For several days the city was cut off from outside communication. Telegraph and telephone wires fell and railroad traffic was paralyzed, which produced an acute shortage of food. Hundreds of persons were made homeless when the roofs of their dwellings gave way beneath the weight of the snow, while other buildings fell when their foundations were undermined by the melting snow. * * *

Eight hundred homeless persons are being housed in synagogues and school rooms until new homes can be provided for them. * * * it will be months before all the damage can be repaired.—*New York Evening Mail, March 30, 1920.* (See also p. 80 above.)

Australia.—In Australia the welcome rains continued.[1]

South Africa.—The serious drought which (has) been prevalent in South Africa was broken by copious (rain) falls.[1]

DETAILS OF THE WEATHER OF THE MONTH IN THE UNITED STATES.

CYCLONES AND ANTICYCLONES.

By R. HANSON WEIGHTMAN, Meteorologist.

Cyclones.—The month was marked by the occurrence of 9 secondary developments, while the number of primary lows amounted to 11. Disturbances were more than usually numerous in southern districts (see Chart II). The table below gives the number of lows by types:

	Alberta.	North Pacific.	South Pacific.	Northern Rocky Mountain.	Colorado.	Texas.	East Gulf.	South Atlantic.	Central.	Total.
February, 1920	6.0	0.0	2.0	2.0	2.0	1.0	1.0	3.0	3.0	20.0
Average number, 1892-1912	3.1	2.3	1.0	0.2	1.5	1.5	0.5	0.2	0.7	11.9

Anticyclones.—The number of highs as shown on Chart III was greater than the average as shown in the table giving the types and number of each which follows:

	North Pacific.	South Pacific.	Alberta.	Plateau and Rocky Mountain region.	Hudson Bay.	Total.
February 1920	0.0	1.0	7.0	2.0	0.0	10.0
Average number, 1892-1912	0.8	0.5	4.7	1.2	0.6	7.8

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, Apr. 1, 1920.]

PRESSURE AND WINDS.

The abnormally high pressure over eastern districts at the close of January was central over New England and the Canadian Maritime Provinces by the morning of February 1, with pressure still above 31 inches, some stations reporting the highest barometer readings ever observed. Temperatures also were extremely low, falling to nearly 50° below zero (F.), in northern New England. This high area moved rapidly into the Atlantic, and was quickly followed by another that prevailed for several days over the northern districts from the Great Lakes eastward. During the same period, pressure was generally high over the far West and low in the Southeast, where a shallow depression, developing over southern Florida at the beginning of the month, moved northward and by the morning of the 5th was central off the middle Atlantic coast as a severe storm. It moved slowly to southeastern New England during the following 24 hours, attended by strong winds and high tides that caused much damage to the cities and towns along the coast from Virginia northward. At points along the coast, the storm is described as being the severest ever experienced. Inland, heavy sleet and snow prevailed almost continuously for several days, accumulating to unusual depths from the Chesapeake Bay region northward, but particularly over southeastern New York and New England, where, on account of drifting and freezing, railway and other transportation interests were paralyzed, mail routes were abandoned, and business was generally demoralized.

Throughout the balance of the first decade pressure remained above normal in the far West, and in fact continued so throughout the greater part of the month. No important storm entered the country from the Pacific or from the Canadian northwest, during the second or third decades of the month, but several storms originating in the central or southern districts increased markedly in their eastward progress and on reaching the middle Atlantic coast had attained considerable proportions, frequently becoming severe over the more northern districts.

The average pressure for the month was above normal over practically all portions of the United States and Canada, from the Mississippi River and Great Lakes westward to the Pacific, the departure increasing in the far northwestern districts, where at points the average pressure for the month was the highest of record. In the eastern districts of the United States, as well as Canada, the pressure for the month as a whole averaged considerably less than normal, particularly along the middle Atlantic coast, where the barometer readings were decidedly low on several occasions.

The high pressure existing from the Missouri Valley westward to the Pacific, during the greater part of the month with its center over the far northwestern States, and the generally low pressure over the more eastern and southern districts, greatly influenced the course of the winds from the Rocky Mountains eastward where they were nearly everywhere from the Northwest. To the westward of the mountains, the winds were greatly diversified but also frequently from the northwest. High winds were observed on a number of dates along the Atlantic coast, particularly on the 4th and 5th, and again about the 14th and 15th. Over the remaining portions of the country, winds of 50 miles per hour or over were reported at a few points only, and along the Pacific coast where high winds are usually frequent during February, they were notably absent.

TEMPERATURE.

