THE LOOK OF OUR LAND

AN AIRPHOTO ATLAS OF THE RURAL UNITED STATES:

The Plains and Prairies

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U.S. DEPARTMENT OF AGRICULTURE    ECONOMIC RESEARCH SERVICE    AGRICULTURE HANDBOOK NO. 419
ABSTRACT

Airphotos illustrate land use patterns and terrain in five land resource regions near the 100th meridian. Portions of small-scale airphoto index sheets and a stereopair of airphotos accompany the description of each area that is reproduced from U.S. Department of Agriculture, Agriculture Handbook 296, "Land Resource Regions and Major Land Resource Areas of the United States."

Key Words: Land resources, Land use patterns, Airphotos, Land resource regions, Land resource areas, Plains and Prairie States.

Studies in the series on The Look of Our Land—An Airphoto Atlas of the Rural United States include:

A. Northwestern Forest, Forage, and Specialty Crop Region
B. Northwestern Wheat and Range Region
C. California Subtropical Fruit, Truck, and Specialty Crop Region
D. Western Range and Irrigated Region
E. Rocky Mountain Range and Forest Region
F. Northern Great Plains Spring Wheat Region
G. Western Great Plains Range and Irrigated Region
H. Central Great Plains Winter Wheat and Range Regions
I. Southwestern Plateaus and Plains Range and Cotton Region
J. Southwestern Prairies Cotton and Forage Region
K. Northern Lake States Forest and Forage Region
L. Lake States Fruit, Truck, and Dairy Region
M. Central Feed Grains and Livestock Region
N. East and Central General Farming and Forest Region
O. Mississippi Delta Cotton and Feed Grains Region
P. South Atlantic and Gulf Slope Cash Crop, Forest, and Livestock Region
Q. Northeastern Forage and Forest Region
R. Northern Atlantic Slope Truck, Fruit, and Poultry Region
S. Atlantic and Gulf Coast Lowlands Forest and Truck Crop Region
T. Florida Subtropical Fruit, Truck Crop, and Range Region

This handbook, subtitled, "The Plains and Prairies," includes regions F, G, H, I, and J.
The Look of Our Land—
An Airphoto Atlas of the Rural United States:

THE PLAINS AND PRAIRIES

This atlas then brings together the text of Agriculture Handbook 296 with photos to show land use and related information according to an established regional and area classification of U.S. land resources. The airphotos in this handbook were selected to show characteristics and land use in 36 resource areas in 11 States in the area along the 100th meridian. Accompanying the photos of each area is a brief description of land use, climate, soils, and topography for that area.

The ways we use our land are usually described verbally or quantitatively, or are depicted on maps. These presentations are informative but limited. There is no substitute for seeing, and an aerial view is unsurpassed for observing certain phenomena on the surface of the earth. Aerial photographs, used with maps and descriptions, provide a comprehensive idea of how land is used. Such richly detailed photos can be viewed stereoscopically for three-dimensional study of relationships between items on the earth’s surface and man’s activities.

USE OF THE AIRPHOTO ATLAS

Two facing pages are devoted to each land resource area. A stereopair, usually at a scale of 1:20,000, shares each right-hand page with a description of the area that is reproduced from Agriculture Handbook 296. To locate and orient the terrain shown in the stereopair, the reader should refer to the numbers on the photo index sheet (described below) on the left-hand page. He will note that the compass orientations of the stereopairs vary, but the index sheet clarifies the orientation.

The area shown on a stereopair overlaps two points on a flight line showing the same portion of the earth’s surface. When viewed through a simple pocket stereoscope the scene appears three-dimensional. Any text on aerial photographic interpretation or photogrammetry describes how such photos are made and how to use the stereoscope.

Each left-hand page shows an aerial photographic index sheet that includes the area of the facing stereopair. Each index sheet was selected to match the land use description for the given area. An index sheet is an uncontrolled mosaic made up of many individual airphotos. The photos are assembled with their identification numbers showing, matched by eye, and mounted on a board. The group is rephotographed, reduced in scale, and printed for use as a reference for locating specific photographs. Most of the index sheets in this bulletin are reproduced at their original scale of 1:63,360. A caution about using the index sheets: Since many individual photos were fitted together by eye, the fit is not always precise, so measurements of distance or area on index sheets are only approximate.

Each index sheet is oriented with north at the top. In some cases, flight lines of the individual photos were other than north-south, so the page must be rotated to read the number. To aid identification, the bottom label of each index sheet gives the following identification: Land resource area number, county, State, year and month of photography, index sheet number and scale, and agency for which the photography was flown. The letter “P” on the label indicates only partial coverage of the county.

Abbreviated sources shown on the photo index sheets are: ASCS, Agricultural Stabilization and Conservation Service; SCS, Soil Conservation Service; and USFS, Forest Service, of USDA.

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NORTHERN GREAT PLAINS SPRING WHEAT REGION

52 Brown Glaciated Plain
53 Dark Brown Glaciated Plain
54 Rolling Soft Shale Plain
55 Black Glaciated Plains
56 Red River Valley of the North
57 Western Minnesota Forest - Prairie Transition
F—NORTHERN GREAT PLAINS SPRING WHEAT REGION
131,100 square miles

The fertile soils and the dominantly smooth topography of this region are favorable for agriculture, but the low rainfall and short growing season severely restrict the crops that can be grown. The annual precipitation ranges from 10 to 24 inches, and a large part of it occurs during the growing season. Average annual temperatures are 40° to 45° F. over most of the region. The freeze-free season ranges from 100 to 145 days, increasing in length from north to south.

Chernozems and Chestnut soils are dominant in most of the region, but Brown soils cover the western part. Other important soils are Lithosols on steep slopes, Solonet soils, Solonchak soils, and Humic Gley soils on terraces and in depressions, and narrow bands of Alluvial soils along the major streams.

The production of spring wheat by dryfarming methods dominates the agriculture of the region. Other spring grains, flax, and hay are also grown. Potatoes are grown in many places, and sugar beets and corn are important in the Red River valley in the east.
52—Brown Glaciated Plain
Montana
19,700 square miles

Land Use: Nearly all the land is in farms and ranches. Level areas, mostly in the west and amounting to almost one-half of the total area, are cropped. Spring wheat is the major cash crop, but feed grains and hay are also grown on most farms. In the east, most of the land is in range although the gentle slopes are dryfarmed to wheat. Narrow discontinuous strips along the Missouri River are irrigated. Feed grains (including corn), hay, and tame pasture occupy much of the irrigated land, and sugar beets are an important cash crop.

Elevation and Topography: 2,000 to 4,000 feet, increasing from east to west and with distance from the Missouri River. This glaciated plain is nearly level to gently rolling, but belts of steep slopes border some of the larger rivers. The Missouri River has extensive flood plains, but along other streams flood plains are narrow and discontinuous.

Climate: Average annual precipitation—10 to 15 inches; highest from midspring to midautumn; winter precipitation is snow. Average annual temperature—40° to 44° F. Average freeze-free period—100 to 120 days.

Water: Most of the area depends on rainfall for water for both range and crops. The Missouri River provides irrigation water to its flood plains and immediately adjacent areas. In the uplands water, mainly for livestock, is stored in small reservoirs. The glacial drift yields a moderate amount of ground water that is hard but otherwise of good quality.

Soil: Brown soils (Scobey and Joplin) on gentle slopes and Regosols (Zahl) on more sloping areas, both underlain by calcareous glacial till, are the major soils. Associated with them in many small areas are Solonetz soils (Phillips). Lithosols (Lismas) and rough broken land are extensive on the more sloping areas underlain by calcareous shales. Chestnut soils (Cavour, Cresbard, and Hoven) on gently sloping uplands, and Humic Gley soils (Parnell and Lamoure) on some of the wetter flood plains.
53—Dark Brown Glaciated Plain
North Dakota, Montana, and South Dakota
29,100 square miles

Land Use: Nearly all this area is in farms and ranches, and slightly more than half is cropland. Spring wheat is the most important crop, and feed grains and forage are grown on a large acreage. Flax is grown on some farms, and some sugar beets are grown on irrigated land in the west. About two-fifths of the area, the more sloping land, is in range of native grasses.

Elevation and Topography: 1,500 to 3,000 feet, increasing gradually from southeast to northwest. This gently rolling glaciated plain includes some areas of kames and moraines that have irregular topography. Steep slopes and badlands border the major valleys.

Climate: Average annual precipitation—15 to 18 inches; highest in the growing season; winter precipitation is snow. Average annual temperature—40° to 46° F. Average freeze-free period—105 to 140 days.

Water: Because rainfall is low and somewhat erratic, conservation of moisture is essential. The only dependable source of water for irrigation is the Missouri River, and irrigated cropland is confined to a narrow band along its valley. Water for livestock is stored locally in small reservoirs in the uplands. Small to moderate amounts of ground water are available.

