

Wisconsin River.—Stevens Point, Wis., 11th, river frozen.
Des Moines River.—Des Moines, Iowa, 18th, river frozen.
Lake Pepin.—Pepin, Wis., 19th, frozen.
Thunder Bay River.—Alpena, Mich., 19th, frozen.
Kennebec River.—Gardiner, Me., 28th, closed for navigation.
Red River.—Shreveport, La., 24th, navigation suspended on account of low water.
Missouri River.—Williston, N. Dak., 18th, frozen over. Pierre, S. Dak., 10th to 14th and 17th, running ice; 18th, west channel closed during the night and east channel partly closed. Forest City, S. Dak., 10th, ice in river. Santee

Agency, Nebr., 19th, floating ice. Plattsmouth, Nebr., 10-12th and 19th, floating ice. St. Joseph, Mo., 19th to 24th, ice running in river.

Mississippi River.—Winona, Minn., 30th, river closed. St. Paul, Minn., 29th, frozen; 30th, river gauge readings suspended for the season. Le Claire, Iowa, 21st-27th, floating ice; 28th, river closed by ice. Muscatine, Iowa, 19th, floating ice. Davenport, 19th-21st and 27th, floating ice. La Crosse, Wis., 11th, ice in the stream; 18th, ice along the shore; 19th, river full of floating ice. Keokuk, Iowa, 25th, navigation closed.

OBSERVATIONS ON THE GREAT LAKES.

REPORTS FROM U. S. LIFE-SAVING STATIONS.

Through the co-operation of the General Superintendent of the Life-Saving Service and the Secretary of the Treasury, the Weather Bureau has received monthly reports for the

month of November, from the keepers of 37 U. S. Life-Saving Stations on the Great Lakes.

REPORTS FROM VESSELS.

The Lake Marine Section, Forecast Division, has received reports from the captains of 39 vessels navigating the Great Lakes.

STATE WEATHER SERVICES.

A tabular summary of the more prominent climatological features of each State and Territory, as given in the reports for November by the directors of the respective State Weather Services, is presented in Table XII. This table gives for the whole area of any State: (a) the average departure from the normal values of the current monthly mean temperatures and total precipitations; (b) the maximum and minimum temperatures and precipitations; (c) the greatest and least monthly ranges of temperature occurring anywhere within the State. This table is essentially a summary of Table II, and therefore presents a somewhat different study of meteorological conditions from that given in Table I, which is based on regular Weather Bureau stations arranged in so-called climatic districts.

The following extracts are taken from the reviews published by the respective services; occasional notes in brackets are added by the Editor:

Alabama.—The month of November will pass into meteorological history as one in which the rainfall was the least for a number of years. This deficiency in rainfall has kept the rivers at an unusually low stage, preventing general navigation. Some of the highest temperatures of the month were recorded on the 2d and 3d and the coldest weather on the 12th, the temperatures falling to freezing or below.

Arkansas.—The weather was favorable for gathering crops, but too dry for fall-sown wheat and oats. Forest fires prevailed in several counties, destroying much timber and some fencing, but otherwise did but little damage.

Florida.—The spell of cold weather on the 12th and 13th was unusually severe for the time of year. The temperature fell to, and in some cases below, the freezing point generally throughout the western portions of the State. At Jacksonville on the morning of the 12th it reached the lowest point ever reached during the second decade of November since the beginning of observations by the Weather Bureau in 1871. The frosts are reported to have done but little damage except to tender vegetation.

Georgia.—A pleasant month with no storms of marked severity.

Idaho.—The month was generally fair and pleasant all over the State, with the exception of the 16th, when a decided cold wave was experienced in all sections.

Indiana.—The conditions of the weather during November were very pleasant and favorable for farm work, and corn gathering was completed, but young crops and pasturage suffered more or less for want of rain; wells, springs, and many smaller streams having become dry, farmers continued to haul water for the live stock.

Iowa.—The month was generally favorable for farm work, but too dry for the farmers' needs, especially in localities where there was a scarcity of stock water.

