

in special forecasts, and the breaking up of the heat and drought during the closing days of July was indicated well in advance by the forecasts.

Two disturbances of tropical origin reached our southern coasts during the first decade of the month. The first of these appeared in the vicinity of Barbados on the 2d, passed thence north of west over the Caribbean Sea to the Yucatan Channel by the night of the 7th, and reached the Texas coast on the 10th. This disturbance had the character of a large shallow depression, rather than that of a well-defined hurricane. Reports show that high winds were encountered northwest of Barbados on the 2d, and that severe wind and rain storms occurred along the south coast of Haiti on the 4th. Rough weather was also reported off the south coast of Cuba during the 8th. Passing from the Yucatan Channel the center of disturbance reached the Texas coast on the 10th, where the earlier signs of its approach were of an alarming character. Beginning on the 9th, Texas coast interests were fully informed by the Weather Bureau relative to the advance of the disturbance over the Gulf, and on the 10th the Bureau was able to issue advices that allayed the fears of the people.

The second storm referred to appeared over the eastern Caribbean Sea on the 6th, passed on a northwest course south of Porto Rico on the 7th, causing a wind velocity of 56 miles an hour at San Juan, skirted the eastern Bahamas on the 8th and 9th, arrived off the North Carolina coast on the 10th, and acquired marked intensity during the night of the 10th, when a maximum velocity of 64 miles an hour was reported at Hatteras, N. C. After the morning of the 11th the storm diminished rapidly in energy. Timely and accurate advices were telegraphed all points in the West Indies and on our southern coasts which lay in the path of these disturbances.

The tracks of the disturbances referred to are shown in part on Chart II.

BOSTON FORECAST DISTRICT.

The weather of the month was without unusual features, excepting, perhaps, the periods of high temperature. The changes to cool weather were correctly forecast, and the forecasts of rain were, as a rule, timely and successful.—*J. W. Smith, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The month was remarkable on account of the intense thermal conditions and extraordinary drought which overspread the greater portion of the great central valleys of the Southwest for three consecutive weeks or more. Temperatures of 100° or over were recorded nearly every day from the 1st to the 25th in the central Mississippi and central and lower Missouri valleys. The maximum temperature records for July, and in fact for all months, were broken in nearly all the middle-west and southwest States. Maximum temperatures of 104° to 108° were recorded several times in the States of Iowa, Illinois, Missouri, and Kansas.

From the 6th to the 26th, inclusive, no rain, other than a few local showers on the 16th and 18th, occurred in central and southern portions of Illinois, Iowa, Missouri, Kansas, Nebraska, and South Dakota, practically covering the greater portion of the important corn-growing section. From the 27th to the 30th, inclusive, the drought was broken by more or less copious and general showers.—*F. J. Walz, Local Forecast Official.*

GALVESTON FORECAST DISTRICT.

But one important disturbance occurred during the month. On the 9th the morning weather map showed a disturbance

over the lower Rio Grande Valley. The evening report of the 9th showed a storm of considerable intensity in the north of Mexico, off the mouth of the Rio Grande River. In the morning general forecast attention was called to the disturbance, and in the evening storm warnings were issued to all stations along the Texas coast. The tide rose rapidly and caused much uneasiness. The conditions were watched closely, and at 3:30 a. m. of the 10th the following bulletin was given to the press:

The barometer is 29.78. The wind is 34 miles from the east, with occasional shifts to southeast. The east wind for the last two days has banked up the water and the tide is running quite high, but no swells are breaking in over the beach. The water is up to Avenue O at Twenty-fifth street. I believe that 2 feet additional rise will put the water across the island at Twenty-fifth street. This will depend a great deal on the force and direction of the wind during the next twelve hours. A flood of a serious nature is not yet indicated, although small buildings near the beach may be washed over. This matter will be watched closely by the Weather Bureau. If any serious change develops, the people will be fully advised.

At 9:30 a. m. the following information was given out:

Tide has receded 3 feet and is now stationary.

At 3 p. m. the following bulletin was issued:

Conditions less threatening; tide 2.5 feet and falling; disturbance apparently moving north to the west of Galveston.

These bulletins, which were given out through the press and over the telephone, allayed the fears of the people and proved very valuable.—*I. M. Cline, Forecast Official.*

DENVER FORECAST DISTRICT.

