIIs.
Rough broken and stony land	VIIs.
Rough gullied land, Billings soil material	VIIIe.
Rough gullied land, Naples soil material	VIIIe.
Rough gullied land, Navajo soil material	VIIIe.
Rough gullied land, Redfield soil material	VIIIe.
Rough hilly land	VIIs.
Rough mountainous land	VIIs.
Shavano fine sandy loam, shallow, 0 to 3 percent slopes	IVs.
Shavano fine sandy loam, shallow, 3 to 5 percent slopes	IVs.
Shavano fine sandy loam, shallow, 5 to 10 percent slopes	VIIe.
Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes	IIIs.
Shavano fine sandy loam, moderately deep, 3 to 8 percent slopes	IIIs.
Shavano fine sandy loam, moderately deep, poorly drained, 0 to 5 percent slopes	IVw.
Shavano fine sandy loam, shallow, poorly drained, 0 to 10 percent slopes	IVw.
Shavano loam, moderately deep, 3 to 5 percent slopes	IIIs.
Shavano loam, moderately deep, poorly drained, 0 to 5 percent slopes	IVw.
Shavano-Sheppard fine sands, 2 to 7 percent slopes	IVs.
Shavano-Sheppard fine sands, duny, 2 to 10 percent slopes	IVIIe.
Shavano-Sheppard fine sands, poorly drained, 2 to 10 percent slopes	IVw.
Shavano-Sheppard fine sands, dunes and rock outcrops	VIIe.
Shavano-Sheppard fine sandy loams, 0 to 5 percent slopes	IIIs.
Shavano-Sheppard fine sandy loams, poorly drained, 0 to 5 percent slopes	IVw.
Sheppard fine sand, hummocky, 2 to 10 percent slopes	VIIe.
Sheppard fine sand, duny, 0 to 3 percent slopes	VIIe.
Sheppard fine sand, duny, poorly drained, 0 to 3 percent slopes	VIIw.
Sheppard sand, deep over gravel, hummocky, poorly drained, 0 to 3 percent slopes	VIIw.
Tabiona fine sandy loam, 0 to 3 percent slopes	IIs.
Tabiona fine sandy loam, 3 to 7 percent slopes	IIIe.
Tabiona clay loam, 0 to 3 percent slopes	IIs.
Tabiona clay loam, 3 to 7 percent slopes	IIIe.
Tabiona loam, 0 to 3 percent slopes	IIe.
Tabiona loam, 3 to 10 percent slopes	IIIe.
Tabiona loam, deep over gravel, 0 to 3 percent slopes	IIs.
Tridell clay loam, 2 to 5 percent slopes	IIIs.
Tridell stony clay loam, 2 to 5 percent slopes	VIs.
Tridell loam, 2 to 5 percent slopes	IIIs.
Tridell stony loam, 2 to 5 percent slopes	VIs.

Estimated Yields

In table 6 the estimated average acre yields are given for the principal irrigated crops. In addition, yields that can be expected are shown for both irrigated and nonirrigated pastures. The figures in columns A represent the estimated average yields of crops grown in 1935. This was a normal crop year, although it was preceded by a year of extreme drought. The figures in columns B indicate yields expected over a period of years if the supply of irrigation water is normal during the growing season and if good management is practiced.

The principal factors that determine productivity are the characteristics of the soil, the kind of management, and the climate. Climate is especially important in the Roosevelt–Duchesne Area because the yearly supply of irrigation water depends largely on the amount of snowfall in the Uinta Mountains. The total amount of snowfall and the water content of the snow vary greatly from year to year. The snow generally melts during a relatively short period late in spring or early in summer. Runoff is rapid for a short time, and then there is a long period of low stream flow. Although facilities for storing the water from runoff have been improved, they are still not adequate for retaining all of the water that flows into the area during periods when streams are high. Even a normal supply of irrigation water will not meet the needs of all the land being irrigated.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*

[Yield figures in columns A are estimates of yields obtained in the crop year 1935; yield figures in columns B are those to be expected over a period of years if the supply of irrigation water is normal and if good management is practiced. Absence of yield figures indicates that data were not available on which to base estimates; the soil is unsuited to the specified crop; or the crop is not commonly grown on the particular soil]

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Non-irrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Ashley sandy loam, 0 to 3 percent slopes	1.0	2.0	25	25		30	35	30	100	12
Ashley sandy loam, eroded, 0 to 3 percent slopes										6
Ashley sandy loam, poorly drained, 0 to 3 percent slopes									125	60
Ashley loam, 0 to 3 percent slopes	1.0	2.5	25	27		35	35	35	125	12
Ashley loam, 3 to 5 percent slopes		2.5		27		35		35	125	12
Ashley loam, poorly drained, 0 to 3 percent slopes									125	60
Ashley clay loam, 0 to 3 percent slopes	1.0	2.5	25	27		35	35	35	125	12
Ashley clay loam, poorly drained, 0 to 3 percent slopes									125	60
Ashley stony soils, 0 to 3 percent slopes									75	10
Avalon fine sandy loam, 0 to 3 percent slopes	1.2	2.5		27		35		35	100	6
Avalon fine sandy loam, 3 to 5 percent slopes		2.0		25		30		30	85	5
Avalon fine sandy loam, 5 to 10 percent slopes									80	5
Avalon sandy clay loam, 0 to 3 percent slopes	2.0	2.5	19	27		35	50	50	100	6
Avalon loamy fine sand, 0 to 3 percent slopes		2.0		25		30		30	85	5
Avalon loamy fine sand, 3 to 5 percent slopes										5
Billings clay loam, 0 to 3 percent slopes	2.0	3.5	23	33	33	50	24	50	200	14
Billings clay loam, eroded, 0 to 3 percent slopes										7
Billings clay loam, 3 to 5 percent slopes		3.0		30		40		40	175	12
Billings clay loam, poorly drained, 0 to 3 percent slopes									50	20
Billings clay loam, poorly drained, 3 to 5 percent slopes									50	20
Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes									40	8
Billings clay loam, moderately deep over shale, eroded, 0 to 3 percent slopes										6
Billings clay loam, moderately deep and deep over shale, 3 to 5 percent slopes		1.5		20		25		25	80	6
Billings clay loam, moderately deep over shale, eroded, 3 to 5 percent slopes										4
Billings clay loam, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes									40	12
Billings clay loam, moderately deep and deep over shale, poorly drained, 3 to 5 percent slopes									40	12
Billings clay loam, deep over gravel, 0 to 3 percent slopes		2.5		27		35		35	125	14
Billings clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes									75	18
Billings stony clay loam, moderately deep over shale, 3 to 5 percent slopes									40	6
Billings silty clay, 0 to 3 percent slopes	1.5	2.0	28	25	41	30	34	30	100	12
Billings silty clay, eroded, 0 to 3 percent slopes										7
Billings silty clay, 3 to 7 percent slopes		1.5		20		25		25	100	10
Billings silty clay, poorly drained, 0 to 3 percent slopes									50	18
Billings silty clay, very poorly drained, 0 to 3 percent slopes									50	20
Billings silty clay, moderately deep and deep over shale, 0 to 3 percent slopes									40	8
Billings silty clay, moderately deep and deep over shale, 3 to 5 percent slopes									40	6
Billings silty clay, moderately deep and deep over shale, poorly drained, 0 to 3 percent slopes									40	8
Billings silty clay, deep over gravel, 0 to 3 percent slopes		2.0		25		30		30	100	12
Billings silty clay, deep over gravel, poorly drained, 0 to 3 percent slopes									50	18
Chipeta clay loam, 0 to 3 percent slopes										3
Chipeta clay loam, 3 to 7 percent slopes										2
Chipeta clay loam, poorly drained, 0 to 7 percent slopes										2
Chipeta stony clay loam, eroded, 3 to 7 percent slopes										1
Chipeta sandy loam, 0 to 3 percent slopes										2
Chipeta sandy loam, 3 to 5 percent slopes										2
Chipeta stony sandy loam, 3 to 5 percent slopes										2
Chipeta clay, 0 to 3 percent slopes										1

