
Appendixes

Features of the Arid and Semiarid Region

Note: The information in this appendix further elaborates on material presented in chapter II.

Natural Features of the Arid and Semiarid Region

The Great Plains

The Great Plains stretch eastward from the Rocky Mountains to the Midwestern United States in a band 300 to 400 miles wide and extend north and south from Canada to the Gulf of Mexico. The region features comparatively level, broad expanses of land that are, for the most part, easily traversed and readily habitable.

The climate of the Great Plains is highly variable, and its weather is known for extremes. Average annual precipitation generally increases from west to east and from north to south; greatest amounts occur during the spring and early summer. Amounts fluctuate widely between years and months but generally range from about 25 inches in southern Texas to less than 12 inches in the northern part of the plains. Snow accounts for 20 to 30 percent of the annual precipitation in the central and northern areas of the region. Another apparent characteristic of precipitation is a tendency for a number of below- and above-average precipitation years to occur together.

Temperatures in the Plains tend to increase as one moves south. In the northern Great Plains, mean monthly temperatures for January and July are 5° and 70°F, respectively. In the south, average temperatures for these months are 40° and 80° F. Winter temperatures of -60 F and summer temperatures as high as 120- F have been reported. The length of the frost-free period ranges from about 100 days in the north to over 200 days in the south.

Wind is a prominent feature of the Great Plains. Over most of the area, average wind velocity is 10 miles per hour. However, in the winter and early spring, the region often experiences strong winds of 30 to 60 miles per hour that are sometimes accompanied by snow. The winds that occur during and after these storms may last for several days and cause severe soil erosion as well as damage to vegetation, livestock, and buildings.

Soil characteristics in the region vary widely, reflecting differences in parent sources, topography, climate, and plant and animal life. In general, soils of the Plains region are relatively fertile, moderate to low in organic matter, and susceptible to wind and water erosion. In poorly drained areas, soils are subject to salinization.

The plants and animals of the Great Plains vary along both the east-west and north-south gradients of precipitation and temperature. In the east, most of the region was originally covered by lush, tall grass, characterized by deep roots and vigorous growth. In the western part, where precipitation is lower, short grasses dominate. The short grasses form a dense sod, and their roots do not penetrate the soil deeply. Herbs also grow in the short grass region. Between the tall grass and short grass regions is a mixed area, composed of midgrasses and short grasses. Both kinds of grasses are intermixed and occur equally—mid-grasses form the upper layer of vegetation, and short grasses and sedges form the lower one. Woody vegetation in the grassland region occurs rarely under natural conditions, except in low areas and along rivers and streams. Pronghorn antelope, mule and white-tailed deer, jackrabbits, and other rodents are common throughout the region. Across the southern part of the Great Plains, grasses are mixed with shrubs and low trees. The northern boundary of these brushlands coincides with the northern distribution of several mammals—e.g., the Mexican ground squirrel and the gray fox.

The Interior Basin

The Interior Basin extends almost to the Canadian border in the north and to Arizona and New Mexico in the south. On the east, the region is bounded by the Rockies; the western and northern border is formed by the Cascade and Sierra Nevada Mountains. Relatively high elevations and level land surfaces characterize the area, but some regions are dissected by rivers or interrupted by small mountain chains. Some of the area consists of separate interior basins without drainage to the sea.

A variety of weather patterns occurs within the Interior Basin because of differences in topography, latitude, and elevation. The region is characterized by low and erratic precipitation. Average annual precipitation ranges from 0 to 48 inches at the tops of mountains. Most of the moisture comes as snow in the winter months.

Temperatures in the Interior Basin are like those of other continental climates. Both daily and seasonal temperatures range widely and reach extreme highs and lows. In the north, average monthly temperatures for January and July are 30 and 60 F. To the south, average temperatures are 35 and 80 F. Subzero winter temperatures in the mountains and summer temperatures over 100° F in southern valleys are common. The frost-free period varies from less than 60 days in high mountain valleys to over 200 days in southern lowland valleys.

Like the Great Plains, the northern part of the Interior Basin experiences strong winds in the winter and early spring as storms move across the area. Winds in the southern region tend to be from the south, and wind speeds are usually light to moderate.

