

Severe local storms, June, 1923—Continued.

[The table herewith contains such data as have been received concerning several 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.
Camden, S. C.	25				3,000	Electrical.	Barn destroyed and valuable horse killed.	Official, U. S. Weather Bureau.
Greenwood, S. C. (near).	25				2,500	do.	Two barns and contents destroyed.	Do.
Tobacco section of Connecticut.	26				100,000	Electrical and hail.	Tobacco and tobacco barns heavily damaged.	Do.
Oakland, Md. (2½ miles south of).	26					Wind.	A house and barn blown down, and several children injured.	Do.
New York City and vicinity.	26			3		Wind and electrical.	Some property damage and several persons injured.	Tribune (N. Y.).
Southwestern and central Iowa.	27			1		Wind and rain.	Considerable property damage and crops severely injured.	Official, U. S. Weather Bureau.
Evansville, Ind.	27					do.	Crops damaged and wires, trees, signs, and chimneys blown down.	Do.
Springfield, Mo.	27					Wind.	Minor damage done.	Do.
Jonesboro, Ark.	27				7,000	Tornado.	Considerable property damage.	Do.
Brownsville, Tenn.	27	P. m.				Thunderstorm.	Several buildings unroofed, plate windows broken, light and telephone poles and trees blown down.	Do.
Ridgely, Tenn.	28			2		do.	Much property damage.	Do.
Rapid City, S. Dak. (2 to 3 miles west of).	29	P. m.	1,700 to 3,520.			Hail.	Heavy crop damage.	Do.
Dodge City, Kans.	29				600,000	Wind and hail.	Considerable damage, principally by hail.	Do.

STORMS AND WEATHER WARNINGS.

CHICAGO FORECAST DISTRICT.

By EDWARD H. BOWIE, Supervising Forecaster.

WASHINGTON FORECAST DISTRICT.

From a forecasting standpoint the month was relatively quiet in the Washington Forecast District. No storms of marked severity crossed the district during the month and the advisory information issued for the coastal waters was in connection with the occurrence of squalls attending thunderstorms. No regular storm warnings were issued during the month, although on the evening of the 25th announcement was made for the East Gulf region concerning the presence of a disturbance of slight intensity off the Louisiana coast. This disturbance advanced east-northeastward during the night of the 25th and during the 26th it passed off the South Atlantic coast in the vicinity of Charleston. It was attended by excessive rains over a narrow belt extending from the Louisiana coast eastward to the Atlantic coast and by winds of more than 40 miles an hour in the vicinity of Pensacola, Fla.

On June 8 small-craft warnings were displayed on the Atlantic coast at and north of the Virginia Capes, in expectation of fresh and strong northwest winds during the following afternoon and night of that day; and on the 26th small-craft warnings were again displayed over the same coastal region in expectation of the occurrence of squalls during the afternoon and night of the 26th. The squalls forecast on the 26th occurred quite generally, the severest taking place in the vicinity of New York, where the wind for a short period equalled 60 miles an hour.

Hot waves were the notable feature of the weather during the month, the beginnings and endings of which were successfully forecast. In respect to warm weather, the month was notable, as for example at Washington, D. C., the month gave a greater number of days with maximum temperature 90°, or higher, than ever before recorded at this station in June. It also established for Washington a new June record for consecutive days, 8 in number, with temperature 90°, or higher.

No frost warnings were necessary during the month, although on several days the temperature in the cranberry bogs of New Jersey approached very close to the freezing point.

No general warnings were necessary in the Chicago Forecast District during the month. There was great variation in temperature, rather cool during the first part, followed by an abnormally warm period, with another period of unseasonably cool weather in the closing days of the month.

Special advices in regard to weather conditions were issued from time to time, and occasionally when the weather map justified, a forecast was made for several days in advance.

The coming of the great heat wave was anticipated in a statement issued on Tuesday, June 12, as follows: "The temperature will rise in the Plains States to-night and in the Middle States Wednesday, and there are now indications of the development of a heat wave in this region before the close of the present week." This was followed on the following day by an additional statement, "The temperature will gradually rise throughout the Middle States, resulting in a warm wave before the end of the week, as indicated in Tuesday's weather bulletin." By the following Monday, June 18, the heat wave had become general over the central portions of the country, the first pronounced heat wave of the season. Shippers of perishable goods were advised of the coming of this heat wave, and, doubtless, important service was rendered by the Bureau at this time.—*H. J. Cox.*

NEW ORLEANS FORECAST DISTRICT.

The weather during June, 1923, did not depart greatly from the conditions that are usual for the month. No storm warnings were issued or required; but threatening conditions in the extreme western portion of the Gulf of Mexico on the 8th justified the display of small-craft warnings issued for the Texas coast on that data.—*R. A. Dyke.*

DENVER FORECAST DISTRICT.

The month was unusually dry and cool in the greater part of the district. The prevalence of high pressure in the Eastern States during the greater part of the month exerted a marked influence on the movement of lows in western districts.

Warnings of local frost were issued for Utah, western Colorado and the mountain districts of New Mexico on the 1st, as relatively high pressure prevailed on the western slope attended by abnormally low temperature. While frost temperatures occurred in places, with freezing weather in northeastern Arizona, a considerable rise in temperature prevented further serious damage. Frost warnings for western Utah were issued on the 13th, when the pressure was low in Rocky Mountain districts and an anticyclonic area was advancing eastward from the middle Pacific. Frost temperatures occurred in localities. On the 22d advices of possibly local frost were issued for western Utah. The center of an area of low pressure occupied the middle Rocky Mountain section, with cooler weather in the Plateau region, frost in Nevada, and rising pressure on the California coast. The rapid development of an area of low pressure of considerable intensity in Nevada was attended by rising temperature.—*Frederick W. Brist.*

SAN FRANCISCO FORECAST DISTRICT.