See footnote at end of table.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Non-irrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Chipeta clay, 3 to 7 percent slopes										1
Chipeta clay, eroded, 3 to 5 percent slopes										1
Chipeta clay, poorly drained, 0 to 7 percent slopes										2
Christianburg clay loam, 0 to 3 percent slopes		3.0		30		40		40	175	12
Christianburg clay loam, 3 to 5 percent slopes		3.9		38		38		38	170	10
Christianburg silty clay loam, 0 to 3 percent slopes		1.7		22		27		27	85	8
Christianburg silty clay loam, poorly drained, 0 to 3 percent slopes										12
Emmons clay loam, 0 to 3 percent slopes		3.5		35		45		45	200	17
Emmons clay loam, 3 to 5 percent slopes		3.5		32		43		43	19	15
Emmons loam, 0 to 3 percent slopes		3.5		33		45		45	200	17
Emmons loam, 3 to 5 percent slopes		3.3		32		43		43	190	15
Emmons loam, poorly drained, 0 to 5 percent slopes										20
Emmons loam, deep over gravel, 0 to 3 percent slopes		3.0		30		40		40	185	13
Emmons fine sandy loam, 0 to 3 percent slopes		3.0		30		40		40	185	14
Emmons fine sandy loam, 3 to 10 percent slopes		2.9		29		39		39	180	13
Fruita fine sandy loam, 0 to 3 percent slopes	1.2	3.0	29	30		40	42	40	185	12
Fruita fine sandy loam, 3 to 5 percent slopes		2.9		29		39		39	180	12
Fruita fine sandy loam, 5 to 10 percent slopes		2.7		29		38		38	175	10
Fruita fine sandy loam, hummocky, 2 to 5 percent slopes		2.5		27		35		35	150	8
Fruita fine sandy loam, deep over clay, 0 to 3 percent slopes		3.0		30		40		40	185	12
Fruita fine sandy loam, deep over gravel, 0 to 3 percent slopes		2.7		29		38		38	175	12
Fruita fine sandy loam, deep over gravel, 3 to 8 percent slopes		2.7		29		38		38	175	10
Fruita fine sandy loam, poorly drained, 0 to 3 percent slopes									70	20
Fruita fine sandy loam, poorly drained, 3 to 5 percent slopes										16
Fruita fine sand, 0 to 3 percent slopes									100	6
Fruita fine sand, hummocky, 2 to 5 percent slopes										4
Fruita fine sand, 3 to 5 percent slopes									85	6
Fruita fine sand, 5 to 10 percent slopes										6
Fruita fine sand, deep over gravel, 0 to 8 percent slopes									85	6
Fruita fine sand, poorly drained, 0 to 3 percent slopes										10
Fruita loam, 0 to 3 percent slopes	2.6	3.5	29	33		45	42	45	200	13
Fruita loam, deep over gravel, 0 to 3 percent slopes		3.0		30		40		40	185	11
Fruita loam, 3 to 7 percent slopes		3.3		32		43		43	190	13
Fruita loam, deep over gravel, 3 to 5 percent slopes		2.7		29		38		38	175	10
Fruita loam, poorly drained, 0 to 3 percent slopes									85	20
Fruita clay loam, 0 to 3 percent slopes		3.5		33		45		45	200	13
Fruita clay loam, 3 to 5 percent slopes		3.0		30		40		40	185	11
Fruita clay loam, deep over gravel, 0 to 3 percent slopes		3.0		30		40		40	185	11
Fruita clay loam, poorly drained, 0 to 3 percent slopes									85	20
Fruita clay loam, poorly drained, 3 to 5 percent slopes										16
Green River clay loam, 0 to 3 percent slopes	1.7	3.5	26	33	36	45	25	45	200	18
Green River clay loam, poorly drained, 0 to 3 percent slopes									70	30
Green River clay loam, very poorly drained, 0 to 3 percent slopes									60	30
Green River loam, 0 to 3 percent slopes	1.7	3.5	26	33	36	45	25	45	200	18
Green River loam, poorly drained, 0 to 3 percent slopes									70	30
Green River fine sandy loam, 0 to 3 percent slopes		3.0		30		40		40	185	18
Green River fine sandy loam, poorly drained, 0 to 3 percent slopes									70	30
Green River fine sandy loam, very poorly drained, 0 to 3 percent slopes									60	20
Green River fine sand, 0 to 3 percent slopes										10
Green River fine sand, poorly drained, 0 to 3 percent slopes									50	18
Green River silty clay, 0 to 3 percent slopes	1.5	2.0	28	25	41	30	34	30	100	12
Green River silty clay, poorly drained, 0 to 3 percent slopes									50	18
Green River silty clay, very poorly drained, 0 to 3 percent slopes									50	20
Leeton clay loam, 0 to 3 percent slopes									125	70
Leeton loam, 0 to 3 percent slopes									125	70
Leeton fine sandy loam, 0 to 3 percent slopes									100	60
Mesa fine sandy loam, moderately deep, 0 to 3 percent slopes	1.0	2.5	20	27	30	35	25	35	150	20
Mesa fine sandy loam, moderately deep, 3 to 8 percent slopes		2.4		26		33		33	140	11
Mesa fine sandy loam, deep, 0 to 3 percent slopes	2.0	3.0		30		40		40	185	13

See footnote at end of table.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Non-irrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Mesa fine sandy loam, deep, 3 to 5 percent slopes	------	2. 5	------	27	------	35	------	35	150	13
Mesa fine sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	20
Mesa fine sandy loam, moderately deep, poorly drained, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	85	20
Mesa sandy clay loam, moderately deep, 0 to 3 percent slopes	1. 5	2. 5	------	27	------	35	15	35	150	12
Mesa sandy clay loam, moderately deep, 3 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	8
Mesa sandy clay loam, deep, 0 to 3 percent slopes	------	3. 0	------	30	------	40	------	40	185	13
Mesa sandy clay loam, deep, 3 to 5 percent slopes	------	2. 7	------	29	------	38	------	38	175	13
Mesa sandy clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	90	20
Millard stony sandy loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	90	8
Millard stony sandy loam, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	75	8
Millard loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	16
Millard loam, 3 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Millard loam, 5 to 10 percent slopes	------	1. 5	------	20	------	25	------	25	110	8
Millard stony clay loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	100	12
Millard stony clay loam, 3 to 10 percent slopes	------	------	------	------	------	------	------	------	90	10
Millard clay loam, 0 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	10
Millard clay loam, 3 to 7 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Millard stony sand, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Montwel sandy loam, moderately deep, 0 to 3 percent slopes	1. 0	2. 0	25	25	------	30	------	30	125	10
Montwel sandy loam, moderately deep, 3 to 5 percent slopes	------	1. 7	------	22	------	27	------	27	115	10
Montwel sandy loam, moderately deep, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	8
Montwel sandy loam, moderately deep, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	16
Montwel sandy loam, shallow, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	100	10
Montwel sandy loam, shallow, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	5
Montwel sandy loam, shallow, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	6
Montwel sand, moderately deep, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	5
Montwel sand, moderately deep, 3 to 7 percent slopes	------	------	------	------	------	------	------	------	------	5
Montwel sand, shallow, 0 to 8 percent slopes	------	------	------	------	------	------	------	------	60	5
Montwel loam, moderately deep, 0 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Montwel loam, moderately deep, 3 to 8 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Montwel loam, moderately deep, poorly drained, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	50	20
Montwel loam, shallow, 0 to 3 percent slopes	------	1. 5	------	15	------	20	------	20	100	10
Montwel loam, shallow, 3 to 5 percent slopes	------	1. 3	------	13	------	15	------	15	85	8
Montwel loam, shallow, poorly drained, 0 to 5 percent slopes	------	------	------	------	------	------	------	------	------	15
Montwel clay loam, moderately deep, 0 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Montwel clay loam, moderately deep, 3 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Montwel clay loam, moderately deep, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	50	20
Montwel clay loam, shallow, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	70	8
Montwel clay loam, shallow, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	8
Montwel clay loam, shallow, eroded, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	5
Montwel clay, moderately deep, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	6
Montwel clay, moderately deep, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	6
Montwel clay, moderately deep, poorly drained, 0 to 5 percent slopes	------	------	------	------	------	------	------	------	------	18
Montwel clay, shallow, poorly drained, 0 to 5 percent slopes	------	------	------	------	------	------	------	------	------	12
Montwel clay, shallow, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	45	6
Montwel clay, shallow, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	6
Myton sandy loam, 0 to 3 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Myton sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	60
Myton stony sandy loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	90	8
Myton stony sandy loam, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	75	8
Myton stony sandy loam, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	8
Myton stony sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	40
Myton loam, 0 to 3 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Myton stony sand, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Myton sand, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	50	8
Myton sand, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	16
Myton clay loam, 0 to 3 percent slopes	2. 4	2. 5	30	27	45	35	------	35	150	10

