

## STORMS AND WEATHER WARNINGS

## CHICAGO FORECAST DISTRICT

## WASHINGTON FORECAST DISTRICT

Storm warnings were issued during the month in advance of four storms. They were southeast warnings in each instance and all were for the Atlantic coast from Cape Hatteras northward.

The first disturbance of marked intensity that crossed the Washington Forecast District was central over northern Indiana the morning of the 9th, and storm warnings were displayed at 10 a. m. from Delaware Breakwater to Eastport, Me. Practically every station reported a verifying velocity, the highest being 48 miles an hour from the southwest at Nantucket, Mass.

During the 15th warnings were ordered displayed from Cape Hatteras to Eastport in connection with a storm of marked intensity then moving northeastward over the upper Lake region. A secondary disturbance developed over the southern Appalachian region the afternoon of the 15th and moved rapidly northeastward. As a result, gales were experienced generally along the coast from Wilmington, N. C., to Eastport. The wind attained a velocity of 72 miles an hour from the southeast at both New York City and Atlantic City.

The next warnings were displayed on the 18th and 19th from Delaware Breakwater to Boston and from Rockland, Me., to Eastport. Winds of gale force were reported only from Atlantic City and Eastport, inasmuch as the secondary disturbance for which they were issued did not increase materially in intensity as it advanced northeastward from western North Carolina.

The last warnings of the month were issued at noon of the 26th from Cape Hatteras to Eastport in advance of a storm of marked intensity and wide extent then central over lower Michigan. Nearly all stations reported winds of gale force, New York City and Block Island reporting 60 miles an hour from the northwest.

Small craft warnings were ordered on the 17th from Bay St. Louis, Miss., to Apalachicola, Fla., and warnings of strong northerly winds for the Canal Zone were issued on the 10th, 11th, and 16th.

Advisory warnings were issued from the 14th to the 16th, inclusive, in connection with a tropical disturbance of minor intensity that developed about 200 miles north of Colon, Canal Zone. This disturbance moved northwestward past Swan Island and later recurved toward the northeast. It passed over western Cuba the night of the 15th-16th and merged the following day with a trough of low pressure that extended southward from a disturbance of wide extent over the eastern half of the United States.

*Cold wave warnings.*—The following warnings were issued: 9th, for western Kentucky, northwestern Tennessee, and northwestern Ohio; 10th, for the northern portions of eastern New York and for northern New England; 26th, for the lower Lake region and the Ohio Valley; 27th for New England and the northern portion of eastern New York; 30th, for northern Ohio. These warnings were fairly well verified.

*Frost warnings.*—Frost warnings were issued on 12 days during the month. Those issued on the 1st and 2d were for northern sections, and by the 3d killing frost had occurred almost generally except in the south Atlantic and east Gulf States. After the middle of the month the warnings were confined to the extreme South.—*C. L. Mitchell.*

*Storm warnings.*—November, 1926, was an unusually stormy month on the Great Lakes. In fact, there were but few days without either strong winds or gales on at least some portion of the Lakes. At Buffalo, N. Y., on Lake Erie, gales occurred on one-half the days of the month. Storm warnings of some character had to be issued on 19 days, and small-craft warnings were called for on 5 additional days. Eleven disturbances crossed the Lakes, and of these the storms of the 8th-10th, 17th-20th, and 25th-27th were the most severe. In each of these three cases the barometric depression first moved from the far Northwest well to the southeastward across the Rocky Mountains to the southern or central Great Plains region and thence recurved and advanced northeastward toward the Great Lakes with increasing intensity. In the case of the storm of the 17th-20th, however, its force began to lessen about the time the center reached the Great Lakes, but winds of storm intensity had occurred over the upper lakes immediately preceding the arrival of the center there. Another fact of interest in connection with this disturbance is that it is difficult to trace its point of origin farther westward than the coast of Washington. Possibly this is owing to the absence of vessel reports from the Pacific Ocean for Sunday, the 14th.

The highest wind velocity reported from any Great Lakes station during the month was at the rate of 72 miles an hour from the southwest, at Buffalo, N. Y., on the 9th.

In the great majority of cases the storm warnings were timely, but in a few cases winds of storm force occurred over limited districts without warnings. The most notable case of this kind was at Sault Ste. Marie, on Lake Superior, where for three hours on the early morning of the 24th the wind velocity equaled or exceeded the verifying velocity. In this connection, however, an advisory message had been sent to that station on the night of the 23d to the effect that a disturbance of increasing force was centered that night over northern Lake Superior and that it would cause rather strong winds on the lake during the following 12 to 24 hours.

*Frost warnings.*—Frost warnings were still needed in portions of the extreme southeastern part of the district at the beginning of the month. The final warning of this character for the season was issued for extreme southern Illinois on the 4th.

*Cold wave warnings.*—These were issued on six dates, namely, the 9th, 17th, 18th, 25th, 26th, and 30th. Those on the first three dates were for areas in the extreme eastern part of the district, while the warnings on the last three dates covered larger geographic areas. This was especially true as to the warnings on the 30th, which included in their scope much of the northern and central portions of the district. Generally speaking, the cold wave warnings were well verified.

*Stock warnings.*—These were issued on only one occasion, namely, on the 25th, for South Dakota, Nebraska, and Kansas.—*C. A. Donnel.*

## NEW ORLEANS FORECAST DISTRICT

Warnings for frosts or freezing were issued for the northern portion of the district on several dates, and southward into the sugar and trucking region on the 9th, 10th, 15th, 17th, and 18th. Subsequent conditions justified the warnings.