Soils of the northernmost part of the Interior Basin developed in thick wind-blown deposits, sometimes mixed with volcanic ash. These soils are generally deep, fertile, and fine-textured, but prone to severe water erosion. Over much of the rest of the region, soils formed in residual materials. Salt flats and playas (the level floors of undrained basins that, at times, may become shallow lakes) are extensive in some areas and contain thick accumulations of alkaline and saline salts.

Vegetation in the region varies widely. In general, the broad valleys in the lower portion of the basin are covered by low shrubs. Almost pure stands of some shrubs occur, and many of them tolerate high alkali and salt concentrations in the soil. The lower elevations of the mountains and foothills in the area are usually covered by big sagebrush and grass, or by a combination of various low, shrubby, woody species. The mountains of the area support complex vegetation with a number of different plant communities, varying from low shrubs in the foothills, to trees at higher elevations, and grasses above timberline.

For the most part, the animals in this region are similar to those found in other areas. Wildlife species are especially important because of the wilderness character of the region. The area is also an important breeding and resting ground for migrating birds.

The Central Valley of California

To the west and south of the Sierra Nevada and Cascade mountain ranges and east of the Coast range is the Central Valley of California. The Central Valley constitutes two major river basins, that of the Sacramento River on the north and the San Joaquin River on the south. These two rivers flow toward each other and join in the Sacramento-San Joaquin delta. The combined basins extend nearly 500 miles in a northwest-southeast direction and average about 120 miles in width. They include more than one-third of California.

Generally, the climate of the Central Valley is mild. Most precipitation occurs in the fall and winter. Annual amounts tend to be higher in the north than in the south and range from 22 inches in the northern Sacramento Valley to 6 inches in the southern San Joaquin Valley.

Precipitation and resulting runoff vary not only from winter to summer of each year, but also in total annual amount in different years. For example, in extremely dry years, the runoff may be as little as one-third to one-tenth the average annual runoff. In extremely wet years, extensive flooding may be caused by runoff which may be two to over three times the average. Moreover, a succession of dry or wet years often occurs.

Temperatures in the Central Valley increase from north to south. Summers are hot and winters are mild. The average temperature for January is 45 F and the average for July is 70° F. The frost-free period ranges from 260 to 300 days.

Soils of the Central Valley formed on a variety of parent material, and properties vary. Generally, however, the soils developed on fertile alluvial deposits and are deep and fine-textured. In low areas, drainage may be poor and alkaline and saline salts may accumulate.

Evidence indicates that the Central Valley of California was once dominated by annual grasses. Today, many of these grasses have been eliminated by cultivation, fire, and grazing. Similarly, some animals such as the tule elk, pronghorn antelope, and feral horse and pig have disappeared from the valley and are confined to higher elevations. Now, deer, rabbits and other rodents, quail, wild turkeys, and partridges are common.

The southwest

The Southwest includes areas in southern California, southern Nevada, southwest Utah, Arizona,

southern New Mexico, and southwest Texas. The region is characterized by a broad spectrum of landscapes, including mountains, valleys, plains, and canyons.

The climate of the Southwest is arid, with hot summers and mild winters. Annual amounts of precipitation range from 0 inches to less than 16 inches. Most occurs during the summer months. Average temperatures range from 45° F in January to 85° F in July. Summer temperatures exceeding 100° F occur frequently. The frost-free period varies from 210 to 365 days in the southernmost part of the region.

Soils in the Southwest are variable. Generally, they formed in residual material and tend to be shallow and coarse in texture, although some are fine-textured and well-developed. In some areas, gravel and bare rock appear on the surface because intense desert storms remove soil accumulations. Salt flats and playas occur in low depressions with no exterior drainage.

Two large deserts occupy much of the area. The deserts of California and Arizona are characterized by large treeform cacti and numerous woody shrubs. These plants provide little groundcover, and small annual plants carpet the ground only after rare and heavy rainstorms. Although large animals are almost absent, small nocturnal burrowers such as rats and mice are common. To the east, the deserts of New Mexico and Texas are characterized by thorny scrub vegetation in open stands or thickets. Short grasses provide forage for pronghorn antelope, deer, and numerous rodents.