See footnote at end of table.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Non-irrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Myton clay loam, 3 to 8 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Myton clay loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	60
Myton stony clay loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	100	10
Myton stony clay loam, 3 to 10 percent slopes	------	------	------	------	------	------	------	------	90	12
Myton stony clay loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	40
Naples sandy clay loam, 0 to 3 percent slopes	1. 5	4. 0	18	35	32	50	------	50	225	13
Naples sandy clay loam, 3 to 5 percent slopes	------	3. 5	------	33	------	45	------	45	200	11
Naples sandy clay loam, 5 to 10 percent slopes	------	3. 0	------	30	------	40	------	------	185	10
Naples sandy clay loam, eroded, 2 to 8 percent slopes	------	------	------	------	------	------	------	------	------	8
Naples sandy clay loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	25
Naples sandy clay loam, deep over gravel, 0 to 3 percent slopes	------	3. 0	------	30	------	40	------	40	185	12
Naples sandy clay loam, deep over gravel, 3 to 8 percent slopes	------	2. 5	------	27	------	35	------	35	150	11
Naples sandy clay loam, deep over gravel, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	50	25
Naples sandy loam, 0 to 3 percent slopes	1. 0	3. 5	23	33	36	45	------	45	200	12
Naples sandy loam, 3 to 5 percent slopes	------	2. 7	------	29	------	38	------	38	170	10
Naples sandy loam, 5 to 10 percent slopes	------	2. 5	------	27	------	35	------	35	150	10
Naples sandy loam, eroded, 2 to 10 percent slopes	------	------	------	------	------	------	------	------	------	6
Naples sandy loam, hummocky, 2 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	6
Naples sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	24
Naples sandy loam, deep over gravel, 0 to 5 percent slopes	------	3. 0	------	30	------	40	------	40	185	13
Naples sandy loam, poorly drained, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	20
Naples loam, 0 to 3 percent slopes	1. 5	4. 0	23	35	36	50	------	50	225	13
Naples loam, 3 to 5 percent slopes	------	3. 7	------	34	------	47	------	47	215	12
Naples loam, 5 to 10 percent slopes	------	3. 0	------	30	------	40	------	40	185	10
Naples loam, eroded, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	6
Naples loam, poorly drained, 0 to 5 percent slopes	------	------	------	------	------	------	------	------	60	30
Naples loam, deep over gravel, 0 to 5 percent slopes	------	3. 0	------	30	------	40	------	40	185	12
Naples loam, deep over gravel, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	100	25
Naples loamy fine sand, 0 to 3 percent slopes	------	1. 5	------	15	------	20	------	20	100	9
Naples loamy fine sand, 3 to 5 percent slopes	------	1. 5	------	15	------	20	------	20	100	9
Naples fine sand, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	24
Naples silty clay, 0 to 3 percent slopes	------	3. 5	------	33	------	45	------	45	200	17
Naples silty clay, 3 to 10 percent slopes	------	3. 5	------	27	------	35	------	35	150	13
Naples silty clay, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	50	18
Naples silty clay, eroded, 2 to 8 percent slopes	------	------	------	------	------	------	------	------	------	8
Naturita fine sandy loam, 0 to 3 percent slopes	------	1. 5	------	20	------	25	------	25	100	10
Naturita fine sandy loam, 3 to 5 percent slopes	------	1. 5	------	20	------	25	------	25	100	8
Naturita fine sandy loam, 5 to 10 percent slopes	------	1. 3	------	17	------	23	------	23	85	10
Naturita fine sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	75	20
Naturita sandy clay loam, 0 to 3 percent slopes	------	1. 5	------	20	------	25	------	25	100	8
Naturita sandy clay loam, very poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	75	20
Naturita stony fine sandy loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	8
Naturita stony fine sandy loam, 3 to 10 percent slopes	------	------	------	------	------	------	------	------	------	8
Naturita stony fine sandy loam, poorly drained, 0 to 10 percent slopes	------	------	------	------	------	------	------	------	------	16
Navajo silty clay, 0 to 3 percent slopes	2. 0	3. 5	23	33	25	45	37	45	200	16
Navajo silty clay, 3 to 5 percent slopes	------	2. 7	------	29	------	38	------	38	165	14
Navajo silty clay, 5 to 10 percent slopes	------	2. 5	------	27	------	35	------	35	150	13
Navajo silty clay, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	50	18
Navajo clay, 0 to 1 percent slopes	------	------	------	------	------	------	------	------	------	1
Neola loam, shallow, 1 to 3 percent slopes	. 6	1. 5	18	20	------	25	27	25	100	10
Neola loam, shallow, 3 to 5 percent slopes	------	1. 5	------	20	------	25	------	25	100	8
Neola loam, shallow, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	8
Neola loam, shallow, poorly drained, 1 to 5 percent slopes	------	------	------	------	------	------	------	------	50	20
Neola loam, moderately deep, 1 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Neola loam, moderately deep, 3 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Neola loam, moderately deep, poorly drained, 1 to 3 percent slopes	------	------	------	------	------	------	------	------	50	20
Neola stony loam, 1 to 3 percent slopes	------	------	------	------	------	------	------	------	75	6
Neola stony loam, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	75	6
Neola stony loam, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	5

See footnote at end of table.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Nonirrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Neola sandy loam, shallow, 1 to 3 percent slopes	------	1. 5	------	20	------	25	------	25	100	10
Neola sandy loam, shallow, 3 to 5 percent slopes	------	1. 5	------	20	------	25	------	25	100	8
Neola sandy loam, shallow, 5 to 10 percent slopes	------	1. 3	------	17	------	23	------	23	85	10
Neola sandy loam, shallow, poorly drained, 1 to 3 percent slopes	------	------	------	------	------	------	------	------	50	20
Neola sandy loam, moderately deep, 1 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Neola sandy loam, moderately deep, 3 to 5 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Neola sandy loam, moderately deep, poorly drained, 1 to 3 percent slopes	------	------	------	------	------	------	------	------	60	30
Neola stony sandy loam, 1 to 3 percent slopes	------	------	------	------	------	------	------	------	75	6
Neola stony sandy loam, 3 to 8 percent slopes	------	------	------	------	------	------	------	------	75	6
Neola clay loam, shallow, 2 to 5 percent slopes	------	1. 5	------	20	------	25	------	25	100	10
Neola clay loam, moderately deep, 1 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Pariette clay loam, moderately deep, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Pariette clay loam, moderately deep, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	4
Pariette clay loam, shallow, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	3
Pariette loam, moderately deep, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Pariette loam, moderately deep, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	6
Pariette loam, shallow, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	3
Pariette loam, shallow, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	3
Pariette clay, moderately deep, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	2
Pariette clay, shallow, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	1
Pavant loam, shallow, 2 to 5 percent slopes	5	1. 5	18	20	------	25	27	25	100	8
Pavant loam, shallow, poorly drained, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	50	20
Pavant loam, shallow, 5 to 10 percent slopes	------	------	------	------	------	------	------	------	------	8
Pavant loam, moderately deep, 2 to 3 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Pavant loam, moderately deep, poorly drained, 2 to 3 percent slopes	------	------	------	------	------	------	------	------	------	20
Pavant stony sandy loam, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	75	6
Pavant stony sandy loam, poorly drained, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	12
Pavant sandy loam, shallow, 2 to 5 percent slopes	------	1. 5	------	20	------	25	------	25	100	8
Pavant sandy loam, shallow, poorly drained, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	45	20
Pavant sandy loam, moderately deep, 2 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	12
Peat, 0 to 1 percent slopes	------	------	------	------	------	------	------	------	------	100
Ravola sandy loam, 0 to 3 percent slopes	------	3. 0	------	30	------	40	------	40	185	12
Ravola sandy loam, hummocky, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	8
Ravola sandy loam, duny, 2 to 8 percent slopes	------	------	------	------	------	------	------	------	------	6
Ravola sandy loam, 3 to 8 percent slopes	------	2. 3	------	26	------	33	------	33	135	9
Ravola sandy loam, eroded, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	5
Ravola sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	60	25
Ravola sandy loam, deep over gravel, 2 to 5 percent slopes	------	2. 0	------	25	------	30	------	30	125	10
Ravola sandy loam, moderately deep and deep over shale, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Ravola sandy loam, moderately deep and deep over shale, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	5
Ravola sandy loam, moderately deep over shale, eroded, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	4
Ravola stony sandy loam, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	4
Ravola loam, 0 to 3 percent slopes	------	3. 5	------	33	------	45	------	45	200	12
Ravola loam, deep over gravel, 0 to 3 percent slopes	------	2. 5	------	27	------	35	------	35	150	10
Ravola loam, moderately deep and deep over shale, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	6
Ravola loam, moderately deep and deep over shale, 3 to 5 percent slopes	------	------	------	------	------	------	------	------	------	5
Ravola loam, moderately deep and deep over shale, poorly drained, 0 to 5 percent slopes	------	------	------	------	------	------	------	------	------	8
Ravola sand, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	85	5
Ravola sand, poorly drained, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	7
Redfield fine sandy loam, 0 to 3 percent slopes	1. 0	3. 5	11	33	------	45	20	45	200	12
Redfield fine sandy loam, 3 to 5 percent slopes	------	3. 3	------	32	------	43	------	43	190	12
Redfield fine sandy loam, eroded, 2 to 5 percent slopes	------	------	------	------	------	------	------	------	------	6
Redfield fine sandy loam, poorly drained, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	85	25
Redfield fine sandy loam, eroded, poorly drained, 2 to 5 per-										

