

ordered for the Gulf coast at and between Cedar Keys, Fla., and the mouth of the Mississippi River, and south-east storm warnings were displayed on the Florida coast at and between Tampa and Key West. The warnings on the Gulf coast were continued as displayed through the 29th, and all interests were fully warned. The center of this disturbance crossed the Coast Line near Cedar Keys, Fla., during the night of the 29th.

The hurricane warning of September 28 was received at 6.53 p. m., seventy-fifth meridian time; and the order to continue September 29 at 5.22 p. m. These were given the extraordinary dissemination as reported for the warning of September 21.

No damage occurred at Mobile. The value of the warning was in detaining vessels from proceeding to sea.—*Albert Ashenberger*, meteorologist, Mobile, Ala.

A detailed report of this storm and its effects in Florida is published on page 524 above.

The evening of the 29th storm warnings were displayed on the South Atlantic coast at and south of Cape Hatteras, and the morning of the 30th storm warnings were ordered displayed on the middle Atlantic and New England coasts and on Lakes Ontario, Erie, and Huron. This tropical disturbance increased in intensity while moving northeastward along the coast, and gales were general over the regions where warnings were displayed.

Mr. Royal Robbins, Nahant, Mass., made the following report on this storm in New England:

Storm of September 30 on the New England coast.—I have taken some pains to trace the course of the center of the severe tropical storm of September 30 and find it entered New England near New Haven, Conn., thence moving slightly east of north through the valley of the Connecticut River into Vermont, where it lost energy among the mountains. The winds were destructive in Connecticut and western Massachusetts, many thousand trees being blown down, with a number of buildings. In short, between midnight and 4 a. m. October 1 the storm reached nearly hurricane force over the interior of southern New England.

Frost warnings were issued on a number of days during the month.

Chicago Forecast District.—The weather continued mild until the closing days of the month, so that no general warnings were issued until the morning of the 28th.

However, warnings of frost for the cranberry marshes of Wisconsin were issued from time to time during the entire month, and they were for the most part fully verified.

Frost warnings were, moreover, issued on the 28th for the Northern and Central Plains States and Rocky Mountain region, and these were extended eastward to the limits of the forecast district on the 29th and 30th. These predictions were for the most part verified, but there were some failures chiefly in the vicinity of the Lakes because of persistent cloudiness or influence of the water surface.

A critical condition prevailed throughout the Corn Belt from the first of the month because of the lateness of the season, but the ensuing mild temperature proved highly favorable, resulting in maturing most of the corn crop before the close of the month. Special forecasts for continued mild temperature were daily included in the general statements printed on the weather map and on the Corn and Wheat Region Bulletin, as well as telegraphed to the corn and wheat region centers, up to the appearance of the cold high area in the Pacific Northwest on the morning of the 27th.

Special fire-weather forecasts, which had been sent to the District Forester at Missoula for use in connection with the National Forests of Montana, were discontinued for the season on September 13.

Special fire-weather forecasts, beginning September 8, were telegraphed daily to the State forests in Minnesota.

Special long-range weekly forecast was sent to Topeka, Kans., on the 12th for use in connection with the State fair, as follows:

Fair to-night and Monday; rising temperature and conditions favorable for mostly fair weather during the week with rather high temperature.

This forecast proved to be quite satisfactory, as shown by the following extract from the Topeka State Journal:

The biggest free fair in history owes a lot to the Weather Bureau this year for its unqualified success. Of course, the Weather Bureau didn't make the weather to order, but the unprecedented crowds came because they had confidence in the prediction of good weather and good roads.—*H. J. Cox*.

New Orleans Forecast District.—A tropical disturbance moved across the Gulf of Mexico during the 20th and 21st, traveling at the rate of about 22 miles per hour. This disturbance moved inland over Louisiana with its center a little east of and nearly over Morgan City, La. The Central Office issued warnings in connection with this disturbance as follows:

September 20: Northeast storm warnings, 10 p. m., New Orleans, La., to Port Lavacce, Tex., and northwest storm warnings, Corpus Christi to Brownsville, Tex.

September 21: Hurricane warnings were ordered, 10 a. m., for southwest Louisiana and from Port Arthur to Corpus Christi, Tex.

September 21: Change to southeast storm warnings, east Louisiana coast, and continue hurricane warnings southwest Louisiana and Port Arthur to Corpus Christi, Tex., and northwest storm warnings, Brownsville, Tex., 10 p. m. (message received 4:53 p. m.).

