

districts, were sent to Arizona. Commenting upon the forecasts of the early part of the month, the Riverside, Cal., Independent, of January 9, 1901, remarks editorially as follows:

The Weather Bureau's reports and predictions this season so far have been remarkably accurate, and their value can hardly be overestimated.

Frosts occurred at intervals during the month in the Gulf and extreme south Atlantic coast districts. In each instance all interests in the districts referred to received timely and accurate forecasts and warnings of approaching frost or freezing weather.

From the 8th to the 20th heavy rain and melting snow caused freshets and floods in the rivers of the Pacific coast States. During the second decade of the month rapid rises occurred in the Coosa, Alabama, and Tennessee rivers. Warnings were sent well in advance of the flood crests, and were of great benefit to property interests affected by the rapid rise in the rivers.

**CHICAGO FORECAST DISTRICT.**

With the exception of a cold wave which overspread the district on the 1st of January, for which warnings had been sent out well in advance, the month was marked by moderate temperature. On two or three occasions later in the month cold waves appeared in the Northwest, but they lost force before extending over a large part of the district.

There were some moderate snowfalls during the month but no warnings of heavy snows were issued.

Advisory messages were sent to all open ports on Lake Michigan several times when high winds threatened. No casualties on the lakes were reported during the month.—*H. J. Cox, Professor.*

**SAN FRANCISCO FORECAST DISTRICT.**

On January 1 special warnings of heavy frost were sent to fruit growers in southern California. On the morning of the 2d killing frosts were reported in central California, and a minimum of 24° was reported at San Luis Obispo. Frost warnings were issued on the 9th for southern California, and citrus fruit growers were warned to smudge vigorously. Heavy frosts were reported at nearly every point, with ice at some stations. Warnings or advisory messages regarding gales were telegraphed to coast stations during the early part of the month; on the morning of the 3d unusually high winds occurred at many points in California. At San Francisco a maximum wind velocity of 56 miles an hour was registered. Shipping interests had been well informed of the approach of the storm, and probably the small list of casualties is due in some measure to precautions taken, based upon warnings given.—*A. G. McAdie, Forecast Official.*

**PORTLAND, OREG., FORECAST DISTRICT.**

The first half of the month was especially noteworthy for the large amount of snow which fell in the mountains of southern Oregon. During this period severe storms occurred at sea, but in every instance warnings were issued in ample time to be of benefit, and no marine disasters, due to high winds, are known to have occurred during January. Heavy rains and melting snow in the foothills resulted in a small freshet in the Willamette River and tributaries between the 13th and 20th of the month. River forecasts were issued twice a day during the freshet, and while considerable damage was done in the streams above Portland to log rafts, small

bridges, etc., at Portland the damage was small and consisted principally of money expended in hiring extra labor to remove goods from cellars and wharfs to higher places. The maximum stage reached at Portland was 20.9 feet on the 17th. This stage at Portland would, if unannounced, result in damaging goods stored in cellars and on low wharfs to the extent of nearly, if not quite, a million dollars, but in this instance the damage was not worth noting, and this state of affairs was largely due to the flood warnings which were sufficiently reliable to enable nearly every one to remove his goods before the water reached them.—*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 velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	3, a. m.	53	108	6, p. m.	39	75	1, 975	2.5*	790	32.0
II.....	5, p. m.	51	114	8, a. m.	39	75	2, 100	2.5	840	35.0
III.....	7, p. m.	51	114	11, a. m.	47	65	2, 325	3.5	664	27.7
IV.....	11, p. m.	32	96	18, a. m.	39	82	950	1.5	633	26.4
V.....	16, a. m.	54	114	17, a. m.	47	101	750	1.0	750	31.2
VI.....	18, a. m.	28	97	20, p. m.	32	65	2, 375	2.0†	1, 188	49.5
VII.....	20, p. m.	48	115	23, a. m.	46	60	2, 900	2.5	1, 160	45.3
VIII.....	22, p. m.	46	123	26, a. m.	39	82	2, 625	3.5	750	31.2
IX.....	31, p. m.	30	91	2, a. m.‡	30	82	2, 250	3.5	643	25.9
							825	1.5	617	25.7
Sums.....							19, 175	34.0	8, 035	334.8
Mean of 10 paths.....							1, 918		804	33.5
Mean of 24 days.....									799	33.3
<b>Low areas.</b>										
I.....	5, a. m.	48	125	10, a. m.	48	54	4, 025	4.0*	1, 006	41.9
II.....	5, p. m.	38	105	7, p. m.	45	67	2, 250	2.0	1, 125	45.9
III.....	8, a. m.	45	118	10, p. m.	43	73	2, 225	2.5	890	37.1
IV.....	8, p. m.	33	106	14, a. m.	48	54	3, 325	5.5	605	25.2
V.....	10, p. m.	48	125	12, a. m.	50	97	1, 450	1.5	907	40.3
VI.....	12, a. m.	48	125	15, a. m.	46	82	2, 200	3.0	733	30.5
	13, a. m.	53	122				3, 750	6.0	625	26.0
VII.....	14, p. m.	49	110	19, a. m.	48	54	3, 200	4.5	711	29.6
	17, a. m.	37	80				1, 725	2.0	952	35.9
VIII.....	17, a. m.	54	114	19, a. m.	42	75	2, 200	2.0	1, 100	45.8
IX.....	18, p. m.	53	114	22, a. m.	48	54	2, 525	3.5	807	33.6
	19, p. m.	54	114				3, 000	2.5	1, 200	50.0
X.....	21, p. m.	54	114				4, 375	8.5	515	21.5
	23, a. m.	20	76	30, a. m.	45	55	3, 200	8.0	412	17.2
	23, a. m.	35	96				3, 150	7.0	450	18.8
XI.....	24, a. m.	53	123	26, p. m.	48	85	1, 775	2.5	710	29.6
XII.....	25, a. m.	34	112	26, p. m.	35	93	1, 150	1.5	707	32.0
	27, p. m.	54	114				3, 575	4.5	861	35.9
XIII.....	27, a. m.	33	118	1, a. m.‡	42	60	3, 500	5.0	700	29.2
	29, a. m.	26	97				2, 475	3.0	825	34.4
Sums.....							55, 775	79.0	15, 571	661.4
Mean of 30 paths.....							2, 789		794	33.1
Mean of 79 days.....									706	29.4

\* Stationary for 1 day. † Stationary for half day. ‡ February.