See footnote at end of table.

TABLE 6.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Alfalfa		Wheat		Barley		Oats		Pasture	
									Irrigated	Non-irrigated
	A	B	A	B	A	B	A	B	B	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
cent slopes										15
Redfield loam, 0 to 3 percent slopes	1.8	4.0	28	35		50		50	225	13
Redfield loam, 3 to 5 percent slopes		3.3		32		43		43	190	11
Redfield loam, poorly drained, 0 to 3 percent slopes									60	25
Redfield clay loam, 0 to 3 percent slopes	1.8	4.0	28	35		50		50	225	13
Redfield clay loam, 3 to 7 percent slopes		3.3		32		43		43	190	11
Redfield clay loam, eroded, 0 to 3 percent slopes										8
Redfield clay loam, poorly drained, 0 to 7 percent slopes									60	25
Redfield loamy fine sand, 0 to 3 percent slopes		1.5		15		20		20	100	9
Redfield loamy fine sand, 3 to 8 percent slopes		1.5		15		20		20	100	9
Redfield loamy fine sand, poorly drained, 0 to 8 percent slopes									60	16
Redfield silty clay, 0 to 3 percent slopes		3.5		33		45		45	200	16
Redfield silty clay, poorly drained, 0 to 3 percent slopes									50	18
Riverwash										1
Rough broken and stony land										1
Rough gullied land, Billings soil material										4
Rough gullied land, Naples soil material										4
Rough gullied land, Navajo soil material										4
Rough gullied land, Redfield soil material										4
Rough hilly land										3
Rough mountainous land										5
Shavano fine sandy loam, shallow, 0 to 3 percent slopes	1.0	1.5		15		20	35	20	100	6
Shavano fine sandy loam, shallow, 3 to 5 percent slopes		1.5		15		20		20	100	6
Shavano fine sandy loam, shallow, 5 to 10 percent slopes		1.3		13		15		15	85	5
Shavano fine sandy loam, moderately deep, 0 to 3 percent slopes	1.2	2.0	35	25		30		30	125	10
Shavano fine sandy loam, moderately deep, 3 to 8 percent slopes		1.7		22		27		27	110	9
Shavano fine sandy loam, moderately deep, poorly drained, 0 to 5 percent slopes									70	10
Shavano fine sandy loam, shallow, poorly drained, 0 to 10 percent slopes										8
Shavano loam, moderately deep, 3 to 5 percent slopes		2.5		27		35		35	150	18
Shavano loam, moderately deep, poorly drained, 0 to 5 percent slopes									70	20
Shavano-Sheppard fine sands, 2 to 7 percent slopes									85	6
Shavano-Sheppard fine sands, duny, 2 to 10 percent slopes									85	4
Shavano-Sheppard fine sands, poorly drained, 2 to 10 percent slopes										8
Shavano-Sheppard fine sands, dunes and rock outcrops										3
Shavano-Sheppard fine sandy loams, 0 to 5 percent slopes		2.0		25		30		30	125	9
Shavano-Sheppard fine sandy loams, poorly drained, 0 to 5 percent slopes										12
Sheppard fine sand, hummocky, 2 to 10 percent slopes										3
Sheppard fine sand, duny, 0 to 3 percent slopes										3
Sheppard fine sand, duny, poorly drained, 0 to 3 percent slopes										6
Sheppard sand, deep over gravel, hummocky, poorly drained, 0 to 3 percent slopes										5
Tabiona fine sandy loam, 0 to 3 percent slopes		3.5		33		45		45	200	16
Tabiona fine sandy loam, 3 to 7 percent slopes		3.3		31		42		42	190	14
Tabiona clay loam, 0 to 3 percent slopes		4.0		35		50		50	225	18
Tabiona clay loam, 3 to 7 percent slopes		3.8		33		48		48	220	16
Tabiona loam, 0 to 3 percent slopes		4.0		35		50		50	225	18
Tabiona loam, 3 to 10 percent slopes		3.7		34		47		47	215	16
Tabiona loam, deep over gravel, 0 to 3 percent slopes		3.0		30		40		40	200	16
Tridell clay loam, 2 to 5 percent slopes		2.5		28		35		35	150	10
Tridell stony clay loam, 2 to 5 percent slopes									100	10
Tridell loam, 2 to 5 percent slopes		2.0		25		30		30	125	10
Tridell stony loam, 2 to 5 percent slopes									90	8

[1] The term "cow-acre-days" is used to express the carrying capacity or grazing value of pasture. It equals the number of days in a year that 1 acre will provide grazing for 1 animal unit without injury to the sod. An animal unit is 1 cow, steer, or horse or 5 sheep.

Characteristics of the soil that influence productivity include topography, erosion, and drainage. Also important are the content of soluble salts and alkali, depth of the soil over bedrock, and the presence of cobblestones or a hardpan of lime.

Yields vary greatly, depending on the kind of management practiced. Improved yields can be obtained by using a suitable cropping system, applying the proper kinds and amounts of fertilizer, and using other good management practices discussed in the section, Management of Cropland and Pasture.

Management of Cropland and Pasture

The soils of the Roosevelt–Duchesne Area are used primarily for irrigated crops and for irrigated and nonirrigated pastures. In table 7 are shown the approximate acreage and proportionate extent of cropland, pasture, and other land by groups of soils.

As shown in table 7, a much smaller acreage is used for crops than for pasture. The deep soils on recent alluvium, which are mainly soils of the Naples, Billings, and Fruita series, have the highest proportion of cropland and the lowest proportion of pasture. Nevertheless, even though these soils are the best in the Area for crops, less than one-third of their acreage is used for that purpose. Shallow soils on recent alluvium, mainly the Ashley and Myton, have the lowest proportion of cropland and the highest proportion of pasture.

An estimated 75 percent of the cropland in the Area is used for alfalfa. An additional 20 percent is used for small grains, and about 5 percent is used for row crops, mainly corn and potatoes.

The low yields of alfalfa result from lack of irrigation water, diseases, and in some areas from the use of soils not well suited to this crop. Also, the yields are low if alfalfa is grown on the same soil for too many years in succession. In some areas alfalfa is used for hay until the stand dies out and is replaced by grasses.

Management of cropland.—Good management on the soils used for crops includes the use of suitable rotations and of adequate amounts and proper kinds of fertilizer. In addition, the soils must be irrigated properly and drained adequately. (See section, Irrigation, Drainage, and Salinity.)

A rotation suggested for the soils of the benches and mesas, principally the Mesa, Neola, and Avalon soils and the deep soils on recent alluvium, consists of 3 years of alfalfa, 1 year of a small grain, 1 year of a row crop, and 1 year of alfalfa and a small grain grown together. Barley is preferred as the small grain, but under some conditions wheat should be substituted on a small part of the acreage used for small grains. Of the row crops, corn grown for silage is generally suggested, but other row crops may also be grown.

Certain rotations are suitable for specific areas. For coarse-textured soils that have uneven slopes, a suitable rotation is sweetclover seeded with a small grain the first year; sweetclover pastured during spring and early in summer of the second year and plowed under for green manure late in summer or early in fall; a row crop grown the third year; and alfalfa seeded with barley the fourth year.

