

Large numbers of stock which were pastured in the low grounds were driven to places of safety; considerable hay and oats, which would otherwise have been ruined, were cut and carried to higher ground, and much green corn, which would have been a total loss, was cut down and saved for stock food. However, much damage was done, which no warning could avert, especially to lowland corn and cotton, large areas of which were inundated and entirely ruined, though the waters have now receded and much of the inundated district will be replanted in corn. The warnings, it is thought, were the means of saving at least \$35,000 worth of stock and other property.

The lower Tombigbee and the Black Warrior rivers were also from 17 to 20 feet above the danger lines, but no reports of serious damage have been received. The rivers of the

South Atlantic States, while quite high, did not reach danger-line stages.

The highest and lowest water, mean stage, and monthly range at 132 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

## CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches and temperature in degrees Fahrenheit.

**Alabama.**—The mean temperature was 76.4°, or about 2.0° below normal; the highest was 98°, at Brewton on the 30th, and the lowest, 58°, at Clanton on the 5th. The average precipitation was 11.03, or about 7.00 above normal; the greatest monthly amount, 26.67, occurred at Mobile, and the least, 5.55, at Marion.—*F. P. Chaffee.*

**Arizona.**—The mean temperature was 81.5°, or 0.5° above normal; the highest was 120°, at Texas Hill on the 27th, and the lowest, 30°, at Snowflake on the 3d. The average precipitation was 0.03, or 0.21 below normal; the greatest monthly amount, 0.72, occurred at Flagstaff, while none fell at a great number of stations.—*W. G. Burns.*

**Arkansas.**—The mean temperature was 76.6°, or 0.6° below normal; the highest was 100°, at Jonesboro on the 10th, and the lowest, 43°, at Witts Springs on the 4th. The average precipitation was 7.10, or 3.22 above normal; the greatest monthly amount, 16.11, occurred at Elon, and the least, 3.05, at Arkadelphia.—*E. B. Richards.*

**California.**—The mean temperature was 71.4°, or 0.9° above normal; the highest was 121°, at Salton on the 30th, and the lowest, 21°, at Bodie on the 16th. The average precipitation was 0.19, or 0.11 below normal; the greatest monthly amount, 2.67, occurred at Boca, while none fell at 61 stations.—*Alexander G. McAdie.*

**Colorado.**—The mean temperature was 65.2°, or 2.7° above normal; the highest was 107°, at Rogers Mesa on the 23d, and the lowest, 21°, at Wagonwheel Gap on the 4th and 15th. The average precipitation was 1.29, or about normal; the greatest monthly amount, 5.62, occurred at Wallet, and the least, trace, at Twinlakes.—*F. H. Brandenburg.*

**Florida.**—The mean temperature was 79.4°, or 0.5° below normal; the highest was 100°, at Ocala on the 28th, and the lowest, 58°, at St. Francis on the 2d. The average precipitation was 9.57, or 2.72 above normal; the greatest monthly amount, 17.94, occurred at Fort Meade, and the least, 2.90, at Jupiter.—*A. J. Mitchell.*

**Georgia.**—The mean temperature was 75.6°, or 1.9° below normal; the highest was 99°, at Fitzgerald on the 30th, and the lowest, 53°, at Dahlo-nega on the 22d. The average precipitation was 8.98, or 4.58 above normal; the greatest monthly amount, 15.88, occurred at Griffin, and the least, 2.95, at Lumpkin.—*J. B. Marbury.*

**Idaho.**—The mean temperature was 65.5°, or 4.4° above normal; the highest was 109°, at Hailey on the 23d, and the lowest, 24°, at Marysville on the 9th. The average precipitation was 0.52, or 0.31 below normal; the greatest monthly amount, 3.92, occurred at Murray, and the least, trace, at Downey.—*S. M. Blandford.*

