

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

A disturbance of moderate intensity was centered near Cape Hatteras on the morning of the 4th. Northeast storm warnings were ordered displayed at 9 a. m. from Norfolk, Va., to Eastport, Me., in the expectation that there would be a marked increase in the storm's intensity. A velocity of 56 miles an hour from the east was reached at Atlantic City, N. J., and 72 miles from the northwest at New York City.

At 8 p. m. of the 6th a storm of marked strength was central over Lake Superior, moving northeastward, and pressure was decreasing rapidly from the lower Lake region southward to the east Gulf coast. Southwest warnings were displayed at 10 p. m. from Jacksonville, Fla., to Eastport, Me. Practically every station north of Savannah, Ga., reported a verifying velocity, the highest being 72 miles an hour from the south at New York City.

Southeast warnings were displayed from Bay St. Louis, Miss., to Cedar Keys, Fla., on the 9th and from Delaware Breakwater to Eastport, Me., on the 10th in connection with the northeastward movement of a disturbance from Texas to the southern New England coast. Pensacola, Fla., reported a maximum velocity of 44 miles an hour from the southwest and Nantucket, Mass., and Block Island, R. I., each 48 miles an hour from the northeast.

On the morning of the 15th a disturbance of considerable intensity was central over western North Carolina, moving rapidly eastward. Northeast storm warnings were ordered displayed from Norfolk, Va., to Atlantic City, N. J., and northwest warnings south of Norfolk to Cape Hatteras. These warnings were well verified, Cape Henry, Va., reporting a maximum velocity of 60 miles an hour from the northeast.

At noon of the 19th a disturbance of marked intensity and wide extent was central over Illinois, moving northeastward. Southwest warnings were displayed from Jacksonville, Fla., to Delaware Breakwater at 4 p. m., and southeast warnings from Baltimore, Md., to Eastport, Me., at 10 p. m. Verifying velocities were reached at a number of stations.

A disturbance that was over the west Gulf States on the 30th, moved rapidly northeastward to the southern New England coast during the next two days, attended by shifting gales along the Middle Atlantic and North Atlantic coasts. Warnings were displayed well in advance of the storm.

Warnings of strong winds were sent to open ports on Lake Michigan on 18 days during the month and warnings of "northers" to the Panama Canal Zone on the 2d and 21st.

Cold-wave warnings were issued for very limited areas on the 1st, 2d, 21st, and 28th, and frost warnings for portions of the Southern States on about one-third of the days of the month.—*Charles L. Mitchell.*

CHICAGO FORECAST DISTRICT.

No special warnings of any kind were necessary in the Chicago Forecast District until the 18th, when advices were sent to the live-stock interests in Nebraska and western Kansas. On that date also heavy snow warnings were issued for northern Wisconsin and eastern Minnesota.

On the 19th, 20th, and 26th, frost warnings were issued for southeastern Kansas and southwestern Missouri, in the latter State the advices being made especially for the benefit of the strawberry growers.

The first severe cold weather of the month appeared in the Canadian Northwest on the morning of March 26. However, no cold-wave warnings were issued then as the temperature in the northern Plains States and the northern Rocky Mountain region was already rather low. On the 27th-28th, cold-wave warnings were ordered for the southern Plains States and the middle and lower Missouri and the middle Mississippi Valleys. The expected drop in temperature was quite pronounced from South Dakota southward over Nebraska and Kansas, but to the eastward the changes were not decided, as the high-pressure area accompanying the cold moved eastward to the Lake region during the 28th. Stock advices were issued for South Dakota, Nebraska, southeastern Wyoming, and western Kansas on the 27th.

Freezing temperature was indicated for southern Missouri and southeastern Illinois on the 31st.

The special forecast service to the *Reporter-Enterprise*, Oconto, Wis., begun in February, was continued during March, a forecast covering Friday, Saturday, and Sunday being telegraphed each Thursday morning. Temperature forecasts for a week in advance were sent to the Wenatchee Valley Traffic Association, Wenatchee, Wash., each Monday, to be used by the association in the protection of their fruit shipments across the northern Rockies and the northern Plains.—*E. H. Haines.*

NEW ORLEANS FORECAST DISTRICT.

The month opened with cold weather in most sections of the district and below freezing to the middle coast of Texas. Though cold weather continued in Texas and northern Louisiana the arrival of freezing weather on the Louisiana coast was delayed until the 4th, but temperatures were only a few degrees above freezing on the 2d and 3d. On the morning of the 3d the freezing temperature forecast for the Louisiana coast was repeated and a warning of killing frost was added. Steps were taken to protect vegetation, but the less hardy crops suffered where they could not be protected. This cold spell, coming late in the winter, was as severe as any during the winter and the most injurious.

After the 4th, frost or freezing-temperature warnings were issued for portions of the district on the 6th, 7th, 9th, 10th, 15th, 20th, 21st, 25th, 26th, 27th, 28th, and 31st.

Warnings for live-stock interests in northwestern Oklahoma and the Texas panhandle were issued on the 8th. Rather heavy snow occurred in these sections on the 9th, with temperatures below freezing.

The month may be characterized as windy and rainy, due to the frequent occurrence of southwestern LOWS which passed northeastward over the district.

On the 1st a disturbance of moderate intensity was central over southern Mississippi and a large area of high pressure was central over South Dakota. The cold-wave warning issued the preceding day was repeated for southern Louisiana and northwest storm warnings were continued on the east coast of Texas, small-craft warnings being displayed on the west coast of Texas. These warnings were verified.

Small-craft warnings were displayed on the Texas coast on the 8th, 9th, 13th, 25th, 29th, 30th, and 31st, and on the Louisiana coast on the 9th, 13th, and 25th.

