

THE WEATHER ELEMENTS

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PRESSURE AND WINDS

The month as a whole was notably free from extensive cyclonic storms (see Chart II). In fact no single storm area of sufficient importance to cause continued precipitation moved over any extensive path. Numerous low-pressure areas attended by more or less rainfall appeared on the daily weather maps, but they persisted for short periods only, save from about the 15th to 21st, when moderately low pressure was maintained in the Middle Plains region, attended by local precipitation. Anticyclones were the dominant feature of the atmospheric circulation, although these were mainly of unimportant character save in their influence toward lower temperatures.

The month opened with high pressure central over the middle Missouri Valley, and as it moved slowly southward and eastward gave the coolest weather of the month over the central valleys and most southern districts. This was soon followed by another which moved from the far Northwest and was central over the Southern Plains at the end of the first decade, moving thence into the Southeastern States during the following few days. The next important high-pressure area entered the far Northwest about the beginning of the last decade, and, as it moved southeastward over the Plateau and Rocky Mountain regions, brought unseasonably low temperatures to those districts. At the end of the month high pressure, moving from the Canadian Northwest toward the Great Lakes, brought moderately cool weather over most northern districts.

On account of the predominance of anticyclonic conditions the average pressure for the month was slightly above the normal in practically all parts of the country. Small areas in the northern Plateau and northern Rocky Mountain regions, in the Southeast, and in the New England States had averages slightly below normal. Compared with June the average pressures were nearly everywhere materially higher, this being particularly so over the Middle Plains and adjacent areas.

Barometric gradients were mainly shallow, and high winds were associated usually with local thunder or other storms, which were generally far less severe than during the preceding month. Likewise the moderately even distribution of the average pressure over the various portions of the country tended toward frequent variations in the prevailing directions of the winds, though over the Great Plains and Mississippi Valley they were largely from the south.

TEMPERATURE

The outstanding feature of the weather during July, 1924, was the further continuation of unseasonably cool weather (see Chart IV), which had been so persistent during the two preceding months, particularly over the northern and central districts from the Rocky Mountains eastward.

The temperature averages for each week in the month were below normal over large areas of the region referred to above, and in some instances nearly the entire country from the Rocky Mountains eastward experienced temperatures unusually low for midsummer.

The coldest period generally was the first week, when temperatures frequently 10° to 15° below the normal pre-

vailed over the central valleys and southern districts, and all sections from the Rocky Mountains eastward had temperatures during this period almost continuously below normal, save over a small area from northern Minnesota westward to Montana, and in northern New England. At the same time decidedly warm weather continued in the far West, as had been the case during much of the two preceding months.

The second week experienced a moderate reaction to more nearly normal conditions, though the week as a whole continued cooler than normal from the Rocky Mountains eastward, save in the extreme South and along the immediate Atlantic coast. In the far West temperature conditions moderated somewhat and the week as a whole was slightly cooler than normal over the southern districts, but mainly slightly warmer over the northern portions.

The week ended July 22 was, in the main, distinctly cool over the greater part of the country, though some high temperatures prevailed locally in the Northwest and Southwest, and the warmest weather of the month was observed over many southern districts at the close. In the far West the long continued heated period was definitely broken, and the week as a whole was moderately cool, affording much relief.

The period from the 23d to the end of the month brought frequent changes in temperature, with the highest readings of the month over much of the country from the Mississippi Valley eastward, and the lowest temperatures in some of the far Western States, and in portions of New York and New England. The period as a whole continued materially warmer than normal in the Southern States from Texas and Oklahoma eastward, and it was moderately warmer than usual over much of the Plateau region and far Northwest. In the central and northern districts from the Rocky Mountains eastward the week as a whole was moderately cool, and like conditions prevailed over most of California and the Southwest.

Maximum temperatures above 100° occurred during the month in all the States save from the Great Lakes and Ohio Valley eastward. The highest reported, 124° , occurred in California.

Minimum temperatures below freezing were reported from a few points near the northern border, and at the higher elevations of the western mountain districts, the lowest, 17° , occurring in the mountains of Idaho. The minimum temperatures during the first two or three days of the month were the lowest, or among the lowest of record for July at many points in the lower Mississippi Valley and adjacent areas of the Gulf States.

For the month as a whole, as previously stated, the average temperature was again well below normal over all central and northern districts from the Rocky Mountains to the Great Lakes and Middle Atlantic States, and it was slightly cooler than normal over most other portions of the country, the only sections appreciably warmer than normal being small areas in the New England States, the Florida Peninsula, and lower Mississippi Valley, a few points in Arizona and generally over the far Northwest.

PRECIPITATION

July was a dry month over much of the country, though such precipitation as occurred was moderately well distributed during the various periods of the month. No day in the month was without material rainfall in

some portion, but the dates on which precipitation was most widespread and in greatest volume were the 8th to 10th, 13th to 14th, 17th to 19th, and on the 31st.

Precipitation was greatly deficient in most of the Southern States, particularly from western Alabama to Arkansas and central Texas, the month being the driest July of record at points in eastern Texas, and among the driest of record at points in Louisiana. Over much of Florida and locally in Georgia, eastern Alabama, and the coast districts of the Carolinas the monthly amounts were above normal, in some cases far above, due to heavy falls on a few days rather than to any excess of rainy days.

Precipitation was largely deficient from central Virginia to southern New England, the total falls in portions of the latter section amounting to less or only slightly more than half an inch. There was likewise a large deficiency in the lower Ohio Valley, and in portions of Iowa and the northern Plains.