**Illinois.**—The mean temperature was 71.0°, or 1.5° below normal; the highest was 95°, at Monmouth on the 7th, at Mount Pulaski on the 28th and at Palestine on the 29th, and the lowest, 39°, at Chemung on the 3d. The average precipitation was 4.28, or 0.07 above normal; the greatest monthly amount, 10.74, occurred at Raum, and the least, 0.42, at Knoxville.—*M. E. Blystone.*

**Indiana.**—The mean temperature was 71.1°, or 1.0° below normal; the highest was 99°, at Laporte on the 24th, and the lowest, 42°, at Logansport on the 2d. The average precipitation was 5.54, or 1.70 above normal; the greatest monthly amount, 14.31, occurred at Vincennes, and the least, 1.82, at Laporte.—*C. F. R. Wappenhans.*

**Iowa.**—The mean temperature was 69.7°, or about normal; the highest was 102°, at Odebolt on the 26th, and the lowest, 38°, at Larrabee on the 2d. The average precipitation was 3.98, or slightly below normal; the greatest monthly amount, 12.35, occurred at Mason City, and

the least, 0.67, at Le Clair.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

**Kansas.**—The mean temperature was 74.9°, or 1.1° above normal; the highest was 110°, at Ulysses on the 27th, and the lowest, 43°, at Scott on the 4th and at Achilles on the 8th. The average precipitation was 3.68, or 0.65 below normal; the greatest monthly amount, 10.30, occurred at Ottawa, and the least, 0.55, at Delphos.—*T. B. Jennings.*

**Kentucky.**—The mean temperature was 73.9°, or 0.9° below normal; the highest was 100°, at Fords Ferry on the 12th, and the lowest, 40°, at Vanceburg on the 4th. The average precipitation was 6.14 or 2.48 above normal; the greatest monthly amount, 13.31, occurred at Hopkinsville, and the least, 1.85, at Frankfort.—*H. B. Hersey.*

**Louisiana.**—The mean temperature was 79.3°, or nearly normal; the highest was 101°, at Libertyhill on the 17th, and the lowest, 60°, at Minden on the 22d and at Southern University Farm on the 25th. The average precipitation was 8.40, or 2.37 above normal; the greatest monthly amount, 17.61, occurred at Schriever, and the least, 3.81, at Plain Dealing.—*W. T. Blythe.*

**Maryland and Delaware.**—The mean temperature was 71.4°, or 0.3° above normal; the highest was 100°, at Hancock, Md., on the 11th, and the lowest, 36°, at Sunnyside, Md., on the 21st. The average precipitation was 4.75, or 1.60 above normal; the greatest monthly amount, 10.94, occurred at Washington, D. C., and the least, 1.48, at Sudlersville, Md.—*Oliver L. Fassig.*

**Michigan.**—The mean temperature was 63.3°, or 1.3° below normal; the highest was 96°, at Harrisville on the 26th, and the lowest, 22°, at Washington Harbor, Isle Royal, on the 3d and 9th; in the State proper the lowest temperature was 24°, at Humboldt, on the 8th. The average precipitation was 2.68, or 0.44 below normal; the greatest monthly amount, 5.10, occurred at Petoskey, and the least, 0.49, at Lincoln.—*C. F. Schneider.*

**Minnesota.**—The mean temperature was 66.8°, or 0.8° above normal; the highest was 102°, at Hallock on the 25th, and the lowest, 23°, at Pokegama on the 30th. The average precipitation was 1.71, or 2.28 below normal; the greatest monthly amount, 7.52, occurred at Milaca, and the least, 0.32, at Morris.—*T. S. Outram.*

**Mississippi.**—The mean temperature was 77.6°, or about 2.5° below normal; the highest was 99°, at Brookhaven on the 18th, and the lowest, 47°, at Louisville on the 3d. The average precipitation was 12.10, or about 7.85 above normal; the greatest monthly amount, 23.30, occurred at Americus, and the least, 5.50, at Natchez.—*H. E. Wilkinson.*