The low areas, generally ill defined, were a prominent feature of the pressure distribution, and, as the few high areas that appeared in the district northwest were of slight intensity, the month in the northern half of the district was characterized by exceptionally high temperatures, and a marked deficiency of precipitation, though thunderstorms were frequent. At Denver the month was the driest July and the warmest month in thirty years, the period covered by the records.

In the southern half of the district the weather was generally seasonable.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

During July storms of the Sonora type may be expected to move along the Mexican boundary westward, recurving over southeastern California, and thence moving northeastward across Nevada and Utah into Wyoming. When there is reason to suppose that the so-called "permanent high" of the south Atlantic coast lies farther to the west than usual, the paths of the storm through Arizona and New Mexico are, as a rule, farther to the west. Early in the month this westerly shift of the Sonora storm tracts was anticipated, and the results seem to have justified the expectation. An area of high pressure over the North Pacific remained in possession during the greater part of the month, and was probably the determining factor in the weather of the Pacific slope.

There was little or no rain in California until the end of the month. There was also less of the summer afternoon fog along the central coast.—*Alexander G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was seasonable, except that it was a trifle cooler than usual, and on the morning of the 4th light frosts occurred in southeastern Idaho, which were successfully forecast twenty-four hours in advance. No high nor hot winds

prevailed, and the entire month was favorable for the filling and ripening of grain and the growth of late crops, such as corn, potatoes, hops, and fruit.—*Edward A. Beals, Forecast Official.*

HAVANA, CUBA, FORECAST DISTRICT.

The only important disturbance of the month in the West Indies advanced from the vicinity of Barbados to the Yucatan Channel from the 2d to the 7th. [It is believed that this is the storm which reached the Texas coast by the morning of the 9th, where it caused high winds and high tides, as noted in the Galveston Forecast District report.—*E. B. G.*]

On the 2d the Barbados light-ship *Flummense* encountered a gale 60 miles north-northwest of Barbados. On the 4th severe storms were reported on the southern coast of Haiti. Ample warnings of the character and course of this disturbance were sent to points in its line of advance. Daily wind forecasts for the Atlantic and Gulf of Mexico north of Cuba and east and west of Florida were telephoned the captain of the port.—*W. B. Stockman, Forecast Official.*

RIVERS AND FLOODS.

The Mississippi River below the mouth of the Missouri was somewhat higher than during June, and considerably higher than during July, 1900. Below the mouth of the Missouri it averaged from 3 to 7 feet lower, the loss below Cairo, Ill., being directly attributable to the rapid decline in the Ohio, which was decidedly lower than during June. The stages, however, were not sufficiently low to interfere with navigation, and did not materially differ from those of July, 1900.

The Missouri fell steadily throughout the month, though not to any great extent.

The rivers of the East presented nothing of special interest, except in the Carolinas where heavy rains from the 12th to the 20th, inclusive, caused rapid rises to near or slightly above the danger lines at many places. Timely warnings were issued wherever necessary, and no serious damage was reported.

On the 27th of the month the Arkansas River at Little Rock, Ark., fell to a stage of 1.1 feet, one foot lower than during any previous July, the record extending back to 1872, and was still lower at other places within the State.

The Brazos River was also lower, and there was a steady fall in the rivers of the Pacific coast system.

The highest and lowest water, mean stage, and monthly range at 135 river stations are given in Table VII. 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. Frankenfeld, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

