

As a whole, the month was warmer than normal, with temperatures 90° or above at a few points in Arizona, California, Florida, and Texas. On the other hand, sub-zero temperatures were recorded at many places in the Rocky Mountain, Great Basin, and most northern border States, chiefly during the latter half of the month.

PRECIPITATION

The precipitation for the month was very unevenly distributed over the United States. Most of the lake region and Ohio Valley received more than the normal amount, while heavy to excessive falls, ranging in some cases from four to six times the normal, were received in parts of the southern Great Plains and lower Missouri Valley; the greatest November fall of record being measured at Kansas City and St. Joseph, Mo., Keokuk, Iowa, and Milwaukee, Wis. On the other hand, in the South the amounts were below the normal, except in the southern portions of Louisiana and Texas, where they were somewhat above, as also they were in most of California. Throughout the interior of the Atlantic States, the northwestern portion of the Great Plains, the northern Rocky Mountain region, and from the central portion of the Great Basin westward, except most of California, the precipitation was markedly deficient, many sections receiving less than 25 per cent

of the normal, while in portions of the northwestern Great Plains and of southwestern Arizona no precipitation whatever was received.

SNOWFALL

No heavy snows occurred in the northern border States, but in the western mountains rather heavy falls were received in Colorado and portions of Nebraska, Wyoming, Utah, and New Mexico, and also in the eastern portion of California, while in portions of the Texas Panhandle unusually heavy falls for the season occurred about the middle of the month.

But little snow remained on the ground at the end of the month, except in the mountains of the West, the upper lake region, and northern portions of the New England States.

RELATIVE HUMIDITY

Over all interior and most western portions of the country the relative humidity was above the normal for the month, the values over the central Great Plains and Rocky Mountain regions being particularly high. Over the Atlantic and East Gulf States the average relative humidity was mainly less than normal and similar conditions prevailed along the immediate Pacific coast.

SEVERE LOCAL STORMS, NOVEMBER, 1928

[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, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Floyd County, Iowa (Rock Grove Township).	14	4 p. m.			\$2,000	Tornado	Character of damage not reported.	Official, U. S. Weather Bureau.
Vinton, Benton County, to Silver Creek, Delaware County, Iowa.	14	4:30-5:15 p. m.		1	200,000	do.	Scores of farmsteads demolished or damaged; much livestock killed; trees and telephone poles leveled; 9 injured.	Official, U. S. Weather Bureau; the Journal (Stout City, Iowa).
Chester, Iowa.	14	5:30 p. m.			3,000	do.	Several buildings damaged; 2 persons injured.	Official, U. S. Weather Bureau.
Wisconsin (eastern and southeastern).	14-15				10,000	High winds	Damage chiefly to overhead-wire systems, small farm buildings, windows, etc.	Do.
Orlando, Okla.	15	7 p. m.	220	2	10,000	Tornado	Several homes and barns wrecked; path 2 miles.	Do.
Michigan (Thumb district).	15			1	25,000	Heavy gales.	Farm buildings blown down; orchards uprooted.	Do.
Iowa (central and north-eastern).	17					Snow and sleet.	Overhead wires broken; poles snapped off; trees damaged.	Do.
Cumberland County, Pa.	19	2:30 p. m.				Wind.	Considerable property damage reported.	Do.
Chemung, Tioga, and Broome Counties, N. Y.	19	4-5 p. m.			120,000	do.	Houses and barns unroofed; several barns demolished; livestock killed; heavy damage to manufacturing plant.	Do.
Wilkes-Barre, Pa., and vicinity.	19	4:30 p. m.			500,000	Probably tornado.	Heavy damage to buildings, trees, etc.	Do.
Montour and Columbia Counties, Pa.	19	P. m.				Wind.	Scores of homes unroofed; communication cut off; highways blocked.	Do.
Rutland, Vt.	19	do.				do.	Wire communication interrupted; 2 automobiles demolished; poles blown down.	Daily News (Burlington, Vt.).

RIVERS AND FLOODS

By H. C. FRANKENFIELD

On the evening of November 15, 1928, a disturbance of apparent North Pacific origin was central over New Mexico. For the ensuing 36 hours it moved northeastward, and during this period it was attended by excessive rains over eastern Kansas, Missouri, eastern Iowa and northern Illinois, and the southern upper Lake region. Floods were, of course, inevitable, especially in the rivers of eastern Kansas and Missouri. They were especially severe in the Osage, Cottonwood, and Neosho Rivers of Kansas, and the following description thereof was prepared by Mr. S. D. Flora, meteorologist in charge of the Weather Bureau office at Topeka, Kans.:

Disastrous floods occurred along the Marais des Cygnes (Osage), Cottonwood, and Neosho Rivers as the result of downpours of 7 to 10 inches of rain that began during the night of November

15-16 and lasted approximately 36 hours. Such heavy rains were without precedent in Kansas so late in the year.

The total property damage in the basins of the three rivers was estimated at \$1,948,000. Eight lives were lost—six in Franklin County, one in Miami County, and one in Labette County.

The greatest damage occurred in and near Ottawa, where the Marais des Cygnes reached a record breaking stage of 37.6 feet 13.6 feet above bankful, at 2 p. m. of the 17th. Fifty blocks of the city were covered by the flood waters. Seven hundred buildings were damaged, 30 houses washed away, and 40 others washed from their foundations. The municipal power plant and water-works pumping plant were entirely disabled, leaving the city in darkness for several nights and without drinking water. Altogether, the water reached approximately 150 acres of land within the city limits. The damage in the city, exclusive to railways, was estimated at \$200,000 by representatives of the United States Engineer Corps. On the same authority the total damage in Franklin County, of which Ottawa is the county seat, was estimated at \$750,000, with an additional \$200,000 damage to railways in and near Ottawa. Damage in Miami County was estimated at \$400,000.

Damage to other counties in the basins of the three rivers was fairly well distributed and was mostly to bridges, highways, and