

The storm was accompanied by some snow in the district and followed by a cold wave, but with diminishing intensity. The movement of the storm was amply covered by cold-wave and norther warnings, and by advisory messages to the vessel interests on Lake Michigan.

Still another cold wave appeared on the 14th in the British Northwest and overspread the Rocky Mountain region and eastern slope during the succeeding twenty-four hours, for which necessary warnings were issued. The storm preceding this cold wave moved from eastern Colorado to Lake Michigan in twenty-four hours, causing high winds on the lake. Vessel interests were warned as to the approach of the storm.

A fourth cold wave moved, during the 25th, 26th, and 27th, southward over the Rocky Mountain region and eastern slope; warnings were furnished to nearly all threatened points.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

Prior to the 13th, the rivers in California were extremely low owing to the drought of the past season and the light rains of the present season up to that date. On the 23d, they began to rise quite rapidly. On the evening of the 24th, a forecast was made that "the lowlands, in the lower portions of the Sacramento and San Joaquin valleys would be flooded by Sunday, the 26th." This was fully verified. The crest of the high water was reached on the 26th, and the afternoon reports showed a general fall. The damage caused by the overflow was slight.

Wind signals were displayed on the 14th, 15th, 16th, and 17th, and again on the 22d and 28th. As usual these warnings were heeded and no disasters occurred.

On the morning of the 9th, the conditions shown on the weather map indicated severe frosts in California. Forecasts were issued at once giving warning of severe frosts throughout the State. Besides the regular distribution of these warnings by displaymen, the daily press, the maps, and forecast postal cards of the Weather Bureau, they were given to the Southern Pacific and San Francisco and San Joaquin Valley railroad companies, which caused the same to be bulletined by their agents throughout the State. Similar warnings were again issued on the 10th and 11th, and distributed in the same manner as were those of the 9th. The usual measures to prevent injury were resorted to, and it is believed with much success. Damaging frosts occurred on the mornings of the 10th, 11th, and 12th. Owing to the advanced stage of the fruit buds the almonds and apricots were seriously damaged, especially the former. Later developments, however, show the injury not so great as was at first anticipated.

On the 10th, warnings of severe frosts were sent to southern Arizona. On the morning of the 11th, Phenix reported a minimum temperature of 32°, but I have not been advised of any injury experienced.—*G. H. Willson, Local Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

River forecasts were issued on March 1, 2, 3, 4, 5, and 6. On March 2 a warning message was sent to the merchants and others in the threatened districts. The newspapers gave the warning great prominence.

Owing to the low stage of the Columbia, and the further fact that there was no rise in that river, the lower Willamette fully discharged its waters and it did not rise in this city as high as was expected; however, for all practical purposes the river forecast was verified.

The season has been backward and frosts were of frequent occurrence, no special frost forecasts were issued because they could be of no benefit.

Many sensational reports were published by the papers concerning damage done to fruit, wheat, and stock by the February freeze and unseasonable March weather, but information given on the subject by this office rapidly and readily checked the ill effects produced by the unwarranted reports.—*B. S. Pague, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During March the tracks of eight highs and eleven lows were sufficiently well defined to be traced on Charts I and II, and the principal points regarding their place of origin and ending, duration, and velocity are given in the accompanying table. The ovals delineating these highs and lows were much better located this month than is ordinarily the case, and their progress across the country could be fairly well traced.

Highs.—All the highs began to the north of Montana, except the last, which began in Wisconsin. Four of them were last noted over Nova Scotia or Newfoundland; Nos. II and VI disappeared off the middle Atlantic coast, No. VII in the middle Gulf, and No. I to the north of Lake Superior. The general tendency was toward the east, but for three of the tracks toward the south and southeast. The sharp falls in temperature were as follows: As high No. III moved out of Manitoba on the evening of the 11th, Kansas City had a fall in temperature of 38° in twenty-four hours, and at 8 a. m. of the 12th Springfield, Mo., reported a fall of 36°. This cold wave moved rapidly north, and disappeared on the morning of the 13th over Ontario. On the morning of the 19th, while No. V was to the north of Montana, a fall of 36° occurred in northern Louisiana. On the evening of the 28th, as high No. VII approached the west Gulf, Montgomery reported a fall of 36°, and at the 8 a. m. report of the 29th a fall of 34°.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.							<i>Miles.</i>	<i>Days.</i>	<i>Miles.</i>	<i>Miles.</i>
I.....	1, p. m.	52	116	4, a. m.	50	85	1,950	2.5	540	22.5
II.....	4, a. m.	50	110	9, p. m.	49	80	2,280	5.5	415	17.3
III.....	9, p. m.	51	113	15, p. m.	47	59	2,520	6.0	420	17.5
IV.....	13, a. m.	53	115	18, p. m.	45	61	3,090	5.5	562	23.4
V.....	18, p. m.	55	108	23, a. m.	48	53	3,390	4.5	740	30.3
VI.....	20, p. m.	51	116	25, a. m.	37	75	2,220	4.5	493	20.5
VII.....	25, a. m.	52	119	29, a. m.	32	59	2,520	4.0	630	26.2
VIII.....	26, a. m.	43	90	29, a. m.	46	58	1,050	3.0	550	22.9
Total							18,960	35.5	4,850	181.1
Mean of 8 paths.....							2,370		544	22.7
Mean of 35.5 days.....									534	22.2
Low areas.										
I.....	*23, a. m.	48	134	3, a. m.	41	69	2,910	3.0	970	40.4
II.....	1, a. m.	34	98	6, a. m.	50	64	2,100	5.0	420	17.5
III.....	5, p. m.	36	89	8, p. m.	48	52	2,340	3.0	780	32.5
IV.....	6, a. m.	52	114	9, p. m.	42	73	2,100	2.5	600	25.0
V.....	8, a. m.	47	128	13, p. m.	47	50	3,960	5.5	720	30.0
VI.....	12, a. m.	49	124	17, a. m.	47	51	3,900	5.0	780	32.5
VII.....	14, a. m.	44	125	20, p. m.	49	62	3,720	6.5	572	23.8
VIII.....	19, a. m.	52	122	25, p. m.	47	56	4,710	6.5	725	30.2
IX.....	23, a. m.	51	124	27, a. m.	48	56	3,510	4.0	877	36.6
X.....	23, a. m.	37	105	30, a. m.	52	63	3,540	7.0	506	21.1
XI.....	28, p. m.	49	114	†1, a. m.	48	61	3,540	3.5	1,011	42.1
Total							36,330	52.5	7,951	331.7
Mean of 11 paths.....							3,303		724	30.2
Mean of 52.5 days.....									692	28.8

*February. †April.

Lows.—Six of the lows originated in the north Pacific, No. IX to the north of Montana, No. X in Colorado, and Nos. II and III in the lower Mississippi Valley. The general movement was toward southeast and east. Nos. I and IV