For the Ashley, Myton, and other shallow soils, a short rotation that includes red clover is suggested. Red clover is used in place of alfalfa because it has shown promising results on these soils. It is best to cut the first crop for hay and to allow the second crop to mature for seed.

All the barnyard manure available should be added to the soils. Phosphate fertilizer is best added according to the needs determined by soil tests. Information on how to make soil tests can be obtained through the Agronomy Department of the Utah Agricultural Experiment Station. Superphosphate is applied preferably to the first clover crop. For coarse–textured soils, green–manure crops should be grown and plowed under.

On some of the cropland, no systematic management is practiced. Little attention is given to rotating the crops or to fertilizing the soils. Alfalfa usually is grown until it dies out, after which a small grain is grown for 2 or 3 years, and then alfalfa is reseeded.

Management of pastures.—Most of the pastures in this area are nonirrigated. Investigations conducted by Blanch and Stewart [5] show that only 28,491 acres of pasture was under irrigation in 1943.

Table 7 also shows a total acreage of idle land that is almost half as great as the total land in crops. Idle areas consist of land that has been cropped at least 1 year out of the several preceding years.

Most of the irrigated pasture is on the shallow soils on recent alluvium and on the soils of benches and mesas.

[5] Blanch, George T., and Stewart, Clyde E. utilization of irrigable land in the reservation area of the uinta basin, utah. Utah Agr. Expt. Sta. Bul. 303. 1943.

Table 7.—*Approximate acreage and proportionate extent of land in various uses*

Soil group [1]	Cropland		Pasture		Urban land and farmyards		Idle land		Wasteland		Total acreage
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*
Deep soils on recent alluvium	42, 056	27. 8	87, 385	57. 8	227	0. 2	20, 909	13. 8	581	0. 4	151, 158
Soils of benches or mesas	29, 272	21. 8	93, 383	69. 6	199	. 2	11, 221	8. 4	------	------	134, 075
Shallow soils on recent alluvium	4, 981	6. 7	68, 589	91. 8	------	------	1, 102	1. 5	------	------	74, 672
Shallow and moderately deep soils over bedrock	5, 880	7. 9	62, 073	83. 9	3	(2)	6, 038	8. 2	------	------	73, 994
Miscellaneous land types; mostly rough lands	------	------	169, 980	80. 6	------	------	------	------	41, 035	19. 4	211, 015
Total	82, 189	12. 7	481, 410	74. 6	429	0. 1	39, 270	6. 1	41, 616	6. 5	644, 914

[1] In composition and distribution, these groups of soils correspond closely to the soil associations. (See section, Soil Associations.)

[2] Less than 0.1 percent.

Although these soils need large amounts of moisture, much water can be wasted through overirrigation. Inferior plants have invaded pastures that have been overirrigated. Improved pasture management includes applying irrigation water carefully and selecting grasses best suited to the soil. Information on pasture mixtures suitable for seeding can be obtained through the Utah Agricultural Experiment Station.

In general the nonirrigated range pastures have been deteriorating over the years. There has been a marked reduction in the amount of palatable forage and an increase in erosion. Large areas of low-lying range, outside the national forests, show no permanent improvement, and more than 85 percent of this acreage is deteriorating even further.

Better management is needed to control erosion, improve the plant cover, and increase the carrying capacity of the range pastures. The slope of the soil and the condition of the vegetation should be considered in range management. The following are practices suggested for improving the range pastures: (1) More effective handling of livestock, including more supplemental feeding and the increased use of feed lots, reduced grazing on spring, fall, and winter ranges; and rotation of grazing according to the season; (2) control of rodents, and (3) artificial reseeding.

Irrigation, Drainage, and Salinity

Crops grown in the Roosevelt-Duchesne Area must be irrigated because precipitation is not sufficient for dryland farming to be successful. As a result of improper irrigation, many of the soils have become poorly drained and salts have accumulated. The following is a discussion of the irrigation, drainage, and salinity of the soils in the Area.

Irrigation.—Most of the water used for irrigating is obtained from the high Uinta Mountains, which lie north of the Area. Much of it is derived from snow that melts and runs off the south slope of the mountains. The main streams that supply irrigation water to the Area are the Duchesne, Lake Fork, Uinta, and Whiterocks Rivers and their tributaries.

During fall, winter, and early in spring, the flow of water is low; late in spring and early in summer, when most of the snow melts, runoff is rapid and streams are high. There is a shortage of irrigation water both before and after the period of high water.

A large basin, the Moon Lake Reservoir, and several small reservoirs have been constructed. These are valuable for storing floodwaters and thus preventing shortages of irrigation water during the latter part of the growing season. Throughout the Area there are many irrigation systems consisting of long canals and lateral ditches.

In this area, irrigation farming was first practiced by the Indians about 1890. The Indians built small ditches to carry the water from the various streams. By 1905, when the area was opened to settlement, about 6,000 acres was under irrigation and was used for cultivated crops. The Uinta Canal, the first in the Roosevelt-Duchesne Area, was constructed in 1906. By 1917 most of the major canals were completed.

A study of irrigation made in the Area in 1936 gave a detailed analysis of the land served by a typical canal.[6] The data strongly indicates that much water was being used on soils unsuited to irrigation farming. It also showed that if irrigation water were used only on the more suitable soils, there would be enough water to irrigate these soils adequately. The amount of irrigation water needed annually per acre was shown to be 3 acre-feet at the point of diversion from the river or 2½ acre-feet delivered to the field. About 25 percent of the water is lost while it is being conveyed from the river to the field.

The corrugation method of irrigation is used most commonly on cropland; generally the furrows are not made on the contour. On irrigated pasture the free-flooding method of irrigation is practiced.

Most of the irrigation water is used between May and September. Some is applied early in spring, chiefly to encourage the crops to germinate. It often is necessary to irrigate after seeding to make sure the seedlings will emerge.

On some soils irrigation water is allowed to run over the same area for days at a time. Such a practice wastes water, causes erosion, lowers the fertility of the soil, and enables inferior plants to invade the field. Many areas can be improved greatly by applying water properly.

Irrigation has created many agricultural problems. These include waterlogging, seepage, erosion, and the accumulation of soluble salts and alkali in the soils. The following is a discussion of the effects of irrigation on drainage and on the accumulation of salts and alkali.

Drainage.—Because of the sloping relief and the many drainageways, surface drainage is medium throughout much of the Area. Nevertheless, many small areas have become poorly drained. Except for the Leeton soils and some areas of Green River and Ashley soils, none of the soils showed evidence of waterlogging before irrigation was introduced. In some spots a stratum of bedrock extends across natural drainageways and slows the movement of the ground water. Internal drainage is blocked in many places by the bedrock of impervious shale or sandstone that underlies much of the Area. In the Navajo, Christianburg, and other fine-textured soils, internal drainage is naturally slow. Excess water has accumulated in some poorly drained soils because of overirrigation.

Only scattered areas of poorly drained soils have been reclaimed, principally because of the lack of drainage outlets for individual farm drains. It is feasible to reclaim some areas of poorly drained soils, but detailed investigations are needed before artificial drainage is installed. In general the cost of installing artificial drainage is high.

Salts and alkali.—Associated with poor drainage is the accumulation of soluble salts. As the ground water rises to the surface and evaporates, it leaves soluble salts on the surface. Soluble salts have accumulated naturally in the soils of the Area because they occur in the parent material and the underlying bedrock and also because the water entering the soil carries salts in solution. Even under natural conditions, some of the soils contained excessive quantities of soluble salts. In many soils,

[6] CLYDE, GEORGE D., and BISHOP, A. ALVIN. LAND AND WATER USE STUDIES—UINTA BASIN. Utah Agr. Expt. Sta. 1935. [Unpublished report.]

however, the high concentrations of salts have been caused or intensified by seepage of irrigation water. Excessive amounts of salts increase the concentration of the soil solution. This interferes with the intake of moisture and nutrients by plant roots.

In addition to having concentrations of soluble salts, some of the soils of the Area are affected by alkali. Alkali acts chemically on the soil colloids to produce unfavorable physical characteristics in the soil.

The minimum quantity of salt and the minimum amount of alkali that interfere with the growth of plants depend somewhat on the composition of the salt, its distribution, the kind of soil, moisture conditions, temperatures, crops grown, and the age of the plants. In general, however, concentrations of salt of 0.2 or more percent are considered injurious to plants. Concentrations of slightly more than 0.2 percent will generally result in lower yields of most cultivated crops. The concentration must be considerably higher before it will kill crops completely.