Soil: Chestnut soils (Williams) on gentle slopes and Regosols (Zahl) on steeper slopes, all derived from calcareous glacial till, are the principal soils. Less extensive are other Chestnut soils (Farland on loess-mantled areas in the southeast and Lihen in sandy outwash and on terraces throughout), Solonetz soils occur where there is a little more rainfall, mainly along the southwestern and western borders, and Alluvial soils (Lohmiller, Bowdoin, and Havre) on the flood plains of the Missouri River and a few of its major tributaries.
54—Rolling Soft Shale Plain
North Dakota and South Dakota
21,700 square miles

Land Use: Nearly all the land is in farms and ranches. In most of the area agriculture is a combination of livestock production and cash-grain farming. About three-fifths of the area is in native grasses and shrubs used for range. The less sloping land, amounting to about one-third of the total area, is dryfarmed. Spring wheat, feed grains, some flax, and hay are the principal crops. Small areas on the bottom land along the Missouri River and a few of its large tributaries are irrigated. Wheat, feed grains, hay, and pasture are the principal crops. Cottonwood and elm trees grow on the narrow bands of wet soils along the large rivers.

Elevation and Topography: 1,800 feet in the east to 3,100 feet in the west. This moderately dissected rolling plain is underlain mainly by calcareous shales and sandstones. Strongly dissected areas of sharp local relief, steep slopes, or badland topography border the major stream valleys in some places. The northern and eastern fringes have glacially modified topography and are covered by thin layers of glacial drift. Maximum local relief is about 300 feet but relief is considerably less in most of the area.

Climate: Average annual precipitation—13 to 19 inches, increasing from west to east; highest from late spring to midsummer and very low during the rest of the year; winter precipitation is snow. Average annual temperature—40° to 45° F. Average freeze-free period—110 to 135 days.

Water: Farming methods that make the most efficient use of moisture are required in this semiarid area. Water for irrigation is available in quantity from only the Missouri River and one or two of its larger tributaries. Water for livestock is stored in small reservoirs in the uplands. Sands and gravels of small areal extent yield moderate amounts of ground water, but ground water is scarce or lacking in parts underlain by shales.

Soil: Chestnut soils (Morton) on gentle slopes and Lithosols ( Bainville and Flasher) on more sloping areas are the major soils. Less extensive are other Chestnut soils (Vebar from sandstone and Williams from thin calcareous glacial till). Solonetz soils (Rhoades) on very gently undulating plains and terraces and Alluvial soils (Havre) on flood plains occupy a small total acreage but are conspicuous locally.
55—Black Glaciated Plains
North Dakota and South Dakota
41,400 square miles

Land Use: Nearly all the area is in farms and ranches, and nearly three-fourths is cropland. Cash-grain wheat production is the principal enterprise on many farms. Other small grains, feed grains, and hay for livestock also occupy moderate acreages. Flax is another important cash crop, and seed potatoes are grown where soils and moisture supplies are favorable. The more sloping thinner soils, amounting to about one-fourth of the area, are in range of native grasses. Narrow bands of wet soils on flood plains are in woodland.

Elevation and Topography: 1,100 to 2,000 feet, increasing from east to west. This nearly level glacial plain is bordered by rolling morainic hills along the western edge. Local relief is low in most of the area, but relief of 50 to 100 feet is typical of the morainic hills.

Climate: Average annual precipitation—14 to 20 inches, fluctuating widely from year to year; highest from late spring to early autumn; winter precipitation is snow. Average annual temperature—40°F to 48°F. Average freeze-free period—100 to 145 days, increasing from north to south.

Water: The low and erratic rainfall is the principal source of water for agriculture. Perennial streams are few and widely spaced and are little used for irrigation. Water for livestock is stored in small reservoirs on individual farms or ranches. Ground water is plentiful in glacial drift but the water is hard. The sandstones underlying part of the area yield large amounts of highly mineralized artesian water, but the shales yield very little water.

Soil: Chernozems (Barnes, Svea, and Houdek from glacial till and Renshaw, Fordville, and Embden from outwash) are the major soils throughout the area. Regosols (Buse on more sloping areas of till and Hecla from outwash) are also fairly extensive. Others are Solonetz soils (Cavour and Aberdeen) on nearly level plains throughout the area, Solonchak soils (Hamerly) in the northeast, Humic Gley soils (Parnell) in wet depressions, and Gray Wooded soils (Kelvin and Rolla) in the Turtle Mountains in the north.
56—Red River Valley of the North
North Dakota and Minnesota
15,700 square miles

**Land Use:** Nearly all the area is in farms and ranches, and about three-fourths is cropland. Important cash crops are spring wheat, potatoes, sugar beets, and corn. Legume seeds are locally important in the northeast. On some farms feed grains and forage for dairy cattle are the principal crops. Nearly 10 percent of the area, mostly the poorer soils in the northeast, is wooded. The more sloping land in the west, amounting to about 10 percent of the area, is in range.

**Elevation and Topography:** 1,100 feet, decreasing gradually to 800 feet in the north. This nearly level glacial lake plain is bordered on the east by outwash, gravelly beach ridges, and dunes.

**Climate:** *Average annual precipitation*—19 to 22 inches; highest from late spring to early autumn; winter precipitation is snow. *Average annual temperature*—35° to 42° F., decreasing from south to north. *Average freeze-free period*—105 to 135 days, decreasing from south to north.

**Water:** Water management is a major problem in the agriculture of this area. In normal years rainfall provides enough moisture for the crops commonly grown, but the wide fluctuations from year to year make the supply uncertain. Even though rainfall is not high, drainage is required in many of the flatter parts. Drainage systems need to be designed to remove excess water rapidly in the spring so that farming operations can be started as soon as temperatures are favorable.

**Soil:** *Grumusols* (Fargo) and *Solonchak soils* (Barden, Glyndon, and Hegne) in medium- to fine-textured lacustrine sediments are the dominant soils. *Humic Gley soils* (Perella, Dimnick, and Tanberg) occupy the wetter parts of the lake plain, *Chernozems* (Embden) the gentle slopes and *Solonchaks* (Ulen) the nearly level slopes of the sandy deltas and lake plains, and *Regosols* (Sioux and Valentine) the gravelly old beach ridges and sand dunes.
57—Western Minnesota Forest-Prairie Transition

Minnesota

3,500 square miles

Land Use: Most of the land is in farms and ranches, but much of one county is an Indian reservation. Cash-grain farming is the principal agricultural enterprise, and livestock production is important. Spring wheat is the major crop; oats, barley, alfalfa, and other hay crops are grown also. The more sloping soils and the wet soils in the east are forested.

Elevation and Topography: 1,000 to 1,100 feet. This glaciated plain is nearly level to gently rolling, but small areas on moraines and outwash terraces have fairly steep slopes. Local relief is commonly in a few feet to a few tens of feet.

Climate: Average annual precipitation—22 to 24 inches; highest from midspring to midautumn; winter precipitation is snow. Average annual temperature—About 40° F. Average freeze-free period—120 to 140 days.

Water: Precipitation is usually adequate for the crops grown, but in the frequent dry years crop yields are reduced. Drainage is necessary for successful crop production on the fine-textured soils of the lowlands. Ground water is abundant but water from deep sources is highly mineralized, especially in the west.

Soil: Chernozems (Waukon, Barnes, and Aastad) in calcareous glacial till and Solonchak soils in silty deposits are the major soils. Brunizems (Wadena and Hubbard) in calcareous outwash and Gray Woodea soils (Nebish and Rockwood) in calcareous stony glacial till are other important soils in the east. Humic Gley soils (Parnell) are conspicuous locally but of small total extent.
WESTERN GREAT PLAINS RANGE AND IRRIGATED REGION

58 Northern Rolling High Plains
59 Northern Smooth High Plains
60 Pierre Shale Plains and Badlands
61 Black Hills Foot Slopes
62 Black Hills
63 Rolling Pierre Shale Plains
64 Mixed Sandy and Silty Tableland
65 Nebraska Sand Hills
66 Dakota - Nebraska Eroded Tableland
67 Central High Plains
68 Irrigated Upper Platte River Valley
69 Upper Arkansas Valley Rolling Plains
70 Pecos - Canadian Plains and Valleys
G—WESTERN GREAT PLAINS RANGE AND IRRIGATED REGION

217,600 square miles

In this section of the Great Plains unfavorable soils, strong slopes, or low moisture supplies make success at dryfarming very uncertain. The annual precipitation ranges from 11 to 24 inches but fluctuates widely from year to year. Average annual temperatures are 45° F. in much of the region, but they range from 40° F. in the north to 60° F. in the south. The freeze-free season ranges from 100 days in the north to 200 days in the south.

Chestnut soils are dominant over much of the region, but Brown soils are important in the west. Lithosols on the more sloping parts of the dissected areas, Regosols in sands, and Alluvial soils on flood plains are also extensive. Less extensive, but important locally, are Gnumusols in heavy clays and Solonetz soils in depressions and on terraces.

A large part of the region is in range; some wheat is produced by dryfarming methods, mainly along the eastern margin. Irrigation agriculture is practiced along some of the major rivers. Forage and grain for livestock are the principal crops on irrigated land; potatoes, sugar beets, and vegetable crops are important locally.
58—Northern Rolling High Plains
Montana, Wyoming, South Dakota, and North Dakota
66,400 square miles

Land Use: More than four-fifths of the land is in ranches; most of the remainder is owned by the Federal Government. Nearly three-fourths of the area is in native grasses and shrubs grazed by cattle and sheep. Gently sloping deep soils, amounting to 4 or 5 percent of the area, are dryfarmed to wheat. Narrow strips of land along the Yellowstone River and one or two of its tributaries are irrigated. Sugar beets, potatoes, vegetables, alfalfa, other hay crops, and feed grains are the principal crops; some of the land is in tame pasture. The upper slopes and tops of some of the higher buttes are in open woodland of western red cedar.

