

districts was interrupted by an area of low barometer which advanced from the west part of the Gulf of Mexico northeastward during the last three days of the month. Ample warnings of the approach of this cold wave were issued in all districts which it visited. Special warnings telegraphed well in advance of the cold wave throughout the Pacific coast and Rocky Mountain districts prompted precautionary measures which resulted in saving large quantities of perishable products. Heavy snow preceded the advance of this cold wave in many of the districts, concerning which ample warnings were given. On the morning of the 29th snow, melting as it fell, was reported at Riverside, Cal.

BOSTON FORECAST DISTRICT.

The storms of the month were not destructive, as the high winds experienced were offshore or westerly winds. Timely warnings were displayed well in advance of the high winds, and the changes in weather and temperature were, as a rule, accurately forecast.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

Cold-wave warnings were issued for portions of the district on the 3d, 10th, 20th, 23d, 24th, 26th, and 27th. The warnings were generally timely and no cold waves occurred without warnings. No severe windstorms occurred during the month. The daily forecasts have given general satisfaction, and favorable comments on the work of the Bureau are heard on all sides.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

A severe cold wave covered the entire district during the 26th and 27th. Warnings were issued for all points well in advance of its approach. Winter navigation continued on Lake Michigan during the month. Occasional high winds occurred and messages were sent to all open ports, advising vessel interests of the storm. No casualty occurred during the month, except the grounding on the bar near the mouth of the Ludington Harbor of the car ferry *Pere Marquette* on the night of the 13-14th. Navigation was seriously impeded along the west shore of Lake Michigan by extensive fields of ice during the latter part of the month.—*H. J. Cow, Professor.*

DENVER FORECAST DISTRICT.

On the night of the 24th cold-wave warnings were ordered in Utah, western Colorado, and northern New Mexico. On the morning of the 25th cold-wave warnings were given general distribution in Utah and western Colorado, and to points in central and eastern Arizona and southeastern Colorado. A few hours later the following message was given general distribution in Colorado:

Conditions favorable for severe cold and high northerly winds, with heavy snow in mountain districts.

These warnings were issued well in advance of the cold and were fully justified, except in parts of Arizona and New Mexico.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month continued dry, with frost general in California until the 16th, when rain fell from San Francisco northward.

The night of the 24th cold-wave warnings were ordered for central and northern California and Nevada. Emergency frost warnings were issued for all points in southern California on the morning of the 25th in ample time to be of service to the orange growers, and emergency frost warnings for southern California were again issued on the morning of the 29th and were verified. Frost warnings were issued on the morning of the 30th. No storms of exceptional severity occurred during the month.—*Alexander G. McAfee, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

On the morning of the 24th a severe cold wave made its appearance in the British Possessions north of Montana. Special reports showed that the cold wave was moving rapidly toward the district and the following cold-wave warning was at once sent to stations east of the Cascade:

Cold wave. Temperature will fall 20° by morning and zero weather will continue several days.

Storm northeast warnings, containing the additional announcement of much colder weather with snow, were sent to all storm warning display stations. The cold-wave warnings were timely and verified in detail, each station being advised about twenty-four hours in advance of the arrival of the cold wave.—*Edward A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1, a. m.	54	114	7, a. m.	47	65	3,450	6.0	575	24.0
II.....	8, p. m.	41	124	10, a. m.	43	104	1,200	1.5	800	33.3
III.....	12, a. m.	50	97	15, a. m.	32	65	2,900	3.0	967	40.3
IV.....	15, a. m.	43	115	16, p. m.	46	78	1,800	1.5	1,200	50.0
V.....	15, a. m.	43	116	18, p. m.	32	65	3,550	3.5	1,014	42.3
VI.....	17, a. m.	41	124	21, a. m.	46	60	3,750	4.0	938	39.1
VII.....	19, p. m.	37	122	23, p. m.	30	82	3,400	4.0	850	35.4
VIII.....	24, a. m.	54	114	1, p. m.*	46	60	3,775	3.5	444	18.5
Sums.....							23,825	32.0	6,788	282.9
Mean of 8 paths.....							2,978		848	35.4
Mean of 32.0 days.....									746	31.1
I.....	1, a. m.	51	104	4, a. m.	47	54	2,500	3.0	833	34.7
II.....	5, p. m.	54	114	7, p. m.	48	86	1,300	2.0	650	27.1
III.....	7, a. m.	54	114	10, p. m.	48	68	2,600	3.5	743	31.0
IV.....	10, a. m.	37	87	13, a. m.	49	64	1,950	3.0	650	27.1
V.....	10, p. m.	46	84	17, a. m.	49	64	1,350	2.5	540	22.5
VI.....	13, p. m.	54	114	20, a. m.	47	54	3,100	4.5	889	28.7
VII.....	16, a. m.	37	80	17, a. m.	32	65	1,300	1.0	1,300	54.2
VIII.....	16, p. m.	37	114	18, p. m.	32	86	1,700	2.0	850	35.4
IX.....	18, a. m.	43	124	23, p. m.	48	63	3,900	5.5	709	29.5
X.....	24, a. m.	47	123	23, p. m.	36	87	2,600	2.5	1,040	43.3
X.....	26, a. m.	47	89	27, a. m.	48	68	900	1.0	900	37.5
Sums.....							23,200	30.5	8,904	371.0
Mean of 11 paths.....							2,109		809	33.7
Mean of 30.5 days.....									761	31.7