| Number. | First observed. | | | Last observed. | | | Path. | | Average velocities. | |
|------------------------|-----------------|---------|----------|----------------|---------|----------|---------------|--------------|---------------------|---------------|
| | Date. | Lat. N. | Long. W. | Date. | Lat. N. | Long. W. | Length. | Duration. | Daily. | Hourly. |
| High areas. | | | | | | | <i>Miles.</i> | <i>Days.</i> | <i>Miles.</i> | <i>Miles.</i> |
| I..... | 6, a. m. | 41 | 101 | 9, p. m. | 38 | 75 | 2,455 | 3.5 | 701 | 29.2 |
| II..... | 9, p. m. | 48 | 104 | 13, p. m. | 33 | 65 | 2,500 | 4.0 | 625 | 26.0 |
| III..... | 17, a. m. | 50 | 100 | 30, p. m. | 39 | 74 | 1,920 | 3.5 | 548 | 22.8 |
| IV..... | 22, a. m. | 50 | 97 | 24, a. m. | 33 | 80 | 1,200 | 2.0 | 600 | 25.0 |
| V..... | 23, a. m. | 53 | 132 | 28, p. m. | 45 | 67 | 3,680 | 5.5 | 669 | 27.9 |
| VI..... | 29, a. m. | 50 | 111 | *2, a. m. | 37 | 86 | 1,900 | 4.0 | 475 | 19.8 |
| Sums..... | | | | | | | 13,655 | 22.5 | 3,618 | 150.7 |
| Mean of 6 paths..... | | | | | | | 2,276 | | 608 | 25.1 |
| Mean of 22.5 days..... | | | | | | | | | 607 | 25.3 |
| Low areas. | | | | | | | | | | |
| I..... | 1, p. m. | 41 | 118 | 8, a. m. | 46 | 60 | 4,150 | 6.5 | 638 | 26.6 |
| II..... | 5, a. m. | 20 | 77 | 10, a. m. | 29 | 95 | 1,200 | 5.0 | 240 | 10.0 |
| III..... | 6, a. m. | 54 | 114 | 9, a. m. | 45 | 98 | 1,800 | 3.0 | 600 | 25.0 |
| IV..... | 8, a. m. | 23 | 70 | 10, a. m. | 35 | 75 | 1,050 | 2.0 | 525 | 21.9 |
| V..... | 18, p. m. | 50 | 110 | 23, a. m. | 42 | 54 | 3,000 | 4.5 | 667 | 27.8 |
| VI..... | 24, a. m. | 44 | 70 | 26, a. m. | 35 | 75 | 700 | 2.0 | 350 | 14.6 |
| VII..... | 27, p. m. | 39 | 108 | 31, a. m. | 48 | 68 | 2,400 | 3.5 | 686 | 28.6 |
| Sums..... | | | | | | | 14,800 | 26.5 | 3,706 | 154.5 |
| Mean of 7 paths..... | | | | | | | 2,043 | | 529 | 22.1 |
| Mean of 26.5 days..... | | | | | | | | | 540 | 22.5 |

* August.

For graphic presentation of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

CLIMATE AND CROP SERVICE.

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

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau.

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

Alabama.—The mean temperature was 82.2°, or 2.1° above normal; the highest was 108°, at Bermuda on the 12th, and the lowest, 56°, at Maple Grove on the 9th and at Riverton on the 10th. The average precipitation was 3.40, or 1.54 below normal; the greatest monthly amount, 8.95, occurred at Mobile, and the least, 0.35, at Notasulga.

The month, as a whole, was generally unfavorable for growth of all crops, except cotton, which made satisfactory progress. Prolonged drought in some northern, north-central, and south-central counties, together with excessively hot, parching winds during middle of month seriously damaged corn and gardens. Rainfall somewhat excessive in extreme southern and extreme northeastern counties.—*F. P. Chaffee.*

Arizona.—The mean temperature was 85.5°, or 2.8° above normal; the highest was 123°, at Mohawk Summit on the 9th and at Maricopa on the 10th, and the lowest, 31°, at Fort Defiance on the 7th. The average precipitation was 2.04, or 0.64 above normal; the greatest

monthly amount, 6.40, occurred at Pantano, and the least, trace, at a number of stations.

Light and widely scattered showers, high drying winds, with lack of water supply for irrigation purposes, during the first and second decades of the month seriously retarded plant growth, and farming operations were confined mostly to harvesting. A damaging frost occurred in the northeast section of the territory on the 7th, Fort Defiance reporting a minimum temperature of 31°. From the 20th to 31st general and beneficial rains occurred in all parts of the Territory, and the month closed with ranges greatly revived and irrigating canals running full.—*L. M. Dey, Jr.*

Arkansas.—The mean temperature was 83.7°, or 3.5° above normal; the highest was 116°, at Jonesboro on the 12th, and the lowest, 50°, at Pond on the 10th. The average precipitation was 2.50, or 1.35 below normal; the greatest monthly amount, 7.55, occurred at Hot Springs (near), and the least, 0.10, at Arkansas City.

Showers fell in many sections, but were so light and scattered that very little benefit was derived. The temperature was excessively high during the greater portion of the month, and corn suffered greatly from the hot, dry weather; the first planted began to twist early in the month and the late planted was not doing well. Toward and during the last weeks of the month early planted corn had been so badly in-