Nevada.—The three months ending with November closed a remarkable period of weather for this State. The temperature while naturally decreasing remained abnormally high. The sunshine was far in excess of the nor-

mal, there being an average of 20 clear days during this month. On several occasions earthquake shocks have been felt, but no serious damage has been done. First killing frost occurred at Golconda on the 16th. Stofiel: Not for several years have we had such a mild November; trees are putting forth abnormal buds and green grass is two inches high.

New England.—The month has been very disagreeable in the north with much cloudy and stormy weather, though the total precipitation was light. The streams and wells there are much lower than usual at this season. Eleven cyclones and nine anticyclones influenced the weather of New England for this month. One of these cyclones formed just south of New England and moved up our eastern coast; it was the most severe for the month in all southern sections; it formed off the New Jersey coast on the 5th and passed east of us with rapidly increasing energy, giving heavy rain and snow and high gales. The snow was very damp and froze to whatever it came in contact with. Telegraph and telephone wires were like great cables, and trees and shrubs were heaps of ice and snow. The weight of this load with the high gale that prevailed did great damage to fruit and shade trees and brought down telegraph poles by the hundreds.

New Jersey.—Millville: The first cold-wave warning of the season was received on the 19th at 1.55 p. m., and the cold wave arrived in time on the 20th with a fall of 31°; on the 24th dandelions were in bloom. Bridgeton: We have had a very remarkable autumn, no killing frost until the 12th; lima beans picked and brought to market as late as the 6th. Rancocas: The month very favorable for belated huskers; some sweet potatoes were being dug on the 15th. Oceanic: November goes out with no frost in the ground, grass fresh and growing, and dandelions in bloom in many places. Toms River: Farmers brought strawberries to market on the 12th. Franklinville: Rather a cold month, being 4.9 below the mean for the past seven years.

New York.—The month was characterized by large ranges of temperature and pressure, and was, on the whole, slightly colder than the average November. The fifth anticyclone of this month, which passed over the Southern States and aided the inflow of warm air toward the depression then over Canada, caused a warm wave, which was terminated by an intense anticyclone on the 19th, and which, in the four days following, reduced the temperature in the northern part of this State more than 40°. Warm waves accompanied the storms of the 24th and 27th, and with the rise of pressure following the latter, the coldest day of November also occurred. Strawberry and raspberry blossoms were seen at South Canisteo on the 1st, and the dandelions were in bloom on the 2d at Malone.

North Carolina.—Quite an uneventful month. The temperature was nearly 2° below the normal, and the precipitation nearly 2 inches. The weather was very pleasant during the greater part of the month. Killing frosts occurred nearly everywhere in the west on the 6th, and over the central part of the State on the 7th and 11th. Weather favorable to all out-door pursuits, but very unfavorable to recently sown grain, such as rye, wheat, etc. Owing to the dry weather, forest fires were very common; dense smoke on the 29th.

North Dakota.—The month was unusually fine in this State. It was warm and bright, with temperature above zero until the 18th, when a cold wave completely covered the State for two days.

Ohio.—The weather during the month was marked by deficient rainfall and temperature and excess of cloudiness. The rainfall was well distributed throughout the month and proved beneficial to the wheat. Sufficient snow fell before the coldest days of the month to serve as a protection to the cereals in the ground.

Oklahoma.—Wheat prospects were never more unfavorable November 30 than this year. Much that was planted in September and October has remained as planted, not having sprouted, on account of want of moisture, and that which came up all right is dried up and dead to the surface of the ground, and some of our farmers say that many of the roots are dead also. On account of the continued low price of wheat and unfavorable conditions for fall sowing the acreage is possibly 25 per cent. less than last year, so that it looks as if next year's crop might be short.

Up to the present time there has been no fall pasturage to amount to anything, so that hay, straw, and other forage crops are commanding good prices. Straw, which in other years was allowed to rot in the fields, is now being carefully preserved and fed to stock. Stock water is exceedingly scarce and hard to get on the ranges, and cattle and horses have in many instances to be driven many miles to secure a supply.