Cash Receipts From Farm Marketing, 17 Western States, 1980*

State	Agricultural product (million dollars)		
	Livestock and products	Crops	Total
Great Plains:			
Texas	5,920	4,114	10,034
Nebraska	3,873	2,569	6,442
Kansas	3,355	2,586	5,941
Oklahoma	1,986	1,148	3,134
South Dakota	1,710	723	2,433
North Dakota	662	1,656	2,318
Mountain region:			
Colorado	2,499	927	3,376
Idaho	907	1,085	1,992
Arizona	864	1,036	1,900
Montana	727	651	1,378
New Mexico	850	273	1,123
Wyoming	572	110	682
Utah	376	124	500
Nevada	150	65	215
Pacific region:			
California	4,452	9,210	13,662
Washington	807	1,807	2,614
Oregon	621	973	1,594
Total, 17 Western States	30,281	29,058	59,339
Total, United States ...	69,209	68,806	138,015

*Other income derived from farming (e.g., Government payments and nonmoney income) are not included in totals.

SOURCE: U.S. Department of Agriculture, Economics and Statistics Service, *Agricultural Outlook*, March 1981, AO-63, p. 25.

Agricultural Exports in the 17 Western
States, by State, October-September,
1979-80 and 1980-81

<i>State</i>	<i>Total agricultural exports (million dollars)</i>	<i>Leading exports *</i>	<i>State</i>	<i>Total agricultural exports Million dollars)</i>	<i>Leading exports*</i>
Great Plains:			New Mexico:		
Texas:		Cotton, feed grain	1 9 8 0 . . .	139	Wheat, teed grains
1980	2,976	wheat, rice, animals, and meat	1981	151	cotton, animals and meat, fats and oils
1981	2,577				
Kansas:		Wheat, feed grains, soybeans, animals and meat, fats and oils	Utah:		Hides and skins, wheat, animals and meats, feed grains
1980	2,085		1 9 8 0	104	
1981	2,263		1981	114	
Nebraska:		Feed grains, wheat, soybeans, animals and meat, fats and oils	Wyoming:		Wheat, animals and meat, hides and skins, fats and oils
1 9 8 0	1,873		1980	76	
1981	2,114		1981	94	
North Dakota		Wheat, sunflower seeds and oil, feed grains, seeds, feed and fodder	Nevada:		Animals and meat, hides and skins, fats and oils
1 9 8 0	1,435		1 9 8 0	23	
1981	1,144		1981	25	
Oklahoma:		Wheat, cotton, animals and meat, fats and oils, hides and skins	Pacific region:		
1980	1,003		California:		Fruits, nuts, cotton vegetables, wheat
1981	931		1980	3,253	
South Dakota:		Wheat, feed grains, soybeans, sun flower seeds and oil	1981	3,589	
1980	697		Washington:		Wheat, vegetables, fruits, seeds, hides and skins
1 9 8 1	708		1980	699	
			1981	1,018	
Mountain region:			Oregon:		Wheat, vegetables, seeds, hides and skins, animals and meat
Colorado:		Wheat, feed grains, an i reals and meat, seeds, hides and skins, vegetables	1980	385	
1 9 8 0	534		1981	513	
1981	780		Total, 17 Western States:		
Idaho:		Wheat, vegetables, feed grains, seeds, hides and skins	1980	16,662	
1980	467		1981	17,656	
1 9 8 1	634		Total, United States:		
Montana:		Wheat, feed grains, animals and meat, fats and oils	1980	40,481	
1 9 8 0	474		1981	43,789	
1 9 8 1	513		17 Western States, percent of total U. S.:		
A r i z o n a		Cotton, wheat, fruits, cottonseed, an i reals and meat	1980	41	
1980	439		1981	40	
1981	488				

*Exports are arranged in approximate, decreasing order of monetary value.

SOURCE: USDA, Economic Research Service, *Foreign Agricultural Trade of the United States*, March/April 1982, table 17

Appendix A References

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2. Brengle, K. G., *Principles and Practices of Dryland Farming* [Boulder, Colo.: Colorado Associated University Press, 1982].
3. Ferguson, Hayden, Lyle, William, Fenster, Charles, and Wendt, Charles, "Dryland Agriculture," OTA, unpublished draft report, August 1982.