

On the morning of the 31st, a large area of high pressure, crested near Winnipeg, Manitoba, occupied the northern half of the country and pressure was low over the upper Rio Grande Valley. Cold-wave warnings were issued for Arkansas and were extended, on special observations, over southern Oklahoma, the northern and western portions of East Texas, and the southeastern portion of West Texas. The warning was generally verified. A cold wave occurred also in the northern portion of West Texas, for which special temperature and livestock warnings had been issued, the temperatures predicted being only slightly higher than the temperatures that occurred.

Northwest storm warnings were issued for the Texas coast at 3 p. m. on the 9th. Northerly winds, closely approximating the verifying velocity occurred.

Warnings for the norther that reached the Texas coast on the 19th were issued at 8.40 p. m. on the 18th and were extended the next morning along the Louisiana coast. For similar conditions on the 24th, northwest storm warnings were issued for the Texas coast at 9 p. m. of the 23d and small-craft warnings were displayed on the Louisiana coast the next morning. Small-craft warnings were displayed also on the Texas coast on the 3d and 29th.

Warnings for northerly gales at Tampico, Mexico, were issued on the 19th and 24th.

In addition to the cold-wave warnings, frost or freezing temperature warnings, mostly for the coast sections, were issued on the 1st, 8th, 9th, 10th, 11th, 21st, 25th, 26th, 27th, and 28th; these warnings were generally verified.—*R. A. Dyke.*

DENVER FORECAST DISTRICT

The month was cold and stormy, with frequent disturbances advancing southeastward across the district, followed by HIGHS of remarkable intensity. The most notable storm moved southeastward from eastern Washington during the 15th, taking the place of an area of high pressure that had occupied the Plateau region for about a week, while another HIGH of unusual strength covered the northeastern Rocky Mountain slope. The low decreased rapidly in intensity during the 17th and reached New Mexico on the night of that date. The area of high pressure overspread the entire Rocky Mountain region by the 19th, with its crest over western Wyoming, where the pressure increased to more than 31.2 inches, and temperatures below zero extended to southern Colorado and north-central Arizona on the morning of that date.

Warnings of cold waves were issued as conditions seemed to require on the dates and for the States and parts of States as shown in the exhibit below. These warnings were generally verified.

*Cold-wave warnings, Denver district, December, 1924*

Dates	Character of cold wave	Places
Dec. 6.....	Moderate.....	Arizona (except extreme southwest portion), Colorado, Utah (eastern and southern).
15.....	do.....	Colorado (eastern and central).
16.....	Severe.....	Colorado (eastern and central), northeast and extreme southeast New Mexico.
16.....	Moderate.....	Extreme west Colorado, northwest New Mexico, northeast Arizona, and Utah.
17.....	do.....	West Colorado, north New Mexico, east Utah.
17.....	Severe.....	New Mexico.
18.....	do.....	West Colorado and north New Mexico.
23.....	Moderate.....	West Colorado, north and west New Mexico, east Arizona, and south Utah.
26.....	Severe (?).....	Colorado (east and central).
27.....	do. (?).....	Colorado (east), and New Mexico (northeast).
30.....	Moderate.....	Colorado (northeast and southeast), Utah (southwest).
31.....	do.....	Colorado (west), New Mexico (north and extreme east), Arizona (east), Utah (southeast).

Livestock warnings were issued on the 6th for Colorado, Arizona, except the extreme southwest portion, and Utah; on the 23d for western Colorado, northern and western New Mexico, eastern Arizona and southern Utah; on the 30th for eastern Colorado and southwestern Utah. The warnings were generally justified, except those for southern Arizona on the 6th.