Elevation and Topography: 3,000 to 6,000 feet, rising gradually from east to west and from north to south. This dissected plain is underlain by shales and sandstones. Slopes are mostly rolling to steep, and wide belts of steeply sloping badlands border a few of the larger river valleys. Local relief is mainly in several tens to a few hundreds of feet. In places flat-topped steep-sided buttes rise sharply above the general level of the plain.

Climate: Average annual precipitation—12 to 16 inches, fluctuating widely from year to year; highest in spring and early autumn; winter precipitation is snow. Average annual temperature—40° to 45° F. Average freeze-free period—120 to 140 days.

Water: The low and erratic rainfall is the principal source of water for agriculture. Water for livestock is stored in small reservoirs but supplies are too small for any significant amount of irrigation. Irrigation water in quantity is available only along the Yellowstone River and one or two of its larger tributaries. Ground water is scarce in most of the area, but locally sand and gravel deposits and coal beds yield small to moderate amounts.

Soil: Lithosols (Lismas, Bainville, Midway, and Flasher) are the major soils in much of the area. Chestnut soils (Morton, Chama, Vebar, and Regent) in the east and Brown soils (Cushman, Renohill, Terry, and Treasure) in the west are on the smoother upland slopes. Locally conspicuous but of small total extent are Gray Wooded soils on the higher butte tops and Solonetz soils (Rhoades, Winnett, and Arvada) on nearly level to gentle slopes. Alluvial soils (Havre, Lohmiller, and Banks) in narrow bands along the major rivers are intensively farmed in many places. About one-eighth of the area is rough broken land or badlands having little or no soil cover.
59—Northern Smooth High Plains
Montana
9,000 square miles

Land Use: Much of the land is in farms and ranches; about one-fifth is owned by the Federal Government. About three-fifths of the area is grazed by cattle and sheep. Most of the grazing land is native range, but small areas are irrigated and in tame pasture. Nearly one-fifth of the area is dryfarmed. Wheat is the main cash crop, and feed grains and hay are also important.

Elevation and Topography: 3,000 to 3,500 feet. The upland divides on these moderately dissected shale plains are fairly broad and the valley walls are steep. The bottom lands in the few stream valleys are narrow. Local relief ranges from a few tens of feet to one or two hundred feet.

Climate: Average annual precipitation—12 to 16 inches; highest from late spring to early autumn; winter precipitation is snow. Average annual temperature—40° to 42° F. Average freeze-free period—120 days.

Water: Agriculture depends almost wholly on the relatively low and erratic rainfall. There are few perennial streams and little water is available for irrigation. Ground water is also scarce.

Soil: Brown soils (Cushman and Scobey) are dominant on the gentler slopes with deeper soil cover and Chestnut soils (Chama) on the moister parts at higher elevations, especially in the east. The most extensive soils are Lithosols (Bainville and Flasher) on hilly and steep slopes. Regosols (Zahl) occur in small areas of glacial till in the east and Solonetz soils (Winnett and Gilt Edge) on nearly level to gentle slopes throughout.
60—Pierre Shale Plains and Badlands  
South Dakota, Wyoming, and Montana  
13,500 square miles

Land Use: Much of the land is in farms and ranches, and about one-fifth is owned by the Federal Government. Nearly three-fourths of the area is in range of native grasses and shrubs grazed by cattle and sheep. Many ranches have small areas of irrigated or tame pasture. Between 5 and 10 percent of the land, mostly gently sloping deep soils in the east, is dryfarmed. Wheat is the main cash crop, but feed grains and hay are grown as well.

Elevation and Topography: 2,500 to 5,000 feet, increasing from east to west. This dissected shale plain has undulating to gently rolling narrow divides and hilly to steep valley walls. Bands of badland topography border most of the larger stream valleys. Local relief is in several tens to a few hundreds of feet.

Climate: Average annual precipitation—11 to 16 inches; highest from midspring to early autumn; winter precipitation is snow. Average annual temperature—About 45° F. Average freeze-free period—115 to 140 days.

Water: Water is scarce throughout the area. The low rainfall limits agriculture to grazing. Ground water is scarce and of poor quality.

Soil: Chestnut soils (Pierre and Rosebud) are the major soils on gentle slopes, but Lithosols (Lismas and Midway) on steeper slopes are more extensive. Large areas of badlands or of rough broken land having little or no soil cover border some of the valleys. Solonetz soils (Rhoades and Arvada) occupy level to gentle slopes and Brown soils (Cushman, Renohill, and Briggsdale) gentle slopes in the driest parts in the west.
**Black Hills Foot Slopes**

South Dakota and Wyoming
5,200 square miles

**Land Use:** Two-thirds or more of the area is in farms, ranches, or other private holdings; the remainder is owned by the Federal Government. Half or more of the area is in range of native grasses or shrubs grazed by cattle and sheep. The higher hills, amounting to less than 10 percent of the area, are in open woodland that has a grass ground cover. This woodland produces some timber and is also used for grazing. Between 5 and 10 percent of the area is dryfarmed, and small areas in some valleys are irrigated.

**Elevation and Topography:** 2,700 feet to more than 5,000 feet. Slopes of these dissected mountain foothills are mostly hilly to steep, but on the narrow ridgetops and in the narrow valleys slopes are gentle. The area is crossed by many streams flowing out of the Black Hills in a radial pattern. Local relief is in several tens of feet to a few hundreds of feet.

**Climate:**
- **Average annual precipitation**—16 to 18 inches; highest from midspring to early autumn; winter precipitation is snow.
- **Average annual temperature**—About 45° F.
- **Average freeze-free period**—115 to 140 days.

**Water:** The area depends mainly on the relatively low rainfall for water. Streamflow provides water for livestock and reservoirs on a few of the major rivers, water for irrigation. Ground water is scarce and of poor quality.

**Soil:** Detailed information is lacking for much of the area. *Chestnut soils* (Pierre, Promise, Grail, Vale, and Fergus) are the principal soils. *Lithosols* (Lismas and Spearfish) occupy the steep slopes bordering many of the valleys and rough stony land, some of the steeper slopes.
Black Hills
South Dakota and Wyoming
2,200 square miles

Land Use: Most of the area is in forest used for recreation and timber production. Small areas of open woodland having a grass ground cover provide a small amount of grazing.

Elevation and Topography: 4,000 feet to more than 7,000 feet. The central mountain core of metamorphic and igneous rocks is surrounded by a dissected plateau that is mostly limestone. Slopes are mainly steep and hilly but those of the plateau remnants are rolling. The radial drainage is considered a classic example of this pattern. Local relief is in several hundreds of feet.

Climate: Average annual precipitation—16 to 24 inches; highest from midspring to early autumn. Average annual temperature—40° to 45° F. Average freeze-free period—100 to 120 days.

Water: The moderate rainfall is the principal source of water. Some of the larger perennial streams provide water for livestock and for recreation. Ground water is scarce.

Soil: Detailed information is lacking. Rough stony land and Lithosols (Spearfish and Laporte) are dominant on the more rugged mountain slopes and Gray Wooded soils (Edloe) on forested slopes. Chernozems and Chestnut soils are the principal soils on the lower slopes in open woods.
63—Rolling Pierre Shale Plains
South Dakota and Nebraska
13,700 square miles

Land Use: Most of the area is in farms and ranches but between 5 and 10 percent is owned by the Federal Government. About three-fourths of the area is in native range grazed by cattle and sheep. About one-fifth of the land is dryfarmed. Winter wheat is the main crop; feed grains and forage for livestock are grown also.

Elevation and Topography: 1,800 to 3,000 feet, rising gradually from east to west. Ridgetops on this dissected shale and clay plain are undulating and relatively narrow; side slopes are hilly to steep. The steep-walled valleys have very narrow flood plains. Local relief ranges from several tens of feet to one or two hundred feet or more.

Climate: Average annual precipitation—15 to 20 inches; highest from midspring to midautumn; winter precipitation is low and falls as snow. Average annual temperature—40° to 50° F. Average freeze-free period—140 to 160 days.

Water: The area depends almost entirely on the relatively low and somewhat erratic rainfall. The few perennial streams have very wide seasonal fluctuations in flow. Ground water is scarce and of poor quality.

Soil: Chestnut soils (Pierre and Promise) are most extensive but there are some Chernozems (Boyd) on moister sites and Lithosols (Lismas) on the more sloping parts.
Land Resource Area 64
Index Sheet 4 of 4. ASCS. 1: 63,360.
64—Mixed Sandy and Silty Tableland
South Dakota and Nebraska
5,700 square miles

Land Use: Nearly all the land is in farms and ranches. About one-half of the area is in native grasses grazed by cattle and sheep. Nearly one-third is cropland. In the southwest cash-grain farming, principally winter wheat, is the major enterprise; elsewhere feed and forage for livestock are the main crops.