South Dakota.—As a whole the month was unusually pleasant and favorable for late autumn farm work. The general absence of snow on the ground

was very favorable for the continuous grazing of live stock on the ranges, thereby economizing the stock of cut hay, of which there was considerable shortage at the beginning of the winter or feeding season.

Tennessee.—Covington: The drought which began about the middle of September continued throughout the month, causing great scarcity of water throughout this section and serious damage to vegetation; forest fires have caused some loss of fencing, and in some places crops have suffered from the heat of the fires. Greenville: This has been the driest month of which we have any record; wheat is needing rain badly. Nunnally: The weather during most of the month has been favorable for farm work; a considerable area has been sown in wheat; stock water is very scarce in some localities; forest fires have been raging a considerable portion of the month.

Utah.—A remarkably uneventful month; very clear, no precipitation whatever, no heavy winds; harvesting entirely finished, thrashing finished last week; the mildness of the fall has been very beneficial for the well-being of the beef stock.

NOTES BY THE EDITOR.

OBSERVATIONS AT HONOLULU, HAWAIIAN ISLANDS.

As the weather on our Pacific coast depends so largely upon the conditions of the atmosphere to the westward, it is considered important to publish in full and as soon as practicable the data furnished by observers in Alaska, the Hawaiian Islands, and adjacent regions.

Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, —0.06, is still to be applied.

The absolute humidity is expressed in grains of water, per cubic foot, and is the average of four observations daily.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

November, 1894.	Pressure at sea level.			Temperature.				Humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	9 a. m.	3 p. m.	9 p. m.	6 a. m.	2 p. m.	9 p. m.	Minimum.	Maximum.	Relative.		Direction.	Force.		
									9 a. m.	9 p. m.				
1....	30.11	30.03	30.10	73	78	74	72	80	59	70	6.0	ne.	4	Ins.
2....	30.12	30.03	30.11	71	79	73	71	80	80	70	6.8	ne.	3	0.02
3....	30.12	30.02	30.10	69	79	73	68	81	67	73	6.6	nne.	3	0.05
4....	30.05	29.97	30.04	73	80	67	72	81	56	83	6.1	ne-s.	2	0.06
5....	30.03	29.91	30.03	63	81	70	63	84	59	83	6.8	n-s.	1	0.00
6....	30.07	29.95	30.06	66	81	72	66	82	71	85	7.1	sw.	2	0.00
7....	30.04	29.93	30.02	67	80	73	67	82	75	80	7.1	sw.	2	0.00
8....	30.03	29.96	30.03	69	79	70	69	82	77	86	7.1	sw.	2	0.00
9....	30.06	29.99	30.05	67	79	72	66	81	74	85	7.2	sw.	2	0.00
10....	30.06	29.96	30.05	68	81	71	66	81	71	84	7.1	sw.	1	0.00
11....	30.03	29.91	29.98	70	77	70	70	80	80	83	7.1	w-sw.	1	0.04
12....	29.95	29.87	29.93	67	79	75	67	80	70	77	6.9	sse.	4	0.00
13....	29.96	29.91	29.99	75	78	75	74	80	77	77	7.5	s.	4-2	0.00
14....	30.00	29.93	29.96	73	78	77	72	80	77	76	7.7	s.	3	0.00
15....	29.95	29.94	29.91	70	74	73	68	75	90	86	7.3	ne-s.	1-4-1	1.77
16....	29.97	29.90	29.97	72	74	71	69	82	73	80	7.6	e-s-w.	2	6-10
17....	30.07	29.96	30.08	68	80	75	68	82	75	77	7.3	no.	3	0.00
18....	30.11	30.02	30.12	73	79	73	71	81	69	80	6.3	nne.	3	0.00
19....	30.10	30.01	30.10	67	77	70	65	79	80	80	6.3	nne.	3	0.00
20....	30.10	29.97	30.01	71	76	73	67	77	63	74	6.4	nne.	3	0.34
21....	30.00	29.95	30.01	71	76	74	66	77	72	74	6.8	no.	4	8-3
22....	29.99	29.91	29.99	71	79	72	69	79	77	88	7.1	ne.	4	3-8
23....	30.04	29.94	30.02	71	78	73	69	82	75	85	7.5	s-ne.	3	10-8
24....	29.98	29.92	29.99	69	77	69	67	79	77	86	7.0	n-e.	2	1.70
25....	30.01	29.94	30.00	64	78	67	64	79	74	85	6.8	n-s.	1	0.00
26....	30.01	29.94	30.02	65	77	74	65	79	74	80	7.2	se.	2	0.00
27....	30.09	29.98	30.07	70	79	68	68	79	85	95	7.5	s.	1	5-23
28....	30.11	30.02	30.08	65	77	73	65	79	86	74	6.8	u.	2	0.07
29....	30.11	30.03	30.08	68	77	70	67	77	70	75	6.7	nne.	2-4	6
30....	30.12	30.05	30.12	67	72	70	67	75	68	67	5.8	nne.	4-6	2.40
	30.045	29.963	30.034	69.1	78.1	71.9	67.9	79.8	73.3	79.6	6.9			10.35