Severe cold, extending over from January, prevailed on the first of the month over the eastern districts from Pennsylvania northward, where the lowest temperatures

[1] The Meteorological Magazine, March, 1920, p. 36.

of the month were recorded, the minimum readings ranging frequently from 30° to nearly 50° below zero (F.), at exposed points in the northern portions of New York and New England. As this cold area moved beyond the field of observation, warmer weather prevailed in the districts from the Mississippi Valley eastward, some of the highest temperatures of the month occurring on the 2d and 3d in the Ohio Valley and Great Lakes region and to the eastward, and generally moderate temperatures prevailed in the far West, particularly in California and Arizona, where the highest temperatures of the month were also frequently reported. Cold weather again set in over the Dakotas about the 3d, and gradually extended to the Great Lakes and New England during the following two days, but elsewhere temperatures remained moderate for the season. No important temperature changes were recorded during the latter part of the first decade or in the early period of the second. On the 13th low temperatures again entered the upper Missouri Valley and gradually overspread the northern and central districts during the middle portion of the second decade, the minimum temperatures falling to 30° or 40° below zero (F.), over the northern States from the Rocky Mountains to the Great Lakes, and they were below zero at exposed points as far south as Oklahoma and thence eastward to the mountains of North Carolina. This period brought the coldest weather of the month over most of the country between the Rocky and the Appalachian Mountains, and killing frosts occurred near the Gulf coast and over northern Florida. The latter part of the second decade had mainly moderate temperatures over all districts.

The early part of the last decade had moderately low temperatures in the Northwest, and it continued cold over portions of the Northeast where the heavy body of snow prevented any material warming. In most of the mountain districts of the West the lowest temperatures occurred during this decade, principally about the middle and near the end, the minimum temperatures falling to nearly 40° below zero at exposed points in Wyoming, and ranging from 20° to 30° below zero in portions of Utah and Idaho. Over the interior districts the temperature during the last decade was without sharp changes and remained very generally above the normal.

For the month as a whole the average temperature was above the normal in practically all portions of the country to westward of the Mississippi River, the average daily excess ranging from 6° to 9° in the Dakotas and portions of surrounding States; and the excess was only slightly less in portions of the Plateau region. East of the Mississippi River the averages were everywhere less than normal, though usually the departures were not large. In the northeastern districts, particularly over New York and New England, the month was largely cold throughout, and while extremely low temperatures were not observed, the continued cold prevented any material melting of the heavy snows, and at the end of the month the accumulated snow of nearly the entire winter remained on the ground, and in some sections the depth was the greatest in many years.

The extremes of temperature were within the usual limits, although the minima of the first over portions of New England were close to the lowest ever observed. The maximum temperatures were usually above 80° over the southern tier of States, reaching 93° at points in Texas. In the Lake Superior district they were not much above 40°. The minimum readings by States ranged from 19° in Florida and 21° in Louisiana to −45° in New Hampshire.

PRECIPITATION.

The month as a whole was abnormally dry over large portions of the country, particularly in the central valleys and the far West. On the other hand, precipitation was frequent in the Atlantic Coast States, particularly from Virginia northward, where heavy snows, rains, and sleet were of frequent occurrence, and the monthly amounts were generally above normal. There was an excess of precipitation over most of Florida and the States of the far Southwest had monthly amounts in excess of the average.

The most notable storm of the month had its origin over extreme southern Florida at the beginning of the month. By the morning of the 4th it had moved to the Carolina coast, attended by heavy rains over the southeastern States, nearly 7 inches falling at Jacksonville from the 1st to the 3d. This storm moved slowly northward along the coast during the following few days, the heavy rains changing to heavy sleet as the storm moved into northern and cooler regions, and to heavy snow over the western and northern areas embraced within the storm's influence. The fall of sleet in this storm was remarkably heavy and continued over a period of unusual length; in some cases the fall continued without material interruption for two days or more.

A second period of important precipitation prevailed over the southern and eastern districts from the 12th to 15th, during which time considerable snow occurred over the northeastern States and some heavy rains fell in the Gulf States and along the Atlantic coast as far north as Chesapeake Bay. The latter half of the month was markedly free from material precipitation over southern and western districts, and in many parts of the Northwest the month as a whole had the least precipitation of record for a winter month. In portions of Oregon and Washington the precipitation was less than 10 per cent of the normal. This condition prevailed even to the coast stations, where February is usually a distinctly rainy month. At Tatoosh Island, off the northwest coast of Washington, no precipitation of any kind was observed from the 7th to the 29th, inclusive, the longest known period without rain in the midst of the rainy season in the history of the station. In California the precipitation was likewise far below the average, a condition that existed also in several preceding months. Some relief occurred in this State, however, toward the end of the month, which improved the situation somewhat temporarily, but there is still a large deficiency in the season's precipitation, which, if not made up during the spring months, will threaten seriously many of the industries of the State which depend so largely upon a normal supply of water.

SNOWFALL.

Snowfall during the month was light in the Ohio and middle and upper Mississippi Valleys, ranging from only a trace to about 7 inches, while the monthly totals were

mostly from 10 to 12 inches in the region of the Great Lakes. In the Northeast, however, the snowfall was very heavy, ranging from about 25 to more than 60 inches, most of which remained unmelted at the close of the month. The snowfall was light in most of the western mountainous districts and this, coupled with the deficiency during the preceding months of the winter, renders prospects unfavorable for an adequate supply of water for irrigation during the coming season. This condition exists most acutely in the mountains of California and thence northward to Washington.