Elevation and Topography: 3,000 to 4,000 feet, increasing gradually from east to west. This level to gently sloping tableland is cut by narrow steep-walled valleys. Along the southern edge, deep sands have irregular rolling to hilly dune topography. Local relief is mainly in a few feet to a few tens of feet but is greater along the valleys.

Climate: Average annual precipitation—15 to 18 inches; highest in the freeze-free period; winter precipitation is snow. Average annual temperature—45° to 48° F. Average freeze-free period—About 140 days.

Water: Most of the area depends on the rather low and erratic rainfall for water. Ground water is scarce and of poor quality in most of the area; locally sands and gravels yield moderate to large amounts of good water.

Soil: Chestnut soils (Keith, Rosebud, and Ánselmo) from silty or fine sandy materials are dominant. Bands of Lithosols (Epping and Canyon), rough broken land, and badlands border the major drainage-ways. Regosols (Valentine) in deep sands and Alluvi al soils (Havre) on flood plains are locally conspicuous but of small total extent.
65—Nebraska Sand Hills
Nebraska
20,000 square miles

**Land Use:** Nearly all the land is in large ranches, and most of it is in native grass grazed by livestock. Small areas along the streams are used to grow hay and other feed crops.

**Elevation and Topography:** 2,000 to 4,000 feet, rising gradually from east to west. Most of the area consists of stabilized old sand dunes having rolling to steep irregular slopes. There are many scattered small level depressions. Streams are few, but there are many ponds, small lakes, and marshes in the deeper depressions. Local relief is in several tens of feet to about 150 feet.

**Climate:** *Average annual precipitation*—17 to 23 inches; about three-fourths falls from midspring to midautumn; winter precipitation is snow. *Average annual temperature*—47° to 50° F. *Average freeze-free period*—140 to 160 days.

**Water:** Rangeland depends on rainfall for water. The many small lakes and ponds provide water for livestock. Ground water is abundant and of good quality; it meets domestic requirements and part of the livestock and other needs.

**Soil:** Stabilized dunes that have little evidence of soil formation except a slight darkening of the upper 2 or 3 inches occupy nearly one-third of the area. Much of the remaining area consists of Regosols (Valentine) that have a thicker and darker surface layer. *Humic Gley soils* (Gannett and Loup) are in depressions among the dunes and along flood plains of the larger streams.
66—Dakota-Nebraska Eroded Tableland
South Dakota and Nebraska
4,500 square miles

Land Use: Nearly all the land is in farms and ranches, and more than three-fourths of it is in range of native grasses. Beef cattle are the principal livestock, but sheep are raised in the west. Between 10 and 20 percent of the area is cropland. Forage and feed grains are the major crops, and some wheat is grown for sale.

Elevation and Topography: 2,000 to 3,000 feet, increasing gradually from east to west. These undulating to rolling uplands are underlain by calcareous sandstones. Steep slopes border the valleys of most streams. Local relief is from a few tens of feet to 100 feet or more.

Climate: Average annual precipitation—18 to 24 inches; highest from midspring to midautumn; winter precipitation is snow. Average annual temperature—47° to 50° F. Average freeze-free period—140 to 160 days.

Water: Crops and range depend mainly on rainfall for water. Ground water is scarce and of poor quality. But along the southern fringe, windblown sands yield an abundance of ground water and the high water table supplies moisture for crops. In these areas wells supply water for livestock.

Soil: Sandy and silty Chernozems (Holt and Moody) occupy most of the gentle slopes and clayey Chernozems (Boyd) the rolling hills. Brunizems (Thurman) are in sandy areas with better moisture supplies and Regosols (Valentine) on the more sloping sandy areas.
67—Central High Plains
Wyoming, Colorado, and Nebraska
33,100 square miles

Land Use: Nearly all the land is in farms and ranches. About three-fifths is in range of native short and mid grasses grazed by cattle and sheep. About one-fourth of the area is dryfarms. Wheat is the major crop; sorghum, broomcorn, dry beans, corn, feed grains, and hay are grown on large acreages. About 5 percent of the area is irrigated. Corn, alfalfa, sugar beets, and vegetables are the major irrigated crops. Wet areas on flood plains are in meadows used for hay or pasture.

Elevation and Topography: 3,500 to 6,000 feet, increasing gradually from east to west. These undulating to rolling plains have been moderately dissected by streams. Steep slopes border the valleys of the larger streams and also the edges of isolated mesas. The dunes bordering some of the valleys have rolling to hilly irregular topography. Local relief is mainly in a few tens of feet to 100 or 200 feet.

Climate: Average annual precipitation—13 to 17 inches; highest in midspring and late autumn. Average annual temperature—45° to 50° F. in most of the area, increasing to 55° F. in the extreme south. Average freeze-free period—120 to 160 days in most of the area but as long as 180 days in the extreme south.

Water: Rangeland and cropland depend largely on the low and erratic rainfall for water. Over much of the area sands and gravels yield adequate supplies of ground water for livestock and for domestic and other uses. Where shale bedrock is near the surface, ground water is scarce and commonly of poor quality. Irrigation water is obtained mostly from the larger rivers; locally wells provide some irrigation water.

Soil: Brown soils (Stoneham, Baca, Vona, and Fort Collins) are dominant on smooth slopes over most of the area and Chestnut soils (Rosebud, Altvan, Weld, Platte, and Keith) on smooth slopes where moisture supplies are more favorable, mainly in the north and east. Lithosols (Canyon, Epping, Lismas, and Midway) are dominant on steep slopes bordering stream valleys and along the edges of mesas. Regosols (Dwyer, Valentine, and Colby) are in deep sands and silts with hilly to steep topography and Alluvial soils (Bridgeport, Lohmiller, Havre, and Banks) on narrow flood plains of the larger streams.
Land Use: Most of the land is in farms and ranches, but more and more areas near Denver and other cities along the western edge are being diverted to urban use. More than half of the area is cropped. Corn, sugar beets, potatoes, melons, and vegetables for canning are grown under intensive management on much of the irrigated land, but a large acreage is in grass, hay, and pasture. Unirrigated cropland is dryfarmed to wheat and other grains. The more sloping and shallow soils, amounting to one-third or more of the area, are in grass and brush used for grazing.

Elevation and Topography: 4,500 to 5,300 feet, increasing gradually from east to west. Several broad valleys cross this undulating to gently rolling silt- and outwash-mantled plain. Steep slopes are confined to relatively narrow bands along a few large valleys. Local relief is mainly in a few tens of feet.

Climate: Average annual precipitation—13 to 15 inches, fluctuating widely from year to year. Average annual temperature—45°F. Average freeze-free period—120 to 160 days.

Water: Water for irrigation is obtained mainly from the South Platte River and a few of its larger tributaries but the supply is supplemented by water diverted from the western slopes of the Rockies. Dryfarming areas depend on the low and erratic rainfall. Ground water is abundant in deep sands and gravels and is adequate for domestic, livestock, and municipal use and for some irrigation. Where shale bedrock is near the surface, ground water is scarce and of poor quality.

Soil: Brown soils (Fort Collins, Terry, and Greeley) and Chestnut soils (Weld, Platner, and Nunn) are the principal soils on the smooth silt-mantled uplands, fans, and terraces and Lithosols (Lismas) on the more sloping areas. Alluvial soils (Havre, Las, and Wann) on flood plains and younger fans are among the more important soils for crops. Regosols (Valentine and Colby) are in deposits of windblown sands and silts on steep slopes.
69—Upper Arkansas Valley Rolling Plains
Colorado
12,200 square miles

Land Use: Nearly all the land is in farms and ranches. Almost three-fourths of the area is in native short grasses used for grazing. Flood plains and terraces along the Arkansas River, 5 to 10 percent of the area, are irrigated. Alfalfa, sugar beets, grain sorghum, melons, seed crops, corn, small grains, onions, and other vegetables are the more extensive crops. Land that is flooded frequently and soils that are strongly affected by salts are used for grazing. Between 5 and 10 percent of the area is dryfarmed. Winter wheat, dry beans, and grain sorghum are the main crops.

Elevation and Topography: 3,500 to 6,200 feet, increasing gradually from east to west. These undulating to rolling shale plains are mantled by loess or windblown sand, alluvium, and outwash in many places. Wide bands of steep slopes border several of the larger tributaries of the Arkansas River. Local relief is mostly less than 50 feet but is as much as one or two hundred feet in some of the rougher parts.

Climate: Average annual precipitation—10 to 15 inches; fluctuates widely from year to year; highest from midspring through late autumn. Average annual temperature—About 50° F. Average freeze-free period—140 to 160 days.

Water: Rangeland depends on the low and erratic rainfall. The Arkansas River and one or two of its larger tributaries provide water for irrigation along their valleys. Ground water in the deeper sands and gravels provides water for livestock and domestic and other uses over much of the area and locally some water for irrigation. Ground water is scarce in the large areas where shale bedrock is near the surface.