**Missouri.**—The mean temperature was 73.2°, or 0.5° below normal; the highest was 103°, at Sarcoxie on the 27th, and the lowest, 44°, at Bethany on the 11th. The average precipitation was 4.85, which is practically normal, but it was very unevenly distributed, portions of the central and eastern sections receiving much more than the usual amount, while over many of the northern and western counties there was a marked deficiency; the greatest monthly amount, 9.07, occurred at Gayoso, and the least, 1.12, at Bethany.—*A. E. Hackett.*

**Montana.**—The mean temperature was 65.6°, or 5.2° above normal; the highest was 109°, at Chinook on the 21st, and the lowest, 25°, at Adel on the 10th. The average precipitation was 1.01, or 1.89 below normal; the greatest monthly amount, 5.01, occurred at Dupuyer, while none fell at Crow Agency, Livingston, and Red Lodge.—*E. J. Glass.*

**Nebraska.**—The mean temperature was 72.5°, or 2.8° above normal; the highest was 110°, at Palmer on the 27th, and the lowest, 37°, at Fort Robinson on the 9th. The average precipitation was 2.50, or 1.35 below normal; the greatest monthly amount, 7.58, occurred at Weeping-water, and the least, 0.25, at Johnstown.—*G. A. Loveland.*

**Nevada.**—The mean temperature was 67.7°, or about 3.8° above normal; the highest was 111°, at Las Vegas on the 29th, and the lowest, 28°, at Palmetto on the 16th. The average precipitation was 0.32, or about 0.14 below normal; the greatest monthly amount, 1.08, occurred at Reno, while none fell at several stations.—*J. H. Smith.*

**New England.**—The mean temperature was 65.7°, or 0.8° above normal; the highest was 105°, at Bemis, Me., on the 1st, and the lowest,

32°, at Newton, N. H., on the 5th. The average precipitation was 2.74, or 0.14 below normal; the greatest monthly amount, 5.51, occurred at Farmington, Me., and the least, 0.63, at South Portsmouth, R. I.—*J. W. Smith.*

*New Jersey.*—The mean temperature was 70.4°, or 0.7° above normal; the highest was 97°, at Beverly and Vineland on the 27th, and the lowest, 39°, at Charlotteburg on the 5th. The average precipitation was 3.08, or 0.46 below normal; the greatest monthly amount, 4.91, occurred at Asbury Park, and the least, 1.10, at Rocktown.—*E. W. McGann.*

*New Mexico.*—The mean temperature was 71.2°, or 1.2° above normal; the highest was 111°, at Lyons Ranch on the 27th, and the lowest, 28°, at Winsors on the 5th. The average precipitation was 1.00, or 0.09 below normal; the greatest monthly amount, 4.67, occurred at Fort Union, while at Eagle, Lordsburg, and Rincon, none was recorded, and only a trace at Alma, Hillsboro, Los Lunas, Lyons Ranch, and Olio.—*R. M. Hardinge.*

*New York.*—The mean temperature was 66.6°, or 0.8° above normal; the highest was 96°, at Penn Yan on the 24th and 26th, at Ticonderoga on the 28th and at Primrose on the 29th; the lowest was 25°, at South Kortright on the 9th. The average precipitation was 2.63, or 0.88 below normal; the greatest monthly amount, 5.91, occurred at Ogdensburg, and the least, 0.75, at Nunda.—*R. G. Allen.*

*North Carolina.*—The mean temperature was 74.4°, or normal; the highest was 99°, at Tarboro on the 13th and at Southern Pines on the 29th, and the lowest, 45°, at Linville on the 20th. The average precipitation was 6.05, or 1.69 above normal; the greatest monthly amount, 19.92, occurred at Horse Cove, and the least, 1.02, at Currituck Inlet.—*C. F. von Herrmann.*