During the survey of the Area, between 1937 and 1940, an analysis was made of the salinity of different soils at 29 different sites. Determination of the content of soluble salts in the samples was made by the electrolytic bridge method. Results of these tests are shown in table 8. For interpreting the effect of the salts and alkali, or both, on crops, it is important to know how they are distributed in the soil, as well as the total amount present.

When the fieldwork for the survey was completed in 1940, it was recognized that salinity and the content of alkali, along with drainage, were not static but were generally becoming less favorable in the Area. Therefore, in 1953, another study of salinity, content of alkali, and drainage was made. This study showed that an additional 47,000 acres had become poorly drained since 1940. By collecting and analyzing soil samples from the 29 sites previously tested between 1937 and 1940, most of which were then relatively free of salts, soil scientists found that the amount of salts in the soils had increased considerably. (See table 8.)

TABLE 8.—*Salinity data for certain soils, determined by analyses of samples taken from identical sites*

Soil [1]	Soluble salts (1937–40) at depths of—		Soluble salts (1953) at depths of—	
	0 to 12 inches	0 to 60 inches	0 to 12 inches	0 to 60 inches
	Percent	*Percent*	*Percent*	*Percent*
Billings clay loam, 0 to 3 percent slopes	0. 06	0. 08	0. 40	0. 43
	. 10	. 09	. 56	. 58
Billings clay loam, moderately deep and deep over shale, 0 to 3 percent slopes	. 16	. 35	. 40	. 48
Billings silty clay, 0 to 3 percent slopes	. 08	. 08	. 15	. 34
Fruita fine sandy loam, 0 to 3 percent slopes	. 39	. 13	. 51	. 30
Fruita loam, 0 to 3 percent slopes	. 05	. 03	. 19	. 29
Mesa fine sandy loam, deep, 0 to 3 percent slopes	. 10	. 13	. 47	. 32
	. 12	. 13	. 40	. 38
	. 04	. 03	. 18	. 32
	. 04	. 04	. 04	. 03
Myton stony sandy loam, 0 to percent slopes	. 03	-------	. 15	-------
	. 02	-------	. 18	-------
Naples sandy clay loam, 0 to 3 percent slopes	. 03	. 08	1. 14	. 53
	. 03	. 03	. 63	. 30
	. 07	. 17	. 11	. 21
	. 06	. 16	. 69	. 97
	. 04	. 13	1. 31	. 39
Naples sandy loam, 0 to 3 percent slopes	. 04	. 04	1. 86	. 56
	. 07	. 04	. 79	. 36
Naples loam, 0 to 3 percent slopes	. 06	. 06	. 42	. 21
Redfield loam, 0 to 3 percent slopes	. 02	. 02	. 04	. 05
Redfield fine sandy loam, 0 to 3 percent slopes	. 02	. 03	. 61	. 26
Redfield fine sandy loam, poorly drained, 0 to 3 percent slopes	. 44	. 29	. 28	. 13
Redfield silty clay, 0 to 3 percent slopes	. 28	. 11	. 13	. 08
	. 09	. 35	. 26	. 36
	. 07	. 07	. 44	. 56
	. 12	. 08	. 20	1. 06
	. 05	. 08	. 13	. 25
	. 15	. 09	. 30	. 24
Average of all samples	. 10	. 11	. 45	. 36

[1] Samples of some soils were taken from several locations; samples of others were taken from only one location.

Formation and Classification of Soils

Parent material as well as climate, vegetation, and relief and drainage have influenced the development of the soils of the Roosevelt–Duchesne Area. Some of the factors that have affected soil formation and that account for major differences among the soils are described in table 9.

Soil Formation

The soils of the Area have formed mainly from a mixture of quartzite, sandstone, and shale but partly from small amounts of limestone. The adjacent Uinta Mountains consist mainly of pre-Cambrian quartzite that is distinctly purple. During periods of glaciation, much of this quartzite was transported from the mountains by glacial streams. It was deposited over the Area in the form of gravel and cobblestones with some boulders.

The sandstone and shale parent material was derived from two rock formations. These are the Duchesne River and the Uinta formations of the Tertiary system, which underlie the soils of the Area. In many places the bedrock is exposed.

The Duchesne River formation, of the Oligocene epoch, is the upper, or more recent, formation. It underlies the northern part of the Area. This formation is composed of alternating bands of sandstone and red, brown, and variegated clay shales. In places lenses of arenaceous clay shale, generally less than 12 inches thick, are enclosed in the sandstone. During the process of weathering, the clay shale material completely covered the sandstone, and so it appears that the layer of clay shale is several feet thick. The sandstone, however, is dominant. In many places it is conglomeratic.

The maximum thickness of the Duchesne River formation is about 1,500 feet. Along the northern boundary of the Area, this formation is bordered by older rocks of

TABLE 9.—*Soil series classified by order and great soil group and some factors that have contributed to their formation*

Great soil group and soil series	Physiographic position	Dominant internal drainage	Parent material
ZONAL SOILS			
Sierozem soils:			
Avalon	Benches or terraces	Medium	Old alluvium derived from very pale brown sandstone and shale.
Mesa	Mesa benches	Medium to slow	Old alluvium derived from quartzite and mixed sedimentary rock.
Montwel	Upland slopes and ridges	Medium to slow	Residuum from sandstone and shale of the Duchesne River formation.
Myton	Low river terraces	Rapid	Cobbly alluvium derived from quartzite and mixed sedimentary rock.
Naturita	Mesa benches and valley benches	Medium	Old alluvium derived from quartzite and mixed sedimentary rock.
Shavano	Upland slopes and ridges	Medium	Residuum from sandstone of the Duchesne River formation.
Brown soils:			
Emmons	Alluvial fans and foot slopes	Medium	Medium textured alluvium derived from quartzite and mixed sedimentary rock.
Millard	Alluvial fans, terraces, and flood plains.	Medium	Old cobbly alluvium derived from quartzite and mixed sedimentary rock.
Tridell	Alluvial fans	Medium	Gravelly alluvium derived from quartzite and mixed sedimentary rock.
INTRAZONAL SOILS			
Calcisols: [1]			
Fruita	Low terraces, alluvial fans, and foot slopes.	Medium	Medium- to coarse-textured alluvium derived from quartzite and mixed sedimentary rock.
Neola	High mesa benches	Slow	Medium to moderately coarse textured old alluvium derived from quartzite and mixed sedimentary rock.
Pariette	Upland slopes and ridges	Medium to slow	Residuum from clay shale of the Uinta formation.
Pavant	High benches and old alluvial fans	Medium to slow	Old cobbly alluvium derived from quartzite and mixed sedimentary rock.
Leeton	Alluvial flood plains	Very slow	Old alluvium derived from quartzite and mixed sedimentary rock.
AZONAL SOILS			
Alluvial soils:			
Ashley	River flood plains	Rapid	Cobbly recent alluvium derived from quartzite and mixed sedimentary rock.
Billings	Alluvial fans and flood plains	Medium	Moderately fine textured alluvium from the Uinta formation.
Christianburg	Flood plains	Very slow	Fine-textured alluvium from the Uinta formation.
Green River	Low first terraces near streams	Medium	Medium to moderately fine textured recent alluvium derived from quartzite and mixed sedimentary rock.
Naples	Alluvial fans and flood plains	Medium	Moderately fine to moderately coarse textured alluvium from the Duchesne formation.
Navajo	Recent flood plains	Slow	Fine-textured alluvium from the Duchesne formation.
Ravola	Alluvial fans and flood plains	Medium to rapid	Moderately fine to coarse textured alluvium from the Uinta formation.
Redfield	Alluvial fans and flood plains	Medium	Moderately fine to moderately coarse textured alluvium from the Duchesne River formation.
Tabiona	Alluvial fans and flood plains	Medium	Medium to moderately coarse textured alluvium derived from quartzite and mixed sedimentary rock.
Lithosols:			
Chipeta	Upland slopes and ridges	Slow	Residuum from clay shale of the Uinta formation.
Regosols:			
Sheppard	Uplands	Rapid	Moderately coarse to coarse textured material deposited mainly by the wind.

[1] HARPER, W. G. MORPHOLOGY AND GENESIS OF CALCISOLS. Soil Sci. Soc. Amer. Proc. 21: 420–424, illus. 1957.

the Uinta Mountains, but the place of contact is obscured by the reworked glacial gravel that caps most of the benches.