Soil: Regosols (Minnequa and Manvel) are the dominant soils on the silt-mantled uplands and terraces and Brown soils (Vona and Baca) in areas where precipitation is slightly higher. Other Regosols (Tivoli and Dwyer) occupy the sloping to rolling sandy areas and Alluvial soils (Las Animas and Havre) the flood plains, terraces, and younger alluvial fans; these Alluvial soils are affected by salts in many places. Lithosols (Penrose, Travessilla, and Lismas) and rough broken land occur on the fairly wide bands of steep slopes bordering the valleys of several tributaries of the Arkansas River.
70—Pecos-Canadian Plains and Valleys
New Mexico and Colorado
28,900 square miles

Land Use: Most of the land is in farms, ranches, or other private holdings; about 10 percent is owned by the Federal Government. More than three-fourths of the area is in range, and cattle and sheep grazing is the principal enterprise. Range at lower elevations consists of short and mid grasses and brush and at higher elevations of open pinyon-juniper woodland that has a grass understory. Some of the northern and eastern slopes of the high mesas in the north are covered by forest, but the total forested area is small. About 3 percent of the area is cropland. Where moisture supplies are more favorable, mainly in the west and north, the deeper soils are dryfarmed. Beans, small grains, and grain sorghum are the principal crops; some hay is grown and some land is in pasture. Small tracts in some of the valleys and on the uplands are irrigated, partly from wells and partly from reservoirs. Sugar beets, forage, and feed grains are the principal crops.

Elevation and Topography: 4,000 to 6,500 feet, increasing gradually from southeast to northwest, a few mesas and mountains 8,000 feet or more. Most of the slopes of this dissected high plain are gentle to rolling, but bands of steep slopes and rough broken land border the stream valleys. A few isolated mountains, mesas, and canyon walls have steep to very steep slopes. Valley floors are mostly narrow and much cut by stream channels. Local relief is mainly in a few tens of feet but is as much as several hundred feet in some of the rougher parts.

Climate: Average annual precipitation—12 to 16 inches, fluctuating widely from year to year; highest from late spring to late autumn. Average annual temperature—50° to 60° F. Average freeze-free period—160 to 200 days, decreasing from southeast to northwest.

Water: Because of the low and erratic rainfall and the few perennial streams, water is scarce throughout the area. Ground water in deep sands and gravels in the north and from limestone in the southern two-thirds of the area provides water for domestic use and livestock and locally for irrigation. Where shale and sandstone are near the surface, ground water is scarce.

Soil: Shallow soils and soils having weakly expressed profiles are widespread—Lithosols (Apache, Penrose, Potter, Laporte, and Travessilla), rough broken land, and rockland on gentle to moderate slopes of uplands, and Regosols (Tivoli and Preston) in deep sands. Reddish-Brown soils (Carnero, Witt, and Alamo) are on the smoother uplands throughout most of the area, but Reddish Chestnut soils and Chestnut soils (La Brier and Paiso) are in the deeper materials in the north. Calcisols (Quay and Harvey) are of small total extent but are important locally.
CENTRAL GREAT PLAINS WINTER WHEAT AND RANGE REGION

71 Central Nebraska Loess Hills
72 Central High Tableland
73 Rolling Plains and Breaks
74 Central Kansas Sandstone Hills
75 Central Loess Plains
76 Bluestem Hills
77 Southern High Plains
78 Central Rolling Red Plains
79 Great Bend Sand Plains
80 Central Rolling Red Prairies
Central Great Plains Winter Wheat and Range Region

219,900 square miles

Soils, topography, and climate are more favorable for agriculture in this region than in the Great Plains to the north and west. The longer freeze-free season permits a greater variety of crops to be grown than in the northern Great Plains. The average annual precipitation is 20 to 30 inches over much of the region but ranges from 15 to 35 inches, increasing from northwest to southeast. More rain falls during summer than in the rest of the year. Average annual temperatures are 50° to 65° F., increasing from north to south. The freeze-free season is 170 to 180 days in most of the region but ranges from 150 to 240 days, increasing in length from north to south.

The important soils in the north are in the Chernozem and Chestnut groups. Reddish Prairie soils and Reddish Chestnut soils are extensive in the south. Lithosols on steep slopes, Regosols in deep sands, and Alluvial soils on flood plains are common throughout the region.

Cash-grain farming with wheat as the principal crop is the major agricultural enterprise on most of the better soils. Grain sorghum is grown in many of the drier areas. In the south where the freeze-free period exceeds 200 days, cotton is grown extensively under irrigation from wells. The steeply sloping shallow and sandy soils are used for range.
71—Central Nebraska Loess Hills
Nebraska
8,000 square miles

Land Use: Nearly all the land is in farms and ranches and almost two-fifths of it is dryfamed. Winter wheat is the major cash crop, but corn, grain sorghum, other feed grains, and hay occupy large acreages. Between 5 and 10 percent of the total area, consisting of flood plains and terraces along the Platte River and its larger tributaries, is irrigated. Corn and forage are the principal crops, and some sugar beets, seed crops, and potatoes are grown. About one-half of the area is in native grasses used for grazing.

Elevation and Topography: 1,500 to 2,500 feet, increasing from east to west. Undulating to gently rolling loess-mantled narrow ridgetops are separated by steep slopes bordering drainageways. The large streams have wide level flood plains and adjoining terraces. Local relief is in several tens of feet to one or two hundred feet.

Climate: Average annual precipitation—20 to 25 inches; highest from spring through autumn with the maximum in late spring to early summer. Average annual temperature—About 50° F. Average freeze-free period—150 to 160 days, increasing from west to east.

Water: Over most of the area both crops and pasture depend on the low and erratic rainfall. The larger rivers provide water for irrigation along their valleys. Over much of the area ground water is abundant and of good quality; it meets domestic and livestock needs and is used locally for irrigation.

Soil: Chernozems (Holdrege, Hastings, Hall, and Hord) are dominant on gentle slopes of uplands and terraces and Regosols (Colby) on steep slopes. Solonetz soils (Exline) occupy small nearly level areas on terraces; their total area is small but they are conspicuous and affect the use and management of adjacent soils.
Land Use: Nearly all the land is in farms and ranches and three-fifths or more is cropland. This is a major dryfarming area. Winter wheat is the main cash crop, but other small grains, grain sorghum, some corn, and alfalfa and other hay crops occupy large acreages. Many kinds of crops are grown on the narrow bands of irrigated land along the Platte, Republican, and Arkansas Rivers. One-third or more of the area, consisting of hilly and steep slopes bordering drainageways, is in native grasses and shrubs used for grazing.

Elevation and Topography: 2,000 to 4,000 feet, increasing from east to west. On this smooth loess-mantled tableland slopes are mostly undulating to gently rolling, but the major valleys are bordered by steep slopes. The Arkansas and Platte Rivers and a few of their larger tributaries have broad level flood plains and terraces. Local relief in the uplands is in a few feet to a few tens of feet, but valleys are 100 feet or more below the general level of the upland.

Climate: Average annual precipitation—16 to 21 inches, fluctuating widely from year to year; highest from late spring through early autumn; winter precipitation is snow. Average annual temperature—50° to 57° F. Average freeze-free period—170 to 185 days, increasing from northwest to southeast.

Water: Crops and pastures on uplands depend on the low and erratic rainfall. Irrigation water obtained from the Arkansas, Republican, and Platte Rivers is used along their valleys. Over most of the area ground water of good quality is adequate for domestic and livestock needs and is used locally for irrigation. Where shales are near the surface, ground water is scarce.

Soil: Chestnut soils (Keith, Rosebud, Richfield, and Anselmo) on the smoother loess-mantled uplands and terraces occupy half or more of the area. Regosols (Colby on steep loess-mantled slopes and Tivoli and Valentine in deep sands) are also important. Lithosols (Canyon and Potter) are on steep slopes bordering the large streams.
73—Rolling Plains and Breaks
Kansas and Nebraska
17,700 square miles

Land Use: Nearly all the area is in farms and about three-fifths is dryfarmed cropland. Winter wheat and grain sorghum are the major crops over much of the area, and corn is important in the north. Feed grains and hay are other major crops. About 2 percent of the area, mostly in narrow bands of bottom land and terraces along the Republican and Platte Rivers and their major tributaries, is irrigated. Corn, alfalfa, small grains, and hay occupy much of the irrigated land, and some potatoes and vegetables are grown. One-third or more of the area is in native grasses used for grazing.

Elevation and Topography: 1,500 to 3,000 feet, increasing from east to west. These dissected plains have broad undulating to rolling ridgetops and hilly to steeply sloping valley sides. Valleys are generally narrow, but the Republican River and its larger tributaries have broad flood plains and terraces. Local relief is in a few tens of feet to one or two hundred feet.

Climate: Average annual precipitation—20 to 25 inches; highest from midspring to early autumn; winter precipitation is snow. Average annual temperature—50° to 55° F. Average freeze-free period—150 to 180 days, increasing from northwest to southeast.

Water: In most of the area crops and pastures depend on the moderate and erratic rainfall. The Republican and Platte Rivers and their larger tributaries provide water for irrigation along their valleys. Abundant ground water for irrigation and other uses is obtained from deep wells in the north, but ground water is scarce in the south where shale and limestone are near the surface.