Dry weather continued in most districts from the Rocky Mountains westward, save in portions of the northern Rocky Mountain and Plateau regions, where locally there were some good rains. In the Pacific coast States drought continued, though of course rain is not expected at this season of the year. However, the absence of the usual falls earlier in the season has resulted in a greatly reduced supply of water. Stream flow continued the lowest of record, particularly in California, and old wells were dug deeper and new ones opened to alleviate the water shortage. Hydroelectric plants were unable to deliver the required amount of power, and

auxiliary steam plants were operated everywhere to augment the output.

On account of the continued drought in the far West and the dry and heated condition of the forests, the fire hazard was greatly increased and forest fires were frequent, and in many cases hard to control.

SNOWFALL

An unusual fall of snow was reported from the high elevations of the Yellowstone Park locality on the 20th, where depths of 4 to 6 inches occurred, continuing for a period of nearly 24 hours.

RELATIVE HUMIDITY

The extreme drought conditions existing during the month in the lower Mississippi Valley and adjacent portions of Texas were attended by a marked deficiency in the percentage of relative humidity in that section as compared with the normal, and similar conditions existed in most districts from the Rocky Mountains westward. In other parts of the country the departures from normal were not unusual.

The month was distinctly lacking in sunshine in portions of the Southeastern States, notably in Florida and southern Georgia, and less so in the southern Appalachian Mountains. Elsewhere there was mainly abundant sunshine, and it was almost continuous in the Great Valleys of California and in western Arizona.

SEVERE LOCAL HAIL AND WIND STORMS, JULY, 1924

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path ¹	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Richards, Colo.	1	4 p. m.	8,800		\$10,000	Heavy hail	Roofs damaged; chickens killed	Official, U. S. Weather Bureau.
Los Lunas, N. Mex.	1	6-6:30 p. m.	2 mi.		10,000	do.	Damage chiefly to crops	Do.
Hooker, Okla.	1					do.	Large area of fine wheat total loss	Do.
Stead (near), N. Mex.	1	3 p. m.	10 mi.		10,000	do.	Character of damage not reported	Do.
Stevens County, Kans.	1	4 p. m.	3-7 mi.			Hail	Very destructive storm; 30,000 acres of wheat ruined; other crops beaten; path 40 miles long	Do.
Winsors, N. Mex.	2	4 p. m.	3 mi.			Heavy hail	Roofs and gardens damaged	Do.
Dimmitt, Tex.	3	8:15 p. m.	8 mi.		500,000	Hail	Total loss of crops	Do.
Landrum, S. C.	4					do.	Moderate damage	Do.
Livonia, N. Y.	5	3:30 p. m.	7,040			Heavy hail and rain	Orchards, vineyards, and buildings damaged; grain injured; telephone and telegraph poles down	Official, U. S. Weather Bureau; Rochester Herald (N. Y.).
Lake County, Ill. (w. and sw. of Grayslake)	7	2 p. m.	2-3 mi.			Hail	Considerable crop damage	Official, U. S. Weather Bureau.
Burlington, Wyo.	7	2 p. m.	1,760		5,000	Heavy hail	Crops damaged and poultry killed	Do.
Grundy County, Iowa	7	P. m.			100,000	Hail	Total loss of crops to many farmers	Do.
Airlie, Minn.	11	6 p. m.	4-5 mi.			Small tornado	Four buildings wrecked	Official, U. S. Weather Bureau; Press and Dakotan (Yankton, S. Dak.).
Lamar, Mo.	11-12					Wind and rain	Damage principally to crops	Official, U. S. Weather Bureau.
Furnas County, Nebr.	12	7 p. m.	6 mi.			Heavy hail	Loss of crops partial to total; buildings more or less damaged	Do.
Decatur County, Kans.	12	11 p. m.	4-6 mi.			Hail	Very destructive storm; wheat and other crops heaviest sufferers; some property damage	Do.
Smith County, Kans.	12	P. m.	1,320			do.	Growing crops badly injured	Do.
Ellsworth County, Kans.	13	5 p. m.	10-15 mi.			do.	Damage comparatively small	Do.
Ford County, Kans.	13	P. m.				Tornado	Farm buildings damaged	Do.
Dodge City, Kans. (5 mi. sw. of)	13	P. m.				do.	Minor damage reported	Do.
McPherson County, Kans.	13	7 p. m.			100,000	do.	Barns, houses, windmills, poles, and wires leveled; much stacked wheat blown away	Do.
Butler County, Kans.	13	8:15-8:45 p. m.	80-880	1	2,000,000	do.	20 persons injured rather seriously, 80 slightly. Augusta suffered most; 76 dwellings, 21 business houses, and 1 church destroyed; many others damaged; 300 oil rigs wrecked in near-by territory	Do.
Devon, Kans. (Bourbon County)	13	9:30 p. m.	66			do.	Destruction confined to barns, trees, and outbuildings	Do.
Bourbon County, Kans., from Fort Scott north	13	P. m.				Severe wind	Damage chiefly to barns, garages, telephone and telegraph poles	Do.
Chase County, Nebr.	13	9:30 p. m.	2-mi.			Hail	Loss of crop estimated at from 25 to 75 per cent.	Do.
Jeffersonville, N. Y.	13		880			Moderate hail	Corn stripped; potatoes beaten to ground	Do.
Claiborne County, Tenn.	14	P. m.	1-3 mi.			Hail	Corn, tobacco, and tomatoes damaged. Path 25 miles long	Do.

¹ Yards when not otherwise specified; "mi." signifies miles