Underlying the Duchesne River formation, and also to the south of it, is the Uinta formation, which is composed of fine- and coarse-grained sandstone and arenaceous shales and clays that are dominantly gray.

The colors of the soils have been influenced strongly by the dominant parent material. The soils in the southern part of the Area, formed largely from parent material derived from the Uinta formation, are dominantly pale brown; those in the northern part, formed mainly from material derived from the Duchesne River formation, are dominantly light brown.

The climate of the Area is arid to semiarid. Consequently, the soils are generally low in organic matter and nitrogen and contain large amounts of lime carbonate and salts of calcium, potassium, sodium, and magnesium. The vegetation of the Area is made up of many kinds of plants native to arid and semiarid western regions. Except for the steeper areas, generally classified as miscellaneous land types, most of the soils occur on nearly level to sloping relief. In general the slopes are smooth. Internal drainage of the soils ranges from very rapid to very slow. Many of the soils have become poorly drained as a result of irrigation.

Classification of Soils in Higher Categories

The lower categories of soil classification—phases, types, and series—are explained in the section, Soil Survey Methods and Definitions. Briefly, a soil type consists of one or more phases, and a soil series, of one or more soil types. Soil types or phases (or miscellaneous land types) are the units shown on the detailed soil map.

Soil series are classified in higher categories—the great soil groups and soil orders. Each great soil group is made up of soils that have certain characteristics in common. The broadest categories of soil classification are the three soil orders—zonal, intrazonal, and azonal—in which all of the great soil groups, in turn, are placed. Table 9 shows how the soil series of the Roosevelt-Duchesne Area are classified according to soil order and great soil group.

The major part of the Area lies within the Sierozem soil zone, but the soils in a belt along the northern boundary lie within the Brown soil zone. A discussion of the soil orders and great soil groups of the Area follows. Profiles of representative soils are described for some of the great soil groups.

Zonal soils

Zonal soils reflect the influence of the active factors of soil genesis—climate, vegetation, and living organisms—in their profiles. The zonal soils in the Roosevelt-Duchesne Area have developed mainly through the process of calcification. Under this process, the surface soil is kept supplied with enough calcium to saturate the soil colloids with exchangeable calcium and make them neutral to alkaline reaction.

The zonal soils in the Roosevelt-Duchesne Area are classified in two great soil groups, the Sierozem and the Brown. The Sierozem soils occupy much of the Area, and the Brown soils occur in a narrow belt near the Uinta Mountains.

SIEROZEM SOILS

Sierozem soils have a brownish surface layer that is transitional at increasing depths to lighter colored material and then to an accumulation of carbonate and, in many places, a hardpan layer. In the Roosevelt-Duchesne Area, the Sierozem soils are represented by the Mesa, Naturita, Avalon, Montwel, Myton, and Shavano series.

The Mesa soils occupy extensive areas on high benches, mainly in the central part of the Area. They have developed from old alluvium derived from mixed quartzite and sedimentary rocks that were deposited by streams from the Uinta Mountains. The vegetation consists mainly of sagebrush, shadscale, rabbitbrush, and galletagrass.

Following is a description of the profile of a Mesa sandy clay loam:

A_1 0 to 8 inches, light reddish-brown (5YR 6/4 [7], dry) sandy clay loam; reddish brown (5YR 4/4, moist); weak medium platy structure that breaks easily to moderate fine granular structure; friable; moderately calcareous.

B_2 8 to 14 inches, reddish-yellow (5YR 6/6, dry) clay loam; yellowish red (5YR 4/6, moist); weak medium angular blocky structure but breaks to medium to coarse granular structure; firm; moderately to strongly calcareous; contains some pinkish-white mottles of segregated lime.

B_{3ca} 14 to 35 inches, pink (5YR 8/4, dry) marly clay loam; light reddish brown (5YR 6/4, moist); massive; firm; strongly calcareous; this is the horizon of maximum accumulation of lime carbonate.

D 35 to 60 inches, cobblestones and coarse gravel containing a small amount of fine soil material.

Except for the thickness of the solum, the Naturita soils are similar in profile characteristics to the associated Mesa soils. The Naturita soils are less than 20 inches deep over the cobbly D horizon.

The Avalon soils are deep and as a rule are moderately fine textured. They occur on low benches or terraces in the south-central part of the Area. The parent rock is very pale brown shale and sandstone. The Avalon soils have a moderately well developed B_2 horizon. In some small areas the B_2 horizon has a distinct prismatic structure, and in most places this layer and the underlying material have a high pH, which indicates that sodium may have been an influence in the formation of the soil.

The Montwel soils occur on nearly level to gently rolling uplands and ridges. In most places they are associated with the Shavano soils. The Montwel and Shavano soils have formed from residuum of the Duchesne River formation, mainly light reddish-brown or light-brown sandstone. In many places the sandstone is interbedded with shale or clay shale. In both the Montwel and Shavano soils, the texture becomes finer with increasing depth but there is little evidence of clay flows and orientation on the surfaces of the peds. The Montwel soils have a prominent layer of lime just above the bedrock, but this layer is lacking in the Shavano soils.

The Myton soils, which have formed from cobbly

[7] Symbols express Munsell color notations, which are explained in the Soil Survey Manual, Agriculture Handbook No. 18, and which define color more precisely than it can be defined in words.

alluvium, are shallow and have an accumulation of lime carbonate, mostly on the lower surfaces of the cobblestones and gravel.

BROWN SOILS

Brown soils have a brown surface layer that is transitional at increasing depths to lighter colored material; below this is an accumulation of carbonate. In the Roosevelt-Duchesne Area, the Brown soils are represented by the Millard, Emmons, and Tridell series.

The Millard soils occur on smooth alluvial fans, terraces, and flood plains at comparatively high elevations. These soils lie at the base of the Uinta Mountains in the northern part of the Area. They occur near the town of Whiterocks. The parent material of these soils consists of a mixture of quartzite and sedimentary rocks. Many quartzite cobblestones occur throughout the profile. The present vegetation consists principally of sagebrush, juniper, and pinyon pine.

Following is a description of a profile of a Millard stony sandy loam:

- A_{11} 0 to 5 inches, brown (10YR 5/3, dry) stony sandy loam; dark yellowish brown (10YR 3/4, moist); moderate fine granular structure; friable; noncalcareous.
- A_{12} 5 to 15 inches, stony sandy loam that is slightly lighter in color than soil material in layer above; weak fine granular structure; friable; noncalcareous.
- B_2 15 to 35 inches, reddish-brown (5YR 5/4, dry) stony sandy clay loam; yellowish red (5YR 4/6, moist); weak medium subangular blocky structure; firm; noncalcareous.
- B_3 35 to 42 inches, light reddish-brown (5YR 6/4, dry) stony clay loam; reddish brown (5YR 5/4, moist); massive; firm; slightly to moderately calcareous.
- C_{ca} 42 to 48 inches, light brownish-gray (10YR 6/2, dry) stony sandy clay loam; grayish-brown (10YR 5/2, moist); massive; firm; strongly calcareous; many light-gray fragments of lime mixed with the soil material.

The Emmons soils are moderately well developed. They occur on alluvial fans and foot slopes near the base of the Uinta Mountains. These soils have formed in medium-textured alluvium derived from mixed sedimentary rocks, mainly shale, sandstone, and limestone. The B_2 horizon has a well-developed structure, but the texture is only slightly finer than that of the surface soil. The entire profile is calcareous, and a prominent layer of lime occurs below the B_2 horizon.

The Tridell soils occur on alluvial fans and on old flood plains that are higher than the present flood plains and stream channels. These soils range from shallow to moderately deep over a coarse-textured gravelly substratum. They are calcareous throughout and have a weakly developed B_2 horizon. The B_2 horizon overlies a prominent C_{ca} horizon.

Intrazonal soils

The characteristics of intrazonal soils are influenced more by parent material or relief than by climate and vegetation. In the Roosevelt–Duchesne Area, the only intrazonal soils are the Calcisols.

CALCISOLS

Calcisols have formed on highly calcareous parent material or material that liberates much calcium on weathering. They occur in arid and semiarid regions of the United States, in both the Sierozem and Brown soil zones. The Calcisols occur mainly on well-drained sites and have developed through the process of calcification. In these soils part of the lime has been removed from the surface soil by percolating waters and deposited in a lower layer designated as the C_{ca} horizon. The C_{ca} horizon is generally a foot or more thick and has a prominent white or pinkish-white color. The Calcisols do not have a textural or a structural B_2 horizon. They are represented in the Area by the Neola, Pavant, Fruita, and Pariette series.