RELATIVE HUMIDITY.

In the Rocky Mountains and Great Plains, also over the far Southwest, the relative humidity was very generally above the normal, the excess being well-pronounced in Colorado and thence southward, including Arizona and western Texas. In the central valleys and eastern districts excesses and deficiencies were observed indiscriminately, except in New England, where an excess was the rule. In the far West there was a well-defined deficiency which closely outlined the region of deficient precipitation.

SPECIAL FORECASTS AND WARNINGS—WEATHER AND CROPS.

WEATHER WARNINGS.

By ALFRED J. HENRY, Supervising Forecaster.

[Washington, Mar. 13, 1920.]

Strong winds.—The outstanding feature of the month was the fact that well-developed cyclonic systems with circular or oval isobars did not pass inland from the Pacific or southeastward from the Canadian Northwest. On the other hand, the low-pressure systems of the month west of the Appalachians were in the form of extensive NE.-SW. troughs of low pressure in which several centers of minimum pressure appeared. When these troughs approached Atlantic coast districts some one of the shallow depressions within them would develop into an intense cyclone which would move rapidly northeastward. Four such intense cyclones passed over New England and the Canadian Maritime Provinces during the month, each of which was attended by high winds and heavy snow. In addition to these four major storms, a number of minor disturbances approached the coast and made it necessary to issue warnings. In all, warnings of strong winds were issued on nine different occasions, the initial dates of the storm periods being as follows: 2d, 12th, 14th, 17th, 18th, 19th, 24th, 28th, and 29th. The details of each warning follow:

2d—The great sleet storm in New England and Middle Atlantic States.—High pressure over the Middle Atlantic States and the Atlantic to an unknown distance to the eastward in connection with relatively low pressure off the east Florida coast made it necessary to issue warnings for strong northeast winds, Jacksonville to Hatteras, and these warnings were subsequently extended to Eastport, Me., changed to northwest, Hatteras to Provincetown, Mass., on the 4th and continued from that direction on the 5th and 6th, respectively. The display which began on the south coast on the 2d was not definitely concluded on the New England coast until 10 a. m. of the 8th.

It seems probable that the heavy fall of sleet in portions of the Middle Atlantic and southern New England States on the 4th, 5th, and 6th may be attributed to the underrunning of warm southerly winds by a cold northeasterly current out of the great northern HIGH which apparently blocked the passage of the southern LOW on those dates.

Space will not permit a recital of the damage to beach property due to the waves of the record-breaking high tides of this storm.

12th.—A shallow depression along the middle Gulf coast and rapidly falling pressure made it necessary to issue warnings for strong northeast winds from Jacksonville to Fort Monroe, Va., on the 12th. The warnings were subsequently extended to Eastport, Me.

14th.—During the afternoon of the 14th a secondary disturbance developed over Virginia, the barometer falling 0.35 inch in 12 hours. By the morning of the 15th a cyclone of much intensity with two centers appeared, one center being over southern New England, the other one over the Province of Ontario. Fresh, shifting gales attended this storm in its movement over New England.

17th.—The display of the 17th was a failure; the winds did not attain the strength anticipated.

18th.—Special observations at noon of the 18th showed that a disturbance was developing over Florida. Assuming that it would move northeastward along the coast, northeast warnings were displayed, Jacksonville to Fort Monroe, Va. The storm, however, moved to the eastward over the Atlantic and the warnings failed.

19th.—On the morning of the 19th a cyclonic storm was centered southeast of Nantucket, evidently having developed from a shallow depression of the 18th over North Carolina. Northwest warnings were immediately displayed from Delaware Breakwater to Eastport, Me. This storm subsequently increased very much in intensity.

24th.—Special observations on the 24th showed that a shallow depression centered over North Carolina was increasing in intensity and warnings were accordingly issued for strong northwest winds, Delaware Breakwater to Nantucket. These warnings were subsequently extended to Eastport, Me. This storm increased greatly in intensity as it passed over the Canadian Maritime Provinces, the barometer reaching the low level of 28.62 inches on the morning of the 26th.

28th.—Warnings for strong easterly winds along the Atlantic coast, Norfolk to Boston, were issued 9:30 a. m. These warnings, owing to the erratic course pursued by the storm, were only partially verified.

29th.—Warnings for strong northwest winds along the east Gulf coast were issued at 1 p. m. of this date. They were fully verified.

Heavy snow.—Heavy snow warnings were issued for New England on the 5th.

Cold waves.—Severe and widespread cold waves were notably infrequent during the month, there being but two occasions when the temperature fell sharply in the Washington Forecast District, viz., on the 15th and 29th.

Killing frost.—Warnings of killing frost in northern and central Florida were issued on the 15th, 16th, and 17th and again on the 26th, 27th, and 28th. Cold wave warnings were issued for north and central Florida on the 29th and for central Florida on the 15th and 26th. The temperature fell to and slightly below freezing on each of these dates.