The followings warnings of frost and freezing temperature were issued for southern Arizona: 3d, 4th, 7th, 9th, 10th, 11th, 17th, 20th, and 21st, frost south-central and southeast portions; 18th and 31st, frost south, freezing temperature south-central and southeast portions; 19th, freezing temperature south-central, frost extreme southwest portions; 23d, 26th, and 29th, frost south portion; 24th, 25th, and 27th, frost extreme southwest, freezing temperature south-central and southeast portions. These warnings were generally verified.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT

Abnormal weather conditions prevailed in the San Francisco forecast district during the month of December, 1924. Marked changes occurred in rapid succession, especially from the 8th to the 26th, inclusive. To understand the cause of this period of extraordinary weather, it is necessary to examine daily graphs of both pressure and temperature at stations in Alaska and at Honolulu. A study of these will disclose the fact that there was a constantly falling pressure at Honolulu from the 5th to a minimum on the 15th, and a gradual rise thereafter until the close of the month. There was a rise to above normal pressure over Bering Sea at the end of November, and the pressure continued above normal over that area until the 25th. Over Alaska proper the pressure was normal during the first 10 days of the month, decidedly above normal from the 11th until the 27th, and below normal thereafter. The peaks of highest pressure, which approximated 31 inches, occurred at most Alaska stations on the 14th and 15th and again on the 20th and 21st, over British Columbia on the 23d, and over Idaho on the 25th. The graphs of temperature show a decided change to lower temperatures at Alaska stations to a minimum for the month between the 11th and 15th. This polar air made its appearance over British Columbia on the 15th and moved thence southward, enveloping the whole Pacific slope during the following 48 hours. Temperatures continued decidedly below normal thereafter on the Pacific slope until after the 27th, when a marked rise overspread this region.

The following special forecasts and warnings were issued during the month: (a) On the 5th, for heavy snows in the Sierra Nevada during the next 24 hours; (b) on the 15th, livestock warnings were issued for eastern Washington, eastern Oregon, Idaho, and Nevada for snow, strong north winds, and much colder for the next two or three days; and (c) cold-wave warnings issued for the same section for temperatures much below freezing during the next 36 hours, and for freezing temperatures in northern and central California in 48 hours; (d) cold-wave warnings were issued on the 16th, in eastern Oregon, southern Idaho and Nevada for temperatures of zero or below in the next 36 hours; and (e) warnings in the citrus belt of southern California for much lower temperature for the next three days, when firing would be necessary; (f) on the 19th, special warnings in California, also given to the press associations, for increasing cloudiness with rising temperature probably followed by rain in California and snow turning to rain in Washington and Oregon in the next 24 to 36 hours; (g) on the 26th, a warning for unsettled

weather and higher temperatures with rain or snow in Washington and Oregon and rain in northern California within the next 36 hours, and continued fair weather with zero temperatures in Idaho and Nevada was issued and given to the press.

Storm warnings were ordered on 17 days and frost warnings issued repeatedly between the 9th and 27th. The warnings were generally timely and verified.

The record for low temperature in December, was broken at North Head, Eureka, Winnemucca, Boise, and Pocatello during the month.—G. H. Willson.

627.41 (73)

RIVERS AND FLOODS

By H. C. FRANKENFIELD

Inspection of the table following will disclose the fact that no floods of consequence occurred during the month of December. Those that did occur were confined mainly to some of the rivers of the Carolinas and to the Kentucky and Green Rivers of Kentucky and the Wabash River of Indiana. The heavy rains of December 7 and 8 would ordinarily have caused severe floods in the rivers of South Carolina and Kentucky, but the preceding season had been so devoid of rainfall that the soil absorbed much of the water that would ordinarily have gone into the rivers. This is especially true of the Kentucky and Green drainage areas over which the rainfall for the two days mentioned ranged from 3.5 to 8.5 inches, yet the resulting floods were only moderate and without damage of consequence. The Wabash River flood of the third decade of the month was somewhat more pronounced, although not at all dangerous. The soil was moist from the earlier rains of the month and the heavy fall from December 17 to 19 was sufficient to raise the river a few feet above flood stages, except at Lafayette, Ind., where the excess was 10.2 feet. Here also the losses were small. The remaining floods noted in the table do not need special mention.

The loss and damage resulting from the floods were virtually nothing in the Carolinas and Georgia, and only about \$8,000 elsewhere, with reported savings through the warnings issued of at least an equivalent amount.