*February.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

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was somewhat higher owing to the moderate flood that came out of the Ohio during the early days of the month, its crest passing Cairo, Ill., on the 18th.

The December floods of the Tennessee and the rivers of the Atlantic system subsided rapidly during the early days of the month, although they continued considerably above the danger lines for the first few days, particularly in the lower Tennessee, where the crest did not pass Johnsonville, Tenn., until the 9th and 10th. The flood in the upper Tennessee was particularly severe, in fact the greatest since that of March 2, 1890. The warnings of the Weather Bureau were especially timely, accurate, and comprehensive. Careful attention was given to every detail and as a result property to the value of at least \$500,000 was saved. Newspaper comments and testimonials, both written and oral, from those directly interested were unanimous in their commendation of the excellent service rendered. It is true that much property that could not be removed was lost or destroyed and, unfortunately, it is also true that considerable portable property was lost through

inattention to the Weather Bureau warnings, which were scattered broadcast.

The heavy snow, sleet, and rain storm of the closing days of the month started another rise in the rivers of the South, and the crests had not yet been reached on the last day.

The ice situation remained practically unchanged, save for a considerable increase in the thickness of the ice at places where the rivers were entirely frozen over, notably in the Red River of the North, the Missouri above the mouth of the Platte, the Mississippi above the mouth of the Illinois, and in the Hudson.

The highest and lowest water, mean stage, and monthly range at 134 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans on the Mississippi; Cincinnati and Cairo on the Ohio; Nashville on the Cumberland; Johnsonville on the Tennessee; Kansas City on the Missouri; Little Rock on the Arkansas; and Shreveport on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

Alabama.—The mean temperature was 43.4°, or 1.4° below normal; the highest was 76°, at Healing Springs on the 3d and at Daphne on the 26th, and the lowest, 10°, at Oneonta on the 14th. The average precipitation was 3.86, or 1.06 below normal; the greatest monthly amount, 7.60, occurred at Clanton, and the least, 1.32, at Eufaula.

First half of month, quite cold and dry; latter half, generally rainy and unfavorable for preparatory farm work, which is generally backward. Late reports confirm previous estimates that the greater portion of the fall sown oats were killed by the severe cold in December.—*F. P. Chaffee.*

Arizona.—The mean temperature was 46.2°, or 1.2° above normal; the highest was 86°, at Champies Camp on the 3d, and the lowest, 12° below zero, at Flagstaff on the 26th and at Fort Defiance on the 27th. The average precipitation was 0.85, or 0.31 below normal; the greatest monthly amount, 3.17, occurred at Flagstaff, while none fell at Benson.

Some plowing and seeding were done during the month, the January rains putting the soil in fair condition. On account of the great scarcity of water for irrigation, a greatly decreased acreage is under cultivation as compared with previous years.—*Wm. G. Burns.*

Arkansas.—The mean temperature was 38.0°, or 2.6° below normal; the highest was 79°, at Beebranch on the 9th, and the lowest, 2°, at Dutton on the 26th and at Fayetteville, Oregon, Pond, and Winslow on the 27th. The average precipitation was 4.13, or 0.17 below normal; the greatest monthly amount, 8.51, occurred at Pinebluff, and the least, 0.96, at Fayetteville.