Mean temperature: 6+2+9 ÷ 3 is 73.0°; the normal is 74.0; extreme temperatures, 84° and 63°.

Thunderstorms: 22d, lightning at night; 24th, 2 a. m., thunderstorm from the sw.; 25th, lightning; 27th, thunderstorm from sw. up to 9 a. m.

High winds: S. to w.; storm 13th; heavy rain all over group, 15th, 21st, 29th, 31st, and 29th, northerly; squally; gale, nne., 30th. From 10 to 30 inches of rain at different points on island of Hawaii for month; 8.31 inches of rain in 24 hours on the 21st at Hilo.

PROTECTION FROM FROST.

In response to numerous inquiries the following text is offered:

The proper limiting temperature at which the smudge fires

should be lighted, the number of such fires, the best, namely the cheapest materials to use, all depend upon local circumstances, and must be determined on the spot for each special case. The general rule is that if the local temperature has fallen to 40° or 45° F. in the early evening, if the sky is clear and the wind light, and there is no reason to expect that it will cloud over or become foggy, or very windy, then it will be frosty in the early morning, at least in those spots that are specially liable to frost. If there is even a moderate breeze during the night the smudge smoke will be blown away and do but little good; but in still nights and places sheltered from the wind the smudge should be lighted before 9 p. m. and kept up until danger is past. The smudge materials most approved consist of mixtures of tar, oil, and the refuse from refineries, with wood chips, damp straw, leaves, peat, dried corn stalks, and the fine waste of soft coal. But all these materials are expensive, or in some cases very valuable as manure and as mulching, so that the farmer dislikes to burn them up. In many cases sprinkling with water is as satisfactory as smudging, and although this involves considerable labor, yet it is oftentimes more desirable. The water warms the plants and the soil; it adds moisture to the air and sometimes even may help to make a little local fog; it has to be put on several times during the night either with a hose or the watering pot. Potatoes, beans, and even orange trees have often been saved in this way. If there is plenty of water, little streams may be allowed to run down the furrows of the field; they give off warmth and moisture just as in the case of sprinkling. Cranberry bogs are flooded to prevent frost.

Covering with some sort of shield protects the plants from radiation and saves them from freezing, even though the surface of the ground may get very cold. Such covers may be made of tubs or half barrels; of conical caps of pasteboard, matting, or newspaper; of light wooden frames over which cambric or mosquito bar is stretched; of coarse matting or of rough trellis work. Sometimes a bolt of cloth is rolled up on a reel at one end of a row of plants, and two persons holding the end of the cloth walk down the row unrolling the cloth and covering the plants completely; short stakes should be placed along the row so that the screen will rest upon them a few inches above the plants. For a single night old newspapers are as useful as cloth. A gentleman in Washington has made a very serviceable screen of ordinary laths tied together about two inches apart on a pair of ordinary clothesline ropes; flexible wire will do as well; this screens against hot sun by day and frost by night, and can easily be rolled up out of the way when not in use. Old venetian blinds, japanese screens, or old floor matting are fair substitutes. Rows of vertical walls or screens tipped against each other, forming an A, do good service.

Rows of tall-growing plants set between the rows of delicate