Soil: Chernozems (Holdrege, Hastings, and Crete) in moderate to deep loess cover much of the area. Regosols (Colby) are on the steep slopes bordering many of the valleys and Alluvial soils (Humbarger, Carr, Hohts, and Leshara) on flood plains of the larger streams.
74—Central Kansas Sandstone Hills
Kansas
4,700 square miles

**Land Use:** Most of the land is in farms and more than one-half is cropland. Winter wheat is the principal crop; grain sorghum, hay, small grains, and corn are other important crops. Recently some land along the large rivers has been irrigated. Crops are about the same as in the unirrigated areas although more corn is grown and less wheat. About one-third of the area is in range of native grasses grazed by cattle.

**Elevation and Topography:** 1,300 to 1,800 feet, increasing from east to west. Local relief on this undulating to hilly dissected plain is in several tens of feet to a few hundred feet. The larger rivers have wide flood plains and terraces, but the small streams have narrow bottom lands.

**Climate:** *Average annual precipitation*—25 to 28 inches; highest from spring through autumn with the maximum in midsummer. *Average annual temperature*—54° to 56° F. *Average freeze-free period*—170 to 180 days.

**Water:** The moderate rainfall is generally adequate for crops and pasture if moisture is carefully conserved. The larger streams can supply water for irrigation but most of them have not been so used. Ground-water supplies meet domestic and livestock needs in most of the area and are used locally for irrigation. In the areas in the east where shales are near the surface, ground water is scarce.

**Soil:** *Brunizems* (Lancaster) are the dominant soils on gentle slopes of the sandstone uplands and *Lithosols* (Hedville and Cloud) on hilly and steep slopes of ridges and valley sides. *Chernozems* (Ebenezer and Berg) are on silt-mantled ridgetops and foot slopes, mainly in the east, and *Alluvial soils* (Hobb and Humbarger) on flood plains of the larger rivers.
75—Central Loess Plains  
Nebraska and Kansas  
13,700 square miles

**Land Use:** Nearly all the land is in farms and about two-thirds is cropland. Hard winter wheat and grain sorghum are the main cash crops but other small grains and hay occupy large acreages. Corn is a major crop in the north. Corn and other feed grains are grown on a narrow band of irrigated land along the Platte River in the northwest. About one-fourth of the land is in range or pasture grazed by beef cattle.

**Elevation and Topography:** 1,500 to 2,000 feet, increasing from east to west. This nearly level to gently rolling plain is mantled by loess except in the part south of central Kansas, which is underlain by unconsolidated sediments and soft sandstones and shales. Stream valleys are mostly narrow and are not deeply incised. Relief is in a few feet to a few tens of feet.

**Climate:** Average annual precipitation—25 to 30 inches; highest from midspring to midautumn; the low winter precipitation is snow. Average annual temperature—50° to 58° F., increasing from north to south. Average freeze-free period—160 to 190 days.

**Water:** Grain crops and pasture depend on the moderate but somewhat erratic rainfall for moisture. In the northwest, the Platte River furnishes some water for irrigation. Ground water that is hard but otherwise of good quality is abundant in the sands and gravels underlying much of the area. Where shales and clays are near the surface, ground water is scarce.

**Soil:** Chernozems (Crete, Hastings, Nuckolls, and Kipp) are dominant on gentle to rolling slopes of the loess-mantled uplands and terraces; Planosols (Butler, Goessel, and Fillmore) are on the associated level areas. In the south Brunizems (Irwin and Lady-smith) are on nearly level and gently sloping uplands. Regosols (Colby) are on strongly sloping valley sides and Alluvial soils (Humarger, Hobbs, Carr, and Volin) on flood plains.
76—Bluestem Hills
Kansas and Oklahoma
10,200 square miles

Land Use: Nearly all the land is in farms and ranches and about three-fifths is in native grasses grazed by beef cattle. Nearly one-fifth of the area, mainly the deeper soils in valleys and on some of the uplands, is cropland. Although some winter wheat is grown as a cash crop, other small grains, grain sorghum, alfalfa, and other hay are the major crops. The same crops are grown on small irrigated areas along the Arkansas River.

Elevation and Topography: 1,000 to 1,500 feet. These dissected limestone and shale uplands have narrow divides and narrow steep-sided valleys. Only a few large streams have any significant area of flood plains. Local relief is commonly in several tens of feet to two or three hundred feet.

Climate: Average annual precipitation—30 to 35 inches; highest from midspring through early autumn. Average annual temperature—54° to 60° F. Average freeze-free period—Mainly 170 to 190 days but slightly more than 200 days in the south.

Water: The moderate rainfall provides water for pastures and crops. Much of the water for livestock is stored in small reservoirs and ponds. Shallow wells yield moderate amounts of good-quality water in the limestone areas but very little in areas underlain by shales. Water from deep wells is highly mineralized.

Soil: Lithosols (Sogn) are very extensive. Brunizems (Florence, Summit, Irwin, and Ladysmith) and Planosols (Dwight) are in the more deeply weathered clays, shales, and limestones of nearly level and gently sloping uplands. Alluvial soils (Osage) are on flood plains of the larger streams.
77—Southern High Plains
Texas, New Mexico, Oklahoma, and Kansas
50,300 square miles

**Land Use:** Almost all the land is in farms and ranches. More than two-fifths of the area, consisting of breaks along the Canadian and Cimarron Rivers and their larger tributaries and areas of sandy soils in the southwest, is in range of native grasses and shrubs grazed by beef cattle. About one-third of the area, the smooth uplands, is dryfarmed to winter wheat and grain sorghum. Nearly one-fifth of the area, mostly south of the Canadian River, is irrigated. Cotton and grain sorghum are the major crops.

**Elevation and Topography:** 2,500 to 5,000 feet, increasing gradually from east to west. These smooth high plains have gentle slopes except for the very steeply sloping breaks along the major rivers. The deep sands in the southwest have irregular dune topography. Local relief is in a few feet to a few tens of feet, but the major valleys are one to several hundred feet below the general level.

**Climate:** Average annual precipitation—15 to 23 inches; fluctuates widely from year to year; highest from late spring through autumn; the low winter precipitation is mainly snow. Average annual temperature—55° to 60° F. Average freeze-free period—180 to 220 days, increasing from north to south and from west to east.

**Water:** Dryfammed crops and range depend on the moderately low and erratic rainfall. Perennial streams are few; they fluctuate widely in flow from year to year and have been little used for irrigation. Sands and gravels throughout the area yield an abundance of ground water. Irrigation water is obtained from wells in the southern part, but withdrawals now exceed recharge and the water table is being gradually lowered.

**Soil:** Chestnut soils and Reddish Chestnut soils (Amarillo, Dalhart, Olton, and Pullman) in loamy mantles are the principal soils of the uplands. Calcisols (Mansker and Portales) are dominant on the more sloping parts, and in shallow valleys, Lithosols (Canyon, Kimbrough, Potter, and Travessilla) on the steeper slopes and breaks, and Regosols (Tivoli) and Reddish-Brown soils (Brownfield) in the deep sands in the southwest.
78—Central Rolling Red Plains
Texas, Oklahoma, and Kansas
51,800 square miles

Land Use: Nearly all the land is in farms and ranches. About half the area, mainly the more sloping parts, is in range or pasture of native grasses grazed by beef cattle. The largest areas of range are in the west but there is some throughout the area. The smooth uplands, nearly two-fifths of the area, are cropped. Winter wheat is the major crop throughout the area; cotton is also important south of the Cimarrón River. Grain sorghum and alfalfa occupy large acreages, and sweet potatoes and peanuts are important locally on some of the sandy soils. The same crops are grown on the small irrigated areas south of the Red River and in southwestern Oklahoma.

Elevation and Topography: 1,500 to 3,000 feet, increasing gradually from east to west. On this dissected plain, the broad divides are nearly level to gently sloping and the valleys have short but steep slopes. In places the valleys are bordered by rolling to steep irregular dune topography. Local relief is mainly in only a few tens of feet, but a few of the larger valleys are 100 feet or more below the general level of the plain.

Climate: Average annual precipitation—20 to 30 inches; highest from late spring through autumn. Average annual temperature—57° to 65° F. Average freeze-free period—185 to 230 days.

Water: Over most of the area both crops and range depend on the moderate but somewhat erratic rainfall. The larger rivers are potential sources of water for irrigation but are very little used at present. The deep sands and gravels in valleys yield some ground water. In areas of deep soils on uplands, shallow wells provide water for domestic and livestock needs. In the sloping areas where the underlying sandstones and shales are near the surface, ground water is scarce.

Soil: Reddish Chestnut soils and Chestnut soils (Tillman, Foard, Mansic, Carey, Miles, and Abilene) occupy most of the smoother uplands except those in the northeast on which Reddish Prairie soils (Albion and Grant) occur. In about one-half of the area, consisting of the more sloping parts, the soils are thin or have weakly expressed profiles—Regosols (Quinlan, Tivoli, and Enterprise) in deep sandy materials, Lithosols (Vernon and Potter) on slopes underlain by consolidated rocks, and Calcisols (Mansker) in areas with a strong caliche horizon. Less extensive but locally important are Alluvial soils (Yahola and Miller) on flood plains.
79—Great Bend Sand Plains
Kansas
4,200 square miles

Land Use: Nearly all the land is in farms and ranches and more than two-thirds is cropland. Cash-grain farming is the principal enterprise. Hard winter wheat is the major crop, and grain sorghum and alfalfa are grown also. About one-fifth of the area, consisting of sandy soils and steeply sloping areas, is in range of native grasses grazed by beef cattle.