On account of the long continued drought of last summer the ground was so hard and dry that fall plowing was greatly delayed and much proposed work was finally abandoned. Seeding was also delayed, and on account of the unfavorable condition of the soil much grain was not sown at all. Some seed that was scattered broadcast upon hard ground never sprouted; the drilled seed, however, has given better results. Late fall showers benefited the late sown more than the early sown seed. There being no protection by snow, wheat, oats, and rye were badly injured by the freeze in December; wheat has made very little growth since and the stand is poor generally; oats are very poor, and, in many instances, are reported as being entirely killed. Farm work is either very much retarded or is entirely abandoned. Some plowing for corn has been done, but very little.—*Echeard B. Richards.*

California.—The mean temperature was 44.5°, or 0.3° below normal; the highest was 96°, at Anaheim on the 5th, and the lowest, 20° below zero, at Truckee on the 25th. The average precipitation was 1.38, or 3.17 below normal, the greatest monthly amount, 8.17, occurred at Cuyamaca, while none fell at Hornbrook and Mammoth Tank.

Conditions during the month were generally unfavorable for crops. The temperature was below normal, and severe frosts were frequent. The precipitation was much below the average in all parts of the State. Grain made slow growth, but was not seriously damaged by frost, and green feed became scarce in many places. Oranges in southern California were considerably injured by frost.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 26.1°, or 1.4° above normal; the highest was 74°, at Blaine on the 8th, and the lowest, 31° below zero, at Fort Collins on the 26th. The average precipitation was 0.42, or 0.34 below normal; the greatest monthly amount, 2.60, occurred at Ruby, and the least, trace, at Cheyenne Wells, Fort Morgan, and Seibert.

The snowfall in the mountains was below normal, thus adding to the deficiency already noted for the preceding three months. The old snow is practically solid ice, and high winds have swept the new snow from exposed localities into ravines, gulches and drifts, so that, on the whole, conditions are favorable for its conservation until late in the season.—*F. H. Brandenburg.*

Cuba.—The mean temperature was 67.7°; the highest was 90°, at San Cayetano on the 26th, and the lowest, 40°, at San Cayetano on the 13th and 15th. The average precipitation was 1.27; the greatest monthly amount, 7.49, occurred at Havana, and the least, 0.19, at Pinar del Rio.

The precipitation, which with a few exceptions was unseasonably light, practically all occurred from the 3d to 6th, inclusive, and on the 16th. During the greater portion of the month the temperature continued abnormally low, and the nights were, as a rule, unusually cool. The long prevalence of dry weather proved very disastrous to tobacco not irrigated, and in all the tobacco districts the first cutting gave unusually discouraging yields which were mostly of a poor quality. Spring and fall planted canes suffered greatly from lack of moisture; their development was retarded, and in some sections spring canes dried badly. The dry, cool weather was, however, favorable for the cane harvest, and grinding progressed steadily; throughout the month cane juice density was high. Small crops are extremely scarce in Pinar del Rio; while not abundant elsewhere they are generally sufficient for local needs.—*W. B. Stockman.*

Florida.—The mean temperature was 55.1°, or 2.3° below normal; the highest was 89°, at Bartow on the 28th and 31st and at Gainesville on the 30th, and the lowest, 15°, at Sumner on the 12th and Middleburg on the 13th. The average precipitation was 0.65, or 1.88 below normal; the greatest monthly amount, 3.26, occurred at Bonifay, while none fell at Miami, Rockwell, and St. Augustine.

The month was characterized by low temperatures, much sunshine, and deficient precipitation. As a consequence the growth of vegetables was retarded, and seeding and transplanting were delayed. Numerous frosts, particularly those of the 13th and 14th, did considerable damage to tender vegetables, the recent growth of citrus trees, and the bloom of the strawberry. The absence of rain contributed very materially to the backward state of work and to the scarcity of truck. The bulk of the orange crop was shipped during the month. Citrus trees and pineapples have withstood the weather nicely, and are now in good condition. Considerable cane and cassava have been planted, and land is being prepared for cotton and corn. Peach trees are in bloom; orange buds are swelling.—*A. J. Mitchell.*

Georgia.—The mean temperature was 43.9°, or 1.4° below normal; the highest was 82°, at Waverly on the 27th, and the lowest, 7°, at Greenbush on the 13th. The average precipitation was 1.81, or 2.38 below normal; the greatest monthly amount, 4.27, occurred at Point Peter, and the least, trace, at Millen.

The average precipitation was the lowest on record for January during the past eleven years. Practically none occurred during the first half of the month, and the bulk occurred during the latter part of the