*North Dakota.*—The mean temperature was 66.9°, or 3.5° above normal; the highest was 109°, at Minto on the 23d, and the lowest, 27°, at Churchs Ferry on the 8th. The average precipitation was 1.39, or 1.30 below normal; the greatest monthly amount, 3.45, occurred at Napoleon, and the least, 0.27, at Mayville.—*B. H. Bronson.*

*Ohio.*—The mean temperature was 69.8°, or 0.5° below normal; the highest was 96°, at Annapolis on the 24th and at Norwalk on the 26th, and the lowest, 38°, at Colebrook and Garrettsville on the 30th. The average precipitation was 2.99, or 0.42 below normal; the greatest monthly amount, 6.64, occurred at New Paris, and the least, 0.81, at Ashtabula.—*J. Warren Smith.*

*Oklahoma and Indian Territories.*—The mean temperature was 77.7°, or 0.9° above normal; the highest was 106°, at Waukomis on the 27th, and the lowest, 50°, at Newkirk on the 14th. The average precipitation was 2.58, or 0.88 below normal; the greatest monthly amount, 7.18, occurred at Osage and the least, trace, at Healdton and Pauls Valley.—*C. M. Strong.*

*Oregon.*—The mean temperature was 63.5°, or 3.0° above normal; the highest was 103°, at Pendleton on the 20th, and the lowest, 24°, at Riverside on the 9th. The average precipitation was 2.17, or 0.50 above normal; the greatest monthly amount, 8.65, occurred at Nehalem, while none fell at Klamath Falls.—*E. A. Beals.*

*Pennsylvania.*—The mean temperature was 69.9°, or 1.0° above normal; the highest was 97°, at Irwin on the 24th, at Lockhaven on the 25th and at Athens on the 28th; the lowest, 35°, at Lawrenceville on the 30th. The average precipitation was 3.60, or slightly below normal; the greatest monthly amount, 10.29, occurred at Somerset, and the least, 1.35, at Coopersburg.—*L. M. Dey.*

*South Carolina.*—The mean temperature was 76.2°, or 1.9 below normal; the highest was 97°, at Yemassee on the 25th and 29th, and the lowest, 52°, at Georgetown on the 1st and 21st. The average precipitation was 7.94, or 3.41 above normal; the greatest monthly amount, 15.43, occurred at Holland, and the least, 4.15, at Trenton.—*J. W. Bauer.*

*South Dakota.*—The mean temperature was 69.4°, or about 2.0° above normal; the highest was 109°, at Interior on the 30th, and the lowest, 28°, at St. Lawrence on the 2d. The average precipitation was 2.40, or about 1.38 below normal; the greatest monthly amount, 6.90, occurred at Gannvalley, and the least, 0.11, at Ipswich.—*S. W. Glenn.*

*Tennessee.*—The mean temperature was 74.1°, or 0.9 below normal; the highest was 95°, at Madison on the 10th, and the lowest, 40°, at Andersonville on the 3d. The average precipitation was 9.84, or 5.14 above normal; the greatest monthly amount, 17.93, occurred at Hohenwald, and the least, 2.26, at Bristol.—*H. C. Bate.*

*Texas.*—The mean temperature, determined by comparison of 45 stations distributed throughout the State, was 1.9° above the normal. Nearly normal conditions prevailed along the coast, over southwest Texas, and the panhandle, while there was a general excess over the other portions of the State, ranging from 1.0 to 4.8, with the greatest in the vicinity of Tyler. The highest was 108°, at Colorado on the 17th and at Brownwood on the 26th, and the lowest, 53°, at Amarillo on the 1st. The average precipitation, determined by comparison of 54 stations distributed throughout the State, was 1.69 below normal. There was an excess, ranging from 1.00 to 8.96, over the extreme eastern portion of the State and in the vicinity of Cuero and Henrietta, with the greatest in the vicinity of Beaumont, while there was a general deficiency over the other portions of the State, with the greatest, 4.46, at Temple. The rainfall for the month was very unevenly distributed, there being comparatively none in localities over central Texas, while heavy rains occurred over the eastern portion of the State. The greatest monthly amount, 12.70, occurred at Beaumont, while none fell at Beeville, San Marcos, and Temple.—*I. M. Cline.*

