

regions of Texas on the 3d and 4th, concerning which Dr. I. M. Cline, local forecast official and section director in charge of the Weather Bureau Office at Galveston, reports:

As the a. m. weather map of Thursday, December 2, 1897, showed very unsettled conditions and the possibility of temperatures injurious to sugar and trucking interests in this section during Friday, noon special observations were called for from authorized stations in Texas, Oklahoma, and Kansas, * * * and the following special forecast was made and distributed at 2:45 p. m.: "Temperature may fall to 40° at Galveston, and to 32° at points 50 to 100 miles from Galveston Friday."

The following temperatures were recorded Friday in the district for which the forecast was made: Galveston, 37.5°; Brenham, 30.0°; Columbia, 36.0°; and Missouri City, 32.0°.

The 8 a. m. weather map of Friday, December 3, 1897, indicated freezing to the coast line, and the following special forecast was included with regular a. m. local forecast: "Freezing, with minimum temperature at Galveston 30°, and 50 to 100 miles from Galveston, 24° Saturday morning."

The following temperatures were recorded Saturday in the district for which the forecast was made: Galveston, 30.0°; Brenham, 23.5°; Columbia, 27.0°; Missouri City, 26.0°.

Continued low temperature was forecast for Sunday morning, and freezing occurred again near the coast.

Prompt action was taken on the receipt of the warnings to protect the various crops in this section.

The following are from reports received at this office as to special benefits derived:

E. H. Cunningham & Co., Sugarland, Tex., say:

"Warning of December 2, received twenty-four hours before the freeze. Twelve hundred acres of sugar cane standing in the fields when warning received. Three hundred acres cut and windrowed before freeze set in, and five hundred acres additional cut on strength of warning of December 3. The service was of great value to us, enabling us to get sufficient cane in windrow before freeze came to enable us to save entire crop."

William Dunovant, Eagle Lake, Tex., says:

"Warning received about twelve hours in advance of the norther; cane farms immediately notified by telephone; every knife possible was put in the cane, and water and steam pipes drained. Value of property protected, \$4,000. Cane left standing was only partially damaged, so the loss would not have been entire had none been cut; estimated value saved \$1,000."

C. F. Mercer, Missouri City, Tex., says:

"Warning received about sixteen hours before freeze; perishable vegetables covered up to the value of \$1,000. Special warnings are of great value and we would like them continued."

The vegetable interests in this vicinity are large and half the perishable crops were protected and saved from material injury. It is estimated that the value of that saved to truck farmers is \$5,000. Exposed water pipes to the value of \$10,000 (estimated) were drained and saved from injury.

A reasonable estimate of the property protected from the freeze in this vicinity as a result of the warnings of December 2 and 3 is \$50,000.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month there were seven highs and twelve lows sufficiently well defined to be charted, and their apparent tracks will be found on Charts I and II. The principal facts regarding the place of origin or the region where first seen, and the region of disappearance or where they were last seen, their duration and velocity will be found in the accompanying table.

HIGHS.

Of the seven highs five were first noted to the north of Montana, but could not be traced to the Pacific. The other two were first noted off the middle Pacific Coast. The apparent movement of I was nearly south to Texas and then

east to the Atlantic. Number III moved east and south from middle Pacific Coast and disappeared in extreme east Texas. The remaining highs moved east and southeast, and all disappeared off the Atlantic Coast. The temperature conditions accompanying these highs were remarkably moderate. Only one severe cold wave occurred during the month as high V moved southeast from the north of Montana on 15th and 16th; a. m. of 15th the temperature fell 40° in twenty-four hours at Helena and reached -4°; at Williston the fall was 38° and to -10°; p. m. of 15th the temperature fell 44° at Denver and reached 2°. Morning of 16th the cold wave extended to the Mississippi Valley; the temperature fall at Pueblo was 40°, at Sioux City and Concordia was 34°, and at Omaha, Dodge City, and Amarillo it was 32°. On morning of 17th this cold wave was much diminished, and it continued diminishing till the high disappeared off the New England Coast p. m. of 20th.

LOWS.

Of the lows, six were first noted off the north Pacific Coast, one to the north of Montana, one off the south Pacific Coast, three in the west Gulf, and one in the upper Lake Region. The apparent motion of these lows was toward Newfoundland, where eight were last noted; the others were last seen in the upper Lake Region. As low V approached the Atlantic Coast the wind reached 56 miles an hour at Block Island p. m. of the 14th. As low XII approached the upper Lakes it caused a wind of 56 miles an hour at Chicago, and as it came near the lower Lakes, morning of the 30th, the wind at Buffalo reached 56 miles an hour.

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.....	*29, a. m.	0	0	6, p. m.	33	0	Miles.	Days.	Miles.	Miles.
II.....	4, p. m.	53	117	9, a. m.	46	78	3,190	7.5	416	17.3
III.....	8, p. m.	37	124	11, p. m.	32	108	2,730	4.5	607	25.3
IV.....	10, p. m.	38	125	16, a. m.	33	81	1,550	3.0	517	31.5
V.....	14, a. m.	53	118	20, p. m.	41	69	3,410	5.5	630	25.6
VI.....	23, a. m.	53	105	25, p. m.	37	74	3,040	3.5	468	19.5
VII.....	26, a. m.	52	101	30, p. m.	28	80	1,940	2.5	554	28.1
							3,030	4.5	673	23.0
Total.....							18,820	35.0	3,855
Mean of 7 tracks.....							2,689		551	22.9
Mean of 35 days.....									588	22.4
Low areas.										
I.....	*29, a. m.	48	128	2, p. m.	49	52	3,910	3.5	1,117	45.5
II.....	1, a. m.	38	116	6, a. m.	49	54	3,960	5.0	786	32.8
III.....	4, p. m.	49	127	7, p. m.	46	79	2,280	3.0	760	31.7
IV.....	7, a. m.	49	125	13, a. m.	46	59	4,080	7.0	576	24.0
V.....	10, p. m.	47	127	16, p. m.	48	56	4,790	6.0	786	32.2
VI.....	13, a. m.	48	126	16, a. m.	48	67	2,660	3.0	892	37.2
VII.....	16, p. m.	26	99	19, p. m.	47	55	2,840	3.0	947	39.5
VIII.....	19, p. m.	30	96	21, p. m.	47	55	2,200	2.0	1,100	45.8
IX.....	21, a. m.	48	92	23, a. m.	48	79	840	2.0	170	7.1
X.....	23, p. m.	54	111	26, p. m.	47	76	1,800	3.0	600	25.0
XI.....	25, a. m.	29	89	27, p. m.	47	58	2,100	2.5	840	25.0
XII.....	27, a. m.	48	129	31, a. m.	49	64	2,960	4.0	740	30.6
Total.....							33,680	44.0	9,227
Mean of 12 tracks.....							2,822		777	22.4
Mean of 44.0 days.....									770	22.1

* November.