Other rivers were low as a rule. At the close of the month the Mississippi River was frozen over as far south as Hannibal, Mo., or a short distance below, while the Missouri River was frozen to a short distance below the mouth of the Kansas River. On December 29 an ice gorge formed in the Mississippi River at Turkey Island, about 55 miles below St. Louis, backing up the water above to such an extent that the river at St. Louis rose from 3.7 feet on the morning of December 29 to 11 feet at midnight December 31, with a further slow rise to 12.6 feet by January 5, 1925.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI DRAINAGE					
Licking, Falmouth, Ky.....	Feet 28	8	9	Feet 29.2	9
Kentucky:					
High Bridge, Ky.....	30	9	9	31.3	9
Frankfort, Ky.....	31	9	10	32.0	9
Green:					
Munfordville, Ky.....	28	9	12	30.3	11
Lock No. 6, Brownsville, Ky.....	30	8	12	37.2	12
Lock No. 4, Woodbury, Ky.....	33	8	14	42.2	11
Lock No. 2, Rumsey, Ky.....	34	13	16	35.4	15
Big Barren, Bowling Green, Ky.....	20	9	10	21.0	10
Wabash:					
Lafayette, Ind.....	11	19	23	21.2	21
Terre Haute, Ind.....	16	20	27	19.4	24
Vincennes, Ind.....	14	24	30	16.7	28
Mount Carmel, Ill.....	16	28	28	16.0	28
White, West Fork:					
Noblesville, Ind.....	14	20	20	14.7	20
Elliston, Ind.....	19	22	24	20.4	23
Edwardsport, Ind.....	15	22	26	17.4	25
Big Pigeon, Newport, Tenn.....	6	9	9	6.7	9
Meramec:					
Steelville, Mo.....	12	20	20	12.1	20
Pacific, Mo.....	11	20	22	16.0	22
Bourbeuse, Union, Mo.....	10	30	21	12.4	21
White, Batesville, Ark.....	23	21	21	23.9	21
Gasconade, Arlington, Mo.....	12	20	21	13.0	20
PACIFIC DRAINAGE					
Willamette, Eugene, Oreg.....	10	30	(1)	14.0	30
Santiam, Jefferson, Oreg.....	10	30	30	11.0	30

MEAN LAKE LEVELS DURING DECEMBER, 1924

By UNITED STATES LAKE SURVEY

[Detroit, Mich., January 5, 1925]

The following data are reported in the "Notice to Mariners" of the above date:

Data	Lakes <sup>1</sup>			
	Superior	Michigan and Huron	Erie	Ontario
Mean level during December, 1924:				
Above mean sea level at New York.....	Feet 601.49	Feet 578.48	Feet 570.84	Feet 244.58
Above or below—				
Mean stage of November, 1924.....	-.23	-.28	-.24	-.37
Mean stage of December, 1923.....	-.24	-.32	-.41	+1.11
Average stage for December last 10 years.....	-.78	-1.43	-.86	-.66
Highest recorded December stage.....	-1.64	-4.10	-2.69	-3.03
Lowest recorded December stage.....	+1.29	-.32	-.02	+1.15
Average relation of the December level to:				
November level.....		-.2		-.2
January level.....		(2)	+1	(2)

<sup>1</sup> Lake St. Clair's level: In December, 1924, 573.49 feet.  
<sup>2</sup> Practically no difference.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS—DECEMBER, 1924

By J. B. KINCER

General conditions.—The outstanding features of the weather in relation to agricultural interests during December were the breaking of the widespread drought from the Mississippi Valley eastward during the first part of the month and the unusually cold weather which interrupted all outdoor operations over most of the country during the latter half. The first copious rainfall for a long time occurred over the States from the Ohio and middle Mississippi Valleys southward, and the drought, which had become the most severe of record in parts of that area, was effectually relieved. In central and east Gulf and South Atlantic districts the increased moisture facilitated plowing, while vegetation in general was favorably affected. Except for some interruption by rainfall, seasonable outdoor operations made good progress in

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Roanoke, Weldon, N. C.....	Feet 30	11	11	Feet 32.0	11
Santee:					
Rimintl, S. C.....	12	12	10	13.8	14
Ferguson, S. C.....	12	12	(1)	13.3	15-16
Saluda:					
Pelzer, S. C.....	7	10	10	7.6	10
Chappells, S. C.....	14	25	25	15.2	25
Oconee, Milledgeville, Ga.....	22	25	25	23.3	25

<sup>1</sup> Continued at end of month.