**RIVERS AND FLOODS.**

With the exception of the Tennessee and Cumberland, the rivers of the Mississippi system were lower than during December, 1900, though not decidedly so. Below Cairo, Ill., the Mississippi River fell during the first half of the month, but was considerably higher during the last half, a rise from the Ohio reaching it on the 13th.

Low water caused a suspension of navigation between St. Louis, Mo., and Cairo, Ill., until the 14th, when it was resumed after an interruption of 23 days.

The Mississippi was frozen over during the entire month to below LeClaire, Iowa, and floating ice was observed as far south as Cairo, Ill., on the 2d and 3d. At Hannibal, Mo., the ice

gorged at the Wabash Bridge on the 1st, and did not break away until the 15th.

The Missouri River remained frozen to within a few miles of Omaha, Nebr., but nothing of interest was noted.

No ice was reported in the Ohio River below Portsmouth, Ohio.

Heavy rains over the south Atlantic and Gulf watersheds on the 10th and 11th caused marked rises in the rivers of those districts, and stages near or above the danger lines were quite general in South Carolina, Georgia, and Alabama, particularly in the latter state. Warnings were issued whenever necessary, and they proved to be both accurate and timely. The following report on the flood of the Coosa and Alabama rivers was made by Mr. F. P. Chaffee, official in charge of the Weather Bureau office at Montgomery, Ala.:

Heavy rains fell over the Coosa watershed during the night of 10-11th, ranging from 1.78 inch at Resaca, Ga., to 6.25 inches at Lock No. 4 (Lincoln), Ala., south of which place the rainfall averaged about three-fourths of an inch. Anticipating rapid river rises, warnings were issued on the morning of the 11th, stating that the Coosa would rise rapidly during the next two days, reaching danger line at Gadsden and Lincoln, Ala., by the night of the 12th, with a decided rise at Wetumpka, Ala., and that the Alabama would also rise rapidly during the next three days. The rains continued over the entire watershed of the Coosa and Alabama during the 11th, the total 48-hour rainfalls varying from about one and one-quarter to seven and one-quarter inches.

On the 12th, freshet warnings were issued to Rome, Ga., and Gadsden and Lock No. 4, Ala., were notified that slightly higher floods would prevail at those points, and warnings were also issued from Montgomery to Selma, Ala., that stock and other property liable to damage should be moved from lands subject to overflow at 35 feet, as stages of over 36 and 39 feet would be reached at Montgomery and Selma, Ala., respectively. Later the expected stage for Montgomery was raised to 38 feet.

Both the Coosa and Alabama rivers rose very rapidly during the 11th, 12th, and 13th, the rise during the twenty-four hours ending at 8 a. m. of the 12th being 23.1 feet at Wetumpka, and 16.7 feet at Montgomery, Ala.

The following maximum stages were reported on this rise:

	Maximum stage. Danger line.	
	Feet.	Feet.
Resaca .....	25.7	25
Rome .....	27.0	30
Gadsden .....	22.4	18
Lock No. 4 .....	17.6	17
Wetumpka .....	39.2	45
Montgomery .....	37.7	35
Selma .....	40.0	35

The Coosa was falling at all stations by the morning of the 15th, and the flood crest passed Selma during the afternoon of 17th.

The warnings, which were well in advance of the flood crest, were well distributed by telegraph, telephone, mail, and the local press.

The warnings were highly commended by the local press and were of great value to the lumber and stock raising interests of this section. It is ascertained from a reliable source, that near Coosala, Ala., a small town about 16 miles north of here, 400 head of cattle which would otherwise very probably have been drowned, were driven to high ground and saved as a result of the warnings.

It is conservatively estimated that \$200,000 is the value of the property jeopardized by this rapid river rise; thus far, this office has received no information of serious loss.

The flood in the Warrior and lower Tombigbee rivers was also very pronounced, the waters reaching from 13 to 15 feet above the danger lines at Demopolis and Tuscaloosa, Ala.; warnings of this flood were issued twenty-four or more hours in advance.

Heavy snows fell during the early days of the month over the higher districts of southern Oregon. These snows were followed by warm and heavy rains from the 10th to the 15th, inclusive, and the inevitable result was a decided freshet in the Willamette River and its tributaries. A report on this flood by Mr. E. A. Beals, Forecast Official in charge of the Portland, Ore., forecast district, follows:

During the first ten days of January the weather in western Oregon was slightly cooler than usual and considerable snow fell in the foot-hills and mountains. On January 7, 96 inches of snow was reported on

the ground at Siskiyou, Ore., which is one of the highest stations on the Southern Pacific railroad between Portland, Ore., and San Francisco, Cal. The snowfall in other portions of southern Oregon was correspondingly heavy, and it is estimated to have been the heaviest occurring there within the last ten years.

It was natural to expect with this snowfall that upon a return to warmer weather the streams of western Oregon would rapidly