September 21: Change to hurricane warnings, New Orleans to Pensacola, Fla., 9 p. m.

The special features connected with the life history of this storm and the damage resulting therefrom will be found in a special paper dealing with this subject (pp. 520-524, above).

Hurricane warnings were ordered for Burrwood, La., 6 p. m., September 28; continued, 6 p. m., September 29, and changed to northwest storm warnings, 11 p. m., September 29. The east Louisiana coast was in the left segment of a disturbance moving northeastward through the Gulf of Mexico, and consequently neither storm winds nor high tides occurred.

Small craft warnings for northerly winds were displayed on the Texas coast 11 a. m. September 29.

Frost warnings were issued September 29 for the Texas Panhandle and Oklahoma, and heavy frosts occurred on the 30th, the first of the season. The high-pressure area did not move eastward as rapidly as expected and light frost occurred October 1 at scattered stations in Arkansas and the interior of Louisiana.—*I. M. CLINE*.

Denver Forecast District.—Much unsettled weather prevailed in this district during September, but the rainfall was in general light. At Yuma, Ariz., however, 1.48 inches fell in 12 hours on the 15th, which was the heaviest 24-hour reported at regular Weather Bureau stations. Temperatures were somewhat below normal. The first light frost of the month at the moderate elevations occurred at Durango, Colo., on the 7th; this was the first of the season, barring that on the 28th of August, at the same place. Heavy frost occurred at Durango on 10th, 11th, and 22d. Killing frost was reported at Modena, Utah, on the 23d. Frosts, from light to killing, occurred quite generally in Utah, Colorado, and New Mexico on the 24th. Frost warnings were issued for high districts on the 1st, 10th, 11th, 15th, and for all elevations on the 21st, 23d, 25th, 26th, 27th, 28th, 29th, and 30th. These were verified quite generally. A noteworthy fall in temperature occurred at Modena, Utah, on the morning of the 25th when the lowest was 24°, the lowest for September on record.—*A. H. Thiessen*.

San Francisco Forecast District.—The special forecasts made in connection with the saving of the Dutch S. S. *Arakan*, which went ashore near Point Reyes, Calif., on August 29, 1920, are mentioned in a note in the August REVIEW, page 466.

The last fire-weather warning of the season was issued September 1, for the North Pacific States, for warmer weather with drying winds, and it was verified in part only.

Storm warnings were sent to North Pacific seaports on three days and to the north California coast on one

day. These were supplemented by small craft warnings on several occasions. In addition to the warnings issued by this office, advices from the Central Office as to conditions being such as to indicate stormy weather in the North Pacific Ocean were received on September 11 and September 20. All warnings were given good distribution and they were for the most part verified.

Light to heavy frost was predicted for Washington, Oregon, and Nevada on the 24th and for Nevada on the 25th.—*E. A. Beals.*

RIVERS AND FLOODS, SEPTEMBER, 1920.

By H. C. FRANKENFIELD, Meteorologist.

The floods that were in progress in the Santee and Trinity Rivers at the end of August were unimportant and had subsided by the middle of September.

The Rio Grande, Sulphur, and Trinity Rivers in Texas and the Canadian River in Oklahoma were in moderate flood during the fore part of the month.

Owing to timely warnings very little preventable loss was suffered. The only losses reported were at Hartingen and Brownsville, Tex., in the Rio Grande Valley, where roads, bridges, etc., were damaged to the extent of about \$30,000.

Flood stages during month of September, 1920.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
ATLANTIC DRAINAGE.					
<i>Santee:</i>	<i>Feet.</i>			<i>Feet.</i>	
Rimini, S. C.....	12	(1)	14	16.4	1
Ferguson, S. C.....	12	(1)	18	13.7	1-4
MISSISSIPPI DRAINAGE.					
<i>Canadian:</i>					
Canton, Okla.....	3	5	6	4.0	5
Do.....	3	8	10	4.8	9
Oklahoma, Okla.....	12	15	17	12.4	16
<i>Sulphur:</i>					
Ringo Crossing, Tex.....	20	1	3	20.6	2
WEST GULF DRAINAGE.					
<i>Trinity:</i>					
Dallas, Tex.....	25	(1)	3	30.9	2
Do.....	25	8	15	32.5	12
Trinidad, Tex.....	28	8	20	30.4	10
<i>Rio Grande:</i>					
Rio Grande City, Tex.....	15	3	14	17.2	12

¹ Continued from August.