Northwest storm warnings were displayed on parts of the Texas coast on the 17th and 21st, and small craft warnings were displayed on the 4th, 7th, 8th, 16th, 17th, 21st, and 25th. No general storm occurred on the West Gulf Coast without warning.

Cold wave warnings were issued for Oklahoma and Arkansas on the 8th; for Arkansas and the interior of eastern Texas on the 19th; and for Oklahoma and the Texas Panhandle on the 25th. The temperature fell sharply in each case but the required minimum temperature did not occur. No cold wave occurred without warning.

Fire weather warnings were issued for parts of the district on the 8th, 17th, 25th, and 27th.—*I. M. Cline.*

#### DENVER FORECAST DISTRICT

Frequent lows of marked intensity which advanced from the north Pacific coast southeastward across Wyoming were attended by precipitation, generally light, in the northern portion of the district during most of the month, while mostly fair weather prevailed in the southern portion. Temperatures were generally above normal in about all sections during the first half of the month and were much lower than the seasonal average on the northeastern Rocky Mountain slope after the 16th.

Warning of a cold wave which was fully verified, was issued for southeastern Wyoming and extreme north-central Colorado on the morning of the 20th. A cold wave warning issued on the morning of the 25th for eastern and central Colorado and southern and western Wyoming was verified in extreme eastern Colorado. Although a sharp fall in temperature occurred in central Colorado and southern Wyoming, the minimum temperature required for a full verification was not reached in these sections, owing to the unusually rapid extension southeastward of a storm that remained central off the Washington coast. Warnings were also issued on the morning of the 30th of a severe cold wave in southern Montana and of a moderate cold wave in northeastern Wyoming. The warning was fully verified in southeastern Montana, but was only partially verified in northeastern Wyoming, owing to the very rapid movement eastward of a HIGH that was approaching over Saskatchewan.

On account of the abnormal rise in temperature at Denver during the night of the 15th-16th which reached its maximum at about 2 a. m. of the 16th, a cold wave, without warning, as shown by the thermograph trace, occurred during the 24 hours ended at 2 a. m. of the 17th. Other local cold waves without warning occurred as follows: Flagstaff, 3d and 28th; Durango, 8th; Leadville, 17th; Helena and Yellowstone Park, 19th; Miles City, 20th.

Freezing temperature warnings were issued on the 8th for extreme eastern New Mexico. Frost warnings were issued as follows: 4th, extreme southeastern New Mexico; 9th, southern New Mexico, freezing in extreme southeast portion; 15th, 17th, and 25th, south-central and southeast Arizona. Warnings of this class were generally verified.

Special forecasts of strong winds, principally for the benefit of aviation interests in southern Wyoming and eastern Colorado were issued on the 6th, 10th, 11th, 12th, 15th, 16th, 17th, 18th, 22d, 23d, 24th, 25th, 26th, 27th, and 29th. These were also generally verified.—*J. M. Sherier.*

#### SAN FRANCISCO FORECAST DISTRICT

Beginning on the 13th of the month a radical change from the normal pressure distribution set in over the north Pacific Ocean. The first sign of this change was the appearance on the 13th of a slight fall in pressure northeast of the Hawaiian Islands. Subsequently this became general and a system of low pressure of great area formed and dominated the wind, weather and temperature conditions generally over the northeast Pacific Ocean and over this forecast district from the middle to the end of the month. This system of low pressure required the period from the 13th to the 28th, inclusive, to move from the vicinity of the Hawaiian Islands to the western coast of North America, and while it was doing so a number of secondary cyclonic systems formed, moved eastward, and gave gales and rains over the far western States. At the close of the month, pressure remained low over the ocean generally this side of the one hundred and eightieth meridian and north of the thirtieth parallel of latitude. In consequence, rains were frequent in the far western States during the latter half of November, and were heavy over most of California. Temperatures were mild generally, although for a brief period during the middle of the month low temperatures prevailed over the interior of Washington and Oregon and over Idaho and Nevada. No frost warnings were required for southern California and only one was issued for northern California, where light frost in exposed places was forecast on the 14th.

Storm warnings were issued on the 8th, 10th, and 11th for the north coast and from the 20th on to the 29th storm warnings were ordered for some part of the coast on nearly every day. Gales were frequent and severe, but there is no record of loss of vessels, probably because of the timeliness of the storm warnings.—*E. H. Bowie.*

#### 627.41 (73) RIVERS AND FLOODS

By R. E. SPENCER

Heavy rain over the middle and north Atlantic States on the 15th and 16th caused moderate overflows in the Saluda, James, Unadilla, Lehigh, and Susquehanna Rivers following the 16th. Of these the flood in the Susquehanna was the most extensive, but neither it nor the others did great damage. Crops had been harvested; warnings were in general ample and accurate; and losses were confined to unavoidable damage to highways and bridges—\$75,000 loss reported from the Susquehanna drainage area; and \$100 from the James, with \$1,500 given as the value of property saved by Weather Bureau warnings.

Of the rises in the various tributary streams of the Ohio System which resulted from the heavy general rain of the 15th-16th over that section, the only specific report of damage covered that section of the Little Kanawha drainage area in the vicinity of Glenville, W. Va., and placed the amount of damage to merchandise, household goods, and other commodities at \$30,000, in addition to a \$30,000 loss in corn and hay. Interrupted wire communication rendered impossible the issue of timely warnings to Glenville, where the highest water of record occurred on November 16, but for the other streams in the Ohio drainage warnings were ample and damage unimportant.

The Illinois River, which fell below flood stage at several points before the middle of November, rose again and was above the flood stage at all stations except Morris, Ill., at the end. No additional damage has been reported.