*Utah.*—The mean temperature was 69.7°, or 4.8° above normal; the highest was 111°, at Hite on the 28th, and the lowest, 30°, at Henefer on the 11th and at Tropic on the 15th and 16th. The average precipitation was 0.16, or 0.27 below normal; the greatest monthly amount, 1.00, occurred at Holyoake; none fell at Kelton and 6 additional stations, while a number of stations received but a trace.—*L. H. Murdoch.*

*Virginia.*—The mean temperature was 72.5°, or 0.5° above normal; the highest was 101°, at Doswell on the 30th, and the lowest, 42°, at Meadowdale on the 20th. The average precipitation was 4.61, or 1.83 above normal; the greatest monthly amount, 8.87, occurred at Christianburg, and the least, 0.65, at Birdsnest.—*E. A. Evans.*

*Washington.*—The mean temperature was 62.9°, or 3.8° above normal; the highest was 102°, at Mottingers Ranch on the 20th, and the lowest, 31°, at Republic on the 6th and at Cle-Elum, Colville, and Rosalia on the 9th. The average precipitation was 2.51, or 0.96 above normal; the greatest monthly amount, 13.92, occurred at Clearwater, and the least, trace, at Cheney.—*G. N. Salisbury.*

*West Virginia.*—The mean temperature was 71.2°, or 0.9° above normal; the highest was 98°, at Oldfields on the 11th, and the lowest, 41°, at Philippi on the 1st. The average precipitation was 5.30, or 0.69 above normal; the greatest monthly amount, 15.62, occurred at Chapel, and the least, 2.49, at Southside.—*E. C. Vose.*

*Wisconsin.*—The mean temperature was 65.5°, or 0.8° below normal; the highest was 103°, at Medford on the 19th, and the lowest, 23°, at Barron on the 11th. The average precipitation was 2.01, or 2.33 below normal; the greatest monthly amount, 3.70, occurred at Koepenick, and the least, 0.57, at Spooner.—*W. M. Wilson.*

*Wyoming.*—The mean temperature was 66.0°, or 5.8° above normal; the highest was 116°, at Bittercreek on the 26th, and the lowest, 22°, at Thayne on the 10th. The average precipitation was 0.47, or 1.07 below normal; the greatest monthly amount, 1.31, occurred at Fort Laramie, and the least, trace, at Alcora, Bedford, Bittercreek, and Burlington.—*W. S. Palmer.*

## SPECIAL CONTRIBUTIONS.

### EXTENSION OF WEATHER BUREAU WORK.

By E. B. GARRIOTT, Professor of Meteorology.

A recent report on the system of hurricane warnings in the West Indies, by Mr. Wm. B. Stockman, Forecast Official in charge of the United States Weather Bureau at Havana, Cuba, suggests the following comments on recent extensions of the work of the Weather Bureau:

The West Indian branch of the United States Weather Bureau was established in the summer of 1898, as an emergency measure for providing the United States fleets and the merchant marine in West Indian waters with timely notice of approaching hurricanes. The unquestioned value of this information to the maritime and commercial interests has led to the establishment, on a permanent basis, of a service

in the West Indies, the province of which is to give warning to all interests concerned, of the approach of tropical storms of a destructive character, and to collect data and issue reports on the climate and crops of the islands of Cuba and Puerto Rico.

During the present hurricane season practically all of the cable islands and ports of the West Indies and the Caribbean coast of South America receive advices regarding tropical storms at the expense of the United States, and this information is given effective distribution, and is bulletined and exposed in conspicuous places for the benefit of the public.

The central station of the West Indian service is located at Havana, Cuba, where telegraph and cable reports of meteorological observations taken at Weather Bureau West Indian