The small-craft warnings were changed to storm warnings on the 9th and 13th after the receipt of special mid-day observations. Winds occurred as forecast.

In addition to the strong winds and moderate gales that occurred with the display of the warnings mentioned, a moderate northwest gale occurred at Galveston during the morning of the 19th. A local storm of more than ordinary intensity occurred on the east coast of Texas in the early morning of the 29th. The weather map of the preceding evening gave no indications of this local squall.—*R. A. Dyke.*

DENVER FORECAST DISTRICT.

An area of low pressure which extended southeastward from British Columbia during the 4th, with a center of marked intensity over eastern Colorado on the morning of the 5th, was attended by light to moderately heavy snows in this State and Utah during the 4th–5th. The remainder of the month was notable because of the unusual number of storms which developed on the middle and southern portions of the Rocky Mountain plateau or which moved southeastward from the north Pacific coast. Lows of the types referred to advanced across the Denver district on the 7th–8th, 11th–12th, 16th–18th, 22d–24th, 26th–27th, and the 28th–29th, while another disturbance was central over southern Utah on the 31st. The HIGHS as a rule, moved eastward from Oregon, Washington, or northern California.

Moderately heavy snows occurred in western Colorado on the 5th, in northern and eastern New Mexico on the 8th–9th, in northern Utah on the 10th–11th, and in northern Utah and southwestern Colorado on the 28th–29th. Heavy snows fell in northeastern Arizona and southwestern Colorado on the 11th–12th and the 16th–17th.

Warnings of heavy snow and stockmen's warnings were issued on the 11th for western Colorado, northwestern New Mexico, northern Arizona, and southern Utah and were justified, except in northwestern Colorado.

No cold-wave warnings were issued during the month. Moderate cold waves, without warnings, occurred in southwestern Colorado on the 6th, due to an increase in the intensity of a HIGH that was over California on the morning of the 5th, and in northeastern Colorado on the 28th, owing to the very rapid eastward movement of a LOW that was over the eastern portion of this State on the morning of the 27th and to the correspondingly rapid extension southward to Texas of a HIGH whose crest was over southern Saskatchewan on the last-named date. A local cold wave of moderate intensity also occurred at Santa Fe on the 18th.

Warnings of freezing temperature were issued for south-central and southeastern Arizona on the 1st, for southern New Mexico and south-central and southeastern Arizona on the 6th, and for temperatures near freezing in extreme southeastern New Mexico on the 19th and 28th. The warnings were verified, except in south-central and southeastern Arizona on the 7th and in extreme southeastern New Mexico on the 29th.

Frost warnings were issued for extreme southwestern Arizona on the 1st, 2d, 6th, 12th, and 18th and for southern New Mexico on the 25th and extreme southeastern New Mexico on the 19th, 26th, and 30th. These were generally verified by the actual occurrence of frost or temperatures at which frost might be expected, except in the most extreme southwest portion of Arizona on the 7th and 19th and in extreme southeastern New Mexico on the 27th.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT.

In this district the weather during March was much like that of the preceding month, the distinctive feature being the succession of storms moving inland at a latitude lower than usual. Near the coast the storms were less violent than those of February, but radio reports from vessels in the north Pacific showed the prevalence of strong gales in that region during the greater portion of the month.

The temperature was somewhat below normal, but there were no very cold or warm periods in any portion of the district.

There were more than the usual number of rainy days during the month, but the precipitation was nowhere excessive.

Warnings of heavy frost were issued five times in California, and while frosts occurred, they were not of a damaging nature.

Storm warnings were ordered 14 times, as follows: Washington and Oregon coast, 9; northern California coast, 4; southern California coast, 1; small craft, 2; and advisory, 2. The warnings were generally verified, and, judging from radio reports at sea, they are all believed to have been justified.

The many radio reports received from vessels in the north Pacific were of great assistance in keeping the forecaster in touch with approaching weather conditions.—*G. H. Willson.*

RIVERS AND FLOODS.

By H. C. FRANKENFIELD, Meteorologist.

The great flood in the extreme lower Ohio and lower Mississippi Rivers was in full progress at the close of the month, and the report thereon will be delayed until the flood has subsided.

Floods over the North Atlantic drainage area.—On March 8 rain, combined with high temperatures, melting snow, and the breaking of an ice gorge in the Connecticut River at White River Junction, Vt., caused a rapid rise to a stage of 16 feet, or 3 feet above the flood stage, by the morning of March 9. It so happened that the gorge broke without starting the ice, so that a warning issued on March 8 for flood stages below failed of verification by several feet. Similar meteorological conditions caused the ice in the upper Susquehanna River to move out on a rapidly rising river, with crests somewhat above the flood stage. The flood lasted but a few hours and the damage was slight.

On March 15 the ice in the White River of Connecticut moved out, causing another rapid rise in the Connecticut River at White River Junction, and at 4 p. m. the stage was 18.2 feet, 5.2 feet above the flood stage. There was not much rise below, and the ice did not begin to move out at Bellows Falls, Vt., until March 25. During the last week of the month moderate rains and high temperatures caused a rapid melting of the snow covering, and the greatest rise of the month set in, the ice also moving out from points above. The crest stages were as follows: White River Junction, Vt., 19.5 feet, 6.5 feet above flood stage, and Bellows Falls, Vt., 10.2 feet, 1.8 feet below flood stage, on March 30; Holyoke, Mass., 8.7 feet, 0.3 foot below flood stage, at midnight March 30–31, and Hartford, Conn., 19.9 feet, 3 feet above flood stage, on March 31. Warning of this flood was issued on March 28.