During the month of June the high-pressure area over the eastern portion of the North Pacific Ocean was slower than usual in gaining strength and stability; consequently it did not impinge on the coast to any great extent till near the end of the month. The result was the formation of irregular-shaped troughs of low pressure over the Rocky Mountain and Pacific States that caused protracted spells of cool and unsettled weather in the San Francisco Forecast District. The passage eastward of these trough-shaped low-pressure areas was more or less checked by the presence of persistent high-pressure areas over the Mississippi Valley and the Atlantic States. This type of weather while difficult to predict was of inestimable benefit to the grain crops, and it did much to prevent the spread of forest fires, which sometimes are numerous at this time of the year, especially in the southern portion of the district.

The only warning issued was for light-to-heavy frost in exposed places in Idaho on the 16th inst. No storm warnings were issued nor were any necessary.—*E. A. Beals.*

RIVERS AND FLOODS.

By H. C. FRANKENFIELD, Meteorologist.

The only great flood of the month occurred in the Arkansas River from the vicinity of Hutchinson, Kans., to the mouth of the river. To the westward, the river was only in moderate flood, and flood stages were not reached except at Fort Lyon, Colo., where the river was above the flood stage of 6 feet on June 17, with a crest stage of 10 feet at 8 p. m.

It is evident that the major portion of this rise came from the Purgatoire River, at Higbee, Colo., on that river, reported the washing out of the river gage on June 17, at a stage of 10 feet, or 6 feet above the flood stage, with the river still rising. Flood warnings for the Arkansas River from Fort Lyon to the Kansas line were issued at once, and no serious damage was reported, as the excess water was apparently diverted to the irrigation canals. Other streams in northeastern Colorado were also in flood.

The following account of the flood from Hutchinson, Kans., eastward was summarized from the detailed reports of Messrs. S. P. Peterson, T. G. Shipman, H. S. Cole, and J. P. Slaughter in charge of the river districts—

Wichita, Kans., Fort Smith, Ark., Little Rock, Ark., and Oklahoma City, Okla., respectively. The rainfall responsible for the floods is shown in the following table:

Rainfall, May 21 to June 17, inclusive, 1923.

Station.	River.	Total for 28 days.
		Inches.
Macksville, Kans.	Arkansas	9.31
Great Bond, Kans.	do	9.90
Hutchinson, Kans.	do	11.01
Medora, Kans.	do	12.73
McPherson, Kans.	do	11.04
Hesston, Kans.	Little Arkansas	11.93
Newton, Kans.	do	12.69
Sedgwick, Kans.	do	13.13
Wichita, Kans.	Arkansas	18.36
Ralston, Okla.	do	6.14
Tulsa, Okla.	do	11.35
Webbers Falls, Okla.	do	8.52
Emporia, Kans.	Cottonwood	12.13
Neosho Rapids, Kans.	Neosho	10.06
LeRoy, Kans.	do	9.60
Iola, Kans.	do	8.69
Oswego, Kans.	do	7.97
Wyandotte, Okla.	do	12.27
Okay, Okla.	Verdigris	7.13
Fort Gibson, Okla.	Neosho	6.96
Camargo, Okla.	North Fork Canadian	7.97
Union City, Okla.	do	7.36
Woodward, Okla.	do	9.53
Canton, Okla.	do	8.22
Reno Junction, Okla.	do	5.47
Oklahoma City, Okla.	do	7.21
Calvin, Okla.	Canadian	8.80
Fort Smith, Ark.	Arkansas	8.65
Dardanelle, Ark.	do	8.24
Danville, Ark.	Petit Jean	8.25
Little Rock, Ark.	Arkansas	5.19
Calico Rock, Ark.	White	8.98
Batesville, Ark.	do	8.91
Newport, Ark.	do	12.56
Pine Bluff, Ark.	Arkansas	6.07
Black Rock, Ark.	Black	7.71
Patterson, Ark.	Cache	14.66
Georgetown, Ark.	White	11.95
Clarendon, Ark.	do	7.87

It will be seen from the above table that there was a period of almost four weeks of continuous rains over eastern Kansas, Oklahoma, and Arkansas. From May 21 to 24, inclusive, the rains were heavy. On June 9, they were excessive over Kansas and Oklahoma, and on June 10 over Arkansas. The mean rainfall for the 28 days over the three sections mentioned was 9.60 inches, from two to more than three times the normal amount for the season, with the greatest excess over southeastern Kansas.

Hutchinson, Kans., to Wichita, Kans.—The area covered by the heavy rains was about 45 miles in length, 60 miles in width over the upper portion, and 40 miles over the middle portion, converging to about 10 miles at the extreme lower end. The flooded area was about 40 miles in width at Hutchinson, Medora, and McPherson, Kans., and became extensive southward from a line crossing the drainage area through the headwaters of Big Slough and at Hesston, Kans. The total area of farm lands flooded was about 97,000 acres and the reported damage to crops amounted to \$942,000. Damage to highways and bridges amounted to about \$95,000 and to railroads about \$335,250. In the city of Wichita, situated at the convergence of the Big and Little Arkansas Rivers and Chisholm Creek, the damage amounted to about \$840,750, making a total for the district of about \$2,213,000. About 6 square miles of the city was flooded. The crest stage in the Arkansas River at Wichita was 13.5 feet, 4.5 feet above the flood stage and the highest stage of record, and the river was above the flood stage from June 9 to 15, inclusive.

Previous high-water stages were 11 feet on May 18, 1877, 11.2 feet on Jan. 13, 1910, and 12.1 feet on June 6, 1921. The city overflow water came from the smaller