Elevation and Topography: 1,500 to 2,500 feet. These undulating to rolling plains have a deep mantle of windblown sand and sandy outwash materials. Local relief is mainly in a few tens of feet.

Climate: Average annual precipitation—21 to 28 inches; highest from late spring through early autumn. Average annual temperature—55° to 57° F. Average freeze-free period—180 to 190 days.

Water: Crops and pasture depend on the moderate but somewhat erratic rainfall. Along the northern edge, the Arkansas River is a potential source of irrigation water but is little used at present. Deep sands yield an abundance of good ground water for domestic use, livestock, and other uses.

Soil: Reddish Chestnut soils (Pratt) and Brunizems (Shellabarger and Farnum) occupy the gentle slopes. Regosols (Tivoli) are on areas of dunelike topography and Alluvial soils (Wann, Leshara, and Canadian) on flood plains of the Arkansas River.
80—Central Rolling Red Prairies
Texas, Oklahoma, and Kansas
25,400 square miles

Land Use: Nearly all the land is in farms and ranches. Slightly less than one-half of the area is cropland, and only a few small areas are irrigated. The proportion of cropland is somewhat less and that of range somewhat higher in the southern third of the area. Winter wheat is the main cash crop; cotton and some truck crops are grown in southern Oklahoma and northern Texas. Other crops are small grains, grain sorghum, alfalfa, and hay. A little more than two-fifths of the area is in range or pasture of native grasses and shrubs. Beef cattle are the principal livestock, and locally there are some dairy cattle.

Elevation and Topography: 1,000 to 1,500 feet. On this dissected plain the divides are undulating to gently rolling and the valley sides hilly and steep. Flood plains of large streams are wide and level and much less cut by stream channels than those in areas to the west. Local relief is mainly in a few feet to several tens of feet.

Climate: Average annual precipitation—23 to 35 inches; highest in spring and summer and lowest in midwinter. Average annual temperature—57° to 65° F. Average freeze-free period—190 to 240 days.

Water: Crops and pastures depend on the moderate but somewhat erratic rainfall. Several large rivers that cross the area from west to east are potential sources of irrigation water but are not much used at present. Shallow wells provide moderate amounts of water for domestic use and for livestock in areas of deep soils, but ground water is scarce where the underlying shales and sandstones are close to the surface. Ground water from deep wells is generally highly mineralized.

Soil: Reddish Prairie soils (Renfrow, Grant, Kirkland, and Zaneis) occupy the smoother upland slopes in most of the area but Reddish Chestnut soils (Pond Creek and Pratt) are most extensive on those in the southwest and Chernozems (Idana) on those in Kansas and northern Oklahoma. Lithosols (Lucien, Vernon, and Kipson) are dominant on steep slopes and Regosols (Tivoli) in deep sands. Alluvial soils (Yahola, Gowen, Port, and Reinach) are on flood plains and low terraces along the larger streams.
SOUTHWESTERN PLATEAUS AND PLAINS RANGE
AND COTTON REGION

81  Edwards Plateau
82  Texas Central Basin
83  Rio Grande Plain
This region consists of the warmer part of the southern Great Plains. The moderate precipitation is accompanied by high temperatures so that precipitation effectiveness is low. The average annual precipitation is 20 to 30 inches over most of the region but it ranges from 15 to 35 inches; usually much of it falls in spring and autumn. Average annual temperatures are 60° to 70°F., and the freeze-free season ranges from 220 to 320 days, increasing in length from north to south.

The soils in the deeper coarse- and medium-textured materials are mostly in the Reddish Chestnut and Reddish Prairie great soil groups. Grumusols from limestones and marls and Lithosols and Calcisols in all kinds of parent material on hilly to steep slopes are also fairly extensive.

Range is the dominant land use over most of the region, but some wheat, other small grains, and grain sorghum are grown where soils, topography, and moisture supplies are favorable. In the southeast, cotton grown under irrigation is important. Citrus fruits and winter vegetables are grown along the lower Rio Grande Valley.
81—Edwards Plateau

Texas
33,100 square miles

Land Use: Nearly all the land is in farms and ranches. About four-fifths is in range grazed by beef cattle, sheep, and goats. In the west the cover consists of short grasses and shrubs; in the east the range is open woodland of scrub oak and cedar that has a grass ground cover. Deciduous forests grow on steep valley walls and on flood plains in the east and south. Only 1 or 2 percent of the area, the smoother uplands and the valleys in the east, is cropland. Winter wheat, grain sorghum, and hay are the main crops and there is some pasture. There are many pecan orchards on flood plains in the east, and cotton is grown in a small area in the north. Small areas along the San Saba River are irrigated.

Elevation and Topography: 1,000 to 4,000 feet, increasing gradually from east to west. This broad dissected limestone plateau has gently undulating divides and broad valleys. Valley sides are steeply sloping to rolling or hilly. Relief is in several tens of feet to one or two hundred feet; near the margins, the valleys are several hundred feet below the plateau top.

Climate: Average annual precipitation—15 to 35 inches; highest in late spring and early autumn and least in midsummer and midwinter. Average annual temperature—60° to 70° F. Average freeze-free period—Mainly 220 to 240 days but 260 days along the southern margin.

Water: The low to moderate rainfall is adequate for range grasses but is marginal for dryfarming. All major streams are perennial but their flow fluctuates. Many of the small streams flow only during rainy periods. Along the margins of the plateau large springs flowing from the limestones provide abundant water. Wells in the limestones provide water for livestock and for domestic needs on the plateau and locally for some irrigation.

Soil: Shallow Lithosols (Tarrant, Brackett, and Ector) underlain by limestone occupy the more sloping parts. Grumusols (San Saba, Tobosa, and Valera) are in valleys and on nearly level uplands. Calcisols (Uvalde) on better drained level to gentle slopes where soil materials are less clayey, and Alluvial soils (Frio and Blanco) on narrow flood plains.
82—Texas Central Basin

Texas
3,000 square miles

Land Use: Nearly all the land is in farms and ranches. More than four-fifths of the area is in range of shrubs and grasses, and an additional 10 percent is open oak-juniper woodland that has a ground cover of tall and short grasses. All this land is grazed by cattle and sheep. About 5 percent of the area is cropland. Peanuts, winter wheat, and peaches are the principal cash crops, and grain sorghum and small grains are grown for livestock feed.

Elevation and Topography: 800 to 1,300 feet. The rolling to hilly uplands are crossed by a few smooth valleys and many steep hills and ridges. Local relief is mainly in a few tens of feet but some ridges, especially those underlain by limestone, rise several hundred feet above the level of the valleys.

Climate: Average annual precipitation—25 to 30 inches; highest in spring and autumn. Average annual temperature—About 65° F. Average freeze-free period—About 240 days.

Water: The moderate rainfall is adequate for range grasses but is marginal for crops because of high summer temperatures and evaporation. Only a few of the large streams flow throughout the year. They are potential sources of irrigation water but are not so used at present. Shallow wells provide water for livestock and domestic needs.

Soil: Reddish Prairie soils (Tishomingo, Pedernales, Pontotoc, and Harley) occupy the smoother slopes of uplands and valleys, Lithosols (Darnell) the steep hill slopes, and rough stony land the steepest slopes and cliffs of limestone and the granite ridges.
**83—Rio Grande Plain**

**Texas**

31,900 square miles

**Land Use:** Nearly all the land is in farms and ranches. About four-fifths of it is in range of native shrubs and grasses grazed by beef cattle. Nearly 10 percent of the area, mainly along the Rio Grande and Nueces Rivers, is irrigated. Cotton, seed corn, sweet corn, citrus fruit, melons, and many kinds of vegetables are grown. About the same amount of land in the north and the east is used for crops without irrigation or with only supplemental irrigation. Cotton, grain sorghum, flax, and hay are the principal crops.

**Elevation and Topography:** Sea level in the southeast to 1,000 feet in the northwest. This plain is nearly level to gently undulating. Valleys are few, widely spaced, and shallow. Local relief is mainly in a few feet to a few tens of feet.

**Climate:** Average annual precipitation—20 to 35 inches; highest in spring and autumn. Average annual temperature—About 70° F. Average freeze-free period—260 to 320 days.

**Water:** The high summer temperatures reduce the effectiveness of the relatively low to moderate rainfall. The Rio Grande and Nueces Rivers provide water for irrigation, but the smaller streams have a small and intermittent flow and are little used for irrigation. Ground water is abundant throughout the area, and wells provide water for livestock, domestic use, and some irrigation.