The Neola soils, which are typical Calcisols, have formed from medium to moderately coarse textured old alluvium derived from quartzite and mixed sedimentary rock. They occur on high mesa benches, principally in the Sierozem soil zone.

Following is a description of the profile of a Neola loam:

- A_1 0 to 10 inches, light-brown (7.5YR 6/4, dry) loam; dark brown (7.5YR 4/4, moist); moderate fine to medium granular structure; friable; moderately calcareous.
- C_{ca1} 10 to 26 inches, pinkish-gray (7.5YR 7/2, dry), light-brown (7.5YR 6/4, moist) loam; contains a weakly cemented, massive hardpan of lime.
- C_{ca2} 26 to 36 inches, pinkish-white (7.5YR 8/2, dry) indurated hardpan of lime; pink (7.5YR 7/4, moist); contains many round cobblestones and pebbles of quartzite.
- C 36 inches+, cobblestones and gravel that are weakly cemented with lime.

The Pavant soils are similar to the Neola soils, but they occur in areas of greater precipitation, contain more organic matter, and generally have a darker colored surface layer. The Fruita soils have developed in strongly calcareous, medium- to coarse-textured, deep materials. The Pariette soils have formed in place from clay shale of the Uinta formation.

The Leeton soils have a prominent accumulation of lime, but unlike the typical Calcisols they are naturally poorly drained. They may be referred to as "wet" Calcisols. The Leeton soils are associated with the Myton soils, but they occur in lower positions. As a result internal drainage is very slow. Although these soils occur in the Sierozem soil zone, poor drainage has caused the surface soils to be darker than those of the Sierozem soils.

Azonal soils

The azonal order consists of soils that do not have well-developed profile characteristics. Their youth, relief, or differences in parent material have prevented a normal profile from forming. The azonal soils in the Roosevelt-Duchesne Area are in three great soil groups—the Alluvial soils, the Lithosols, and the Regosols.

ALLUVIAL SOILS

This great soil group consists of soils that have developed from transported and relatively recently deposited alluvium. The profile characteristics of the soils are determined largely by the kinds of sediments deposited.

In the Roosevelt-Duchesne Area, the Alluvial soils occur extensively along the principal streams. Their parent material has been altered only slightly since it was deposited. These soils have a weakly developed A_1 horizon that is underlain by the C horizon, or parent material. The Alluvial soils in the Area are represented by the Ashley, Billings, Christianburg, Green River, Naples, Navajo, Ravola, Redfield, and Tabiona series. Although these soils have a similar sequence of horizons, they have different characteristics that reflect differences in climate, drainage, or kind of parent material.

The Ravola, Billings, and Christianburg soils are similar in color but differ markedly in texture. In general the Ravola soils are medium to moderately coarse textured, the Billings are moderately fine textured, and the Christianburg are fine textured. The parent materials of all of these soils were derived from the light-gray Uinta formation.

The Naples, Redfield, and Navajo soils are mainly light brown to light reddish brown. These soils have formed on alluvial fans and flood plains of the smaller intermittent streams. Their parent materials were derived mainly from the Duchesne River formation.

The soils of the Ashley and Green River series occur on the flood plains of the larger streams, mainly in the valley of the Duchesne River. Their parent material was derived from many kinds of rock, much of which washed down from the Uinta Mountains. Although the Ashley soils are gravelly and are rapidly permeable, the Green River soils are free of gravel and most of them are moderately permeable. The Ashley and Green River soils are subject to overflow when the streams are high.

The Tabiona soils occur on alluvial fans and flood plains in the Brown soil zone. They differ from the Redfield soils in having a darker A_1 horizon that contains a somewhat greater content of organic matter.

LITHOSOLS

This azonal group of soils consists of shallow, weakly to strongly consolidated rock in which the soil characteristics are not clearly expressed. In the Roosevelt-Duchesne Area, only the Chipeta soils are classified as Lithosols. The Chipeta soils have formed from residuum of soft clay shale of the Uinta formation. The genetic characteristics of these soils are very weakly expressed, and the characteristics of the clay shale parent material are dominant.

REGOSOLS

The soils of the Regosol great soil group consist of deep unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed. In the Roosevelt-Duchesne Area, the Sheppard soils are classified as Regosols. These soils occur in the uplands, are coarse textured, and have been modified by the wind.

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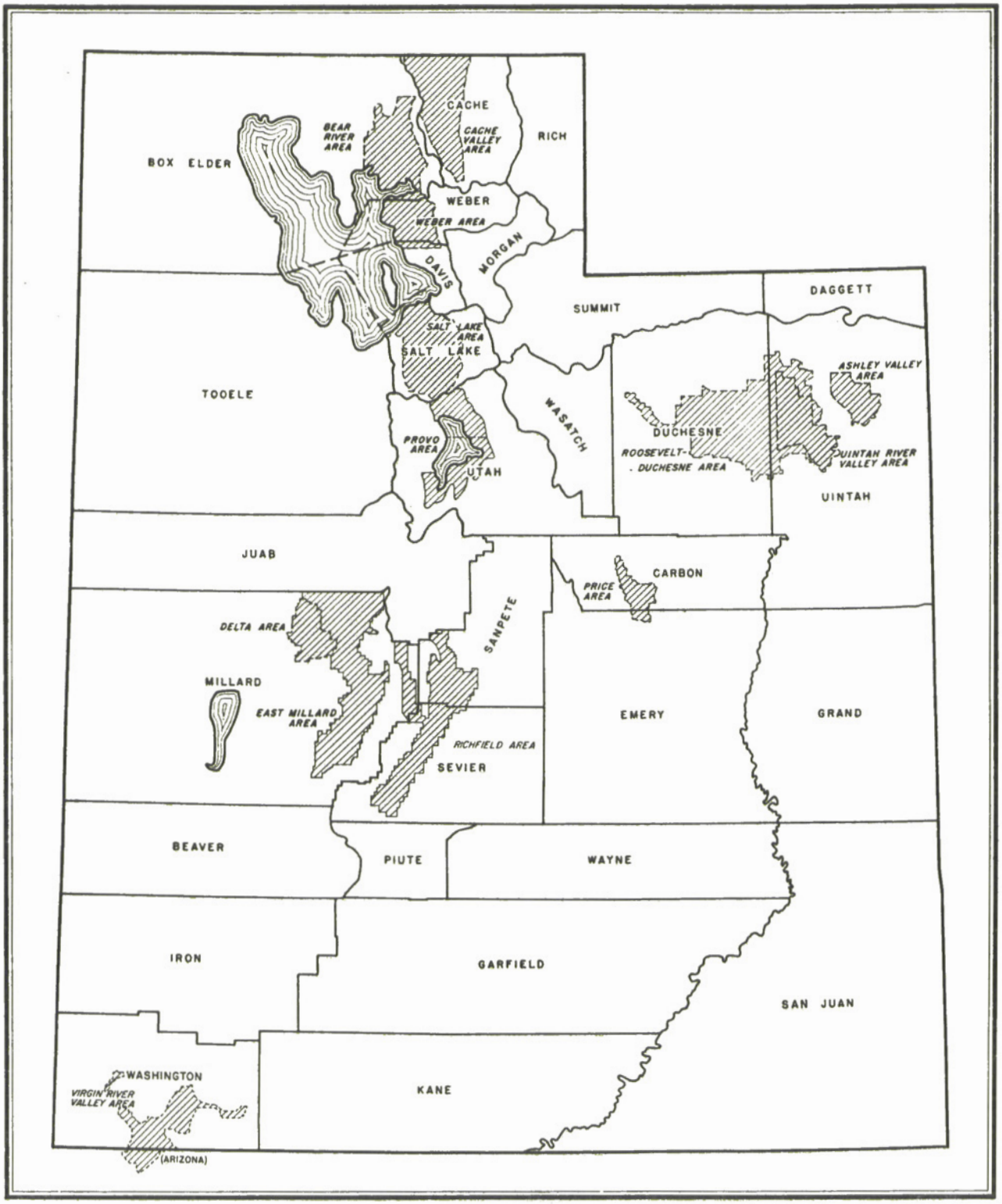

Areas surveyed in Utah shown by shading.

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