

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.