**Soil:** *Grunusols* are extensive (Montell in calcareous clays in the northern and central parts of the area and Lomalta, a slightly saline soil, along the coast). *Reddish Chestnut soils* (Duval, Miguel, and Willacy in less clayey and somewhat less limy materials and Goliad over caliche) are also extensive. *Lithosols* (Zapata) are confined to the low narrow ridges and low plateau-like areas. Sandy *Regosols* (Nueces, Galveston, and Eufaula) occur along the coast, along the Rio Grande, and in the northeast and a clayey *Regosol* (Maverick) in the west. *Calcisols* (Hidalgo and Uvalde) are in sandy and silty old alluvium on stream terraces and deltas in the south and west and *Alluvial soils* (Frio, Harlingen, and Laredo) on narrow flood plains and deltas.
SOUTHWESTERN PRAIRIES COTTON AND FORAGE REGION

84 Cross Timbers
85 Grand Prairie
86 Texas Blackland Prairie
87 Texas Claypan Area
This region consists of the prairies and timbered areas of eastern Texas and south-central Oklahoma. The average annual precipitation ranges from 25 to 42 inches. Average annual temperatures are 60° to 70° F., and the freeze-free season is 200 to 230 days long.

Grunusols, Rendzinas, and Lithosols from limestone and chalks are the more extensive soils. Red-Yellow Podzolic soils, Planosols, and Reddish Prairie soils are also important groups.

The region is intensively farmed. Cotton, grain sorghums, other feed grains, and hay are important crops. Most of the more sloping areas in the west are in open timberland, which is used for grazing.
Cross Timbers
Texas and Oklahoma
17,700 square miles

**Land Use:** Nearly all the land is in farms and ranches. About one-half is in range of shrubs and grasses and an additional one-fourth is open woodland that has a grass understory. All this land is used for grazing. About one-fifth of the area, consisting of deep gently sloping soils both in valleys and on uplands, is crop land. Small grains, grain sorghum, alfalfa and other hay, and cotton are the major crops over much of the area. Peanuts, tree fruits, and vegetables occupy large acreages in the south.

**Elevation and Topography:** 1,000 to 1,200 feet but only 600 feet along the Red River. Ridgetops on these rolling to hilly uplands are nearly level to strongly rolling and narrow to moderately broad. Stream valleys are narrow and have steep gradients. Local relief is mostly in several tens of feet but the large valleys are 200 feet or more below the adjacent uplands.

**Climate:** Average annual precipitation—25 to 35 inches but as much as 45 inches in the east; highest in spring and early summer. Average annual temperature—60° to 65° F. Average freeze-free period—200 to 240 days.

**Water:** Pasture and crops depend mostly on the moderate and somewhat erratic rainfall. Large reservoirs provide water for cities and towns and for recreation. Farm ponds are a major source of water for livestock. Shallow wells supply water for domestic use in most of the area, but where sandstones and shales are near the surface, ground water is scarce.

**Soil:** Red-Yellow Podzolic soils are dominant in much of the area (Bowie, Boswell, and Kirvin in the humid east and Stephenville, Windthorst, and Nimrod—less acid and having darker surface layers than typical for the group—in the drier western part) and Lithosols (Darnell) and rough stony land on hilly to steep ridge slopes and valley sides. Brunizems (Dennis and Bates) occur in small areas underlain by sandstones in the north, Planosols (Axtell and Tabor) on flats underlain by heavy clays, and Alluvial soils (Yohola, Miller, Gowen, and Frio) on narrow flood plains of some larger streams.
85—Grand Prairie
Texas and Oklahoma
12,700 square miles

Land Use: The entire area is in farms and ranches. More than half is in range consisting of short grasses, bunch grasses, mesquite, scrub oak, juniper, and cedar. Beef cattle are the principal livestock and sheep are important in the southern part. The deeper soils on gentle slopes, about one-third of the area, are in cropland. Small grains, grain sorghum, cotton, corn, and hay are the principal crops.

Elevation and Topography: 800 to 1,200 feet. Arbuckle Mountains 1,350 feet. The low rugged Arbuckle Mountains are in the north of this otherwise rolling to hilly dissected plateau. Stream valleys are shallow and narrow in their upper reaches but deepen and broaden near the margins in the east. Broad areas in central Texas are gently sloping but steep slopes border valleys of the larger rivers and occupy most of the Arbuckle Mountains. Relief is mainly in tens of feet, but the large valleys are 100 feet or more below the adjacent uplands. The Arbuckle Mountains rise several hundred feet above the adjoining plain.

Climate: Average annual precipitation—30 to 35 inches; highest in spring and early summer. Average annual temperature—About 65° F. Average freeze-free period—200 to 240 days.

Water: Crops, pasture, and range depend on the moderate but somewhat erratic rainfall. The large rivers flow the year round and are a potential source of water for irrigation but are little used at present. Ground water is abundant and there are many springs and wells throughout the area.

Soil: Grumusols (San Saba) and Brunisols (Denton) underlain by relatively soft limestones are the dominant soils on most of the gentle slopes and Lithosols (Tarrant and Brackett) on steeper slopes of similar materials. Reddish Prairie soils (Durant and Newtonia) are on smooth uplands underlain by sandstones, shales, and limestone. Rough stony land occupies the Arbuckle Mountains, walls of the more deeply incised valleys, and the steepest hills. Alluvial soils (Frio and Gowen) are on flood plains of the larger streams.
86—Texas Blackland Prairie

Texas, 19,700 square miles; Arkansas, 700 square miles

Land Use: Nearly all this area is in farms. In Texas, two-thirds or more is cropland, about one-sixth is in pasture, and the remainder is in abandoned fields or narrow strips of woodland along streams. The small outlier in Arkansas is about one-fourth cropland, three-fifths pasture, and the remainder woodland. Cotton is the major cash crop, but small grains, grain sorghum, corn, and johnsongrass and other hay occupy a larger total acreage. The present trend is to a decrease in cropland and an increase in pasture on the more sloping and eroded soils.

Elevation and Topography: 300 to 800 feet, increasing gradually from south to north and from east to west. On these undulating to gently rolling dissected plains, gentle upland slopes merge into narrow valleys with more sloping sides. The large rivers that cross the area have broad but shallow valleys. The only significant tracts of hilly land are along the western margin in Texas. Relief is mainly in a few feet to a few tens of feet.

Climate: Average annual precipitation—30 to 50 inches; highest in spring and lowest in summer and fall. Average annual temperature—63° to 70° F. Average freeze-free period—230 to 280 days.

Water: The moderate rainfall is adequate for crops and pastures in many years, but summer droughts that reduce crop yields are fairly common. The many reservoirs that have been built recently on the larger streams help control floods, furnish municipal water supplies, and provide recreational facilities. Small farm ponds on individual farms are an important source of water for livestock. Ground water is scarce throughout the area, but a little water is obtained from wells in a few places.

Soil: Dark Grumusols (Houston Black, Houston, Hunt, and Vaiden) on gently sloping to nearly level uplands underlain by marls, soft limestones, and highly calcareous clays are dominant. Rendzinas (Austin, Lewisville, and Binnsville) are on strongly sloping areas of chalk. Planosols (Wilson) are in the less calcareous clays along the eastern side of the main body of this resource area and are the dominant soils in the small outliers in southeast Texas and in Arkansas. Alluvial soils occur on flood plains (Miller, Norwood, and Trinity on those of rivers that flow into the area from the west and Frio, Kaufman, and Gowen on those along the larger streams originating within the area).
87—Texas Claypan Area

Texas
13,200 square miles

Land Use: Nearly all the land is in farms and about half is in woodland. Open post oak savannas that have a thin understory of bunch grasses and brush are dominant over much of the area but there are some pine-hardwood forests in the east. Hardwood forests of oak, elm, pecan, and other species grow on some of the wet bottom lands. About one-half of the area has been cropped at some time but very little is now cultivated. Cotton, grain sorghum, corn, alfalfa, and other hay were grown formerly, but at present cropland is confined almost entirely to some of the sandier soils in the north where truck crops, peanuts, and fruit are grown. Most of the cleared land is now in pasture of native and volunteer grasses that have a low carrying capacity. Clearing of woodland and abandoned cropland for improved pasture is the present trend.

Elevation and Topography: 200 to 500 feet. On this nearly level to gently sloping coastal plain, valleys are narrow and shallow in their upper reaches. Valleys of large streams are shallow, and the wide flood plains are bordered by nearly level terraces. Local relief is mainly in a few feet to a few tens of feet.

Climate: Average annual precipitation—34 to 42 inches; highest in winter and spring and lowest in summer and autumn. Average annual temperature—65° to 70° F. Average freeze-free period—240 to 280 days.

Water: Crops and pasture depend on the moderate rainfall. Summer rainfall is erratic and yields are reduced by lack of moisture in most years. A few large reservoirs provide municipal water supplies and also serve as recreational facilities. Over much of the area water for livestock is obtained from small ponds on individual farms. On many farms water for domestic use comes from shallow wells, but in some places deep wells are needed. The deep wells provide large amounts of good-quality water.

Soil: Planosols in clay (Lufkin, Tabor, and Axtell) are dominant over much of the area. Red-Yellow Podzolic soils (Boswell, Cuthbert, Caddo, and Norfolk) are in the less clayey and more acid materials along the eastern edge and Regosols (Lakeland) in deep sands. Alluvial soils (Miller, Norwood, Gowen, and Navasota) are on flood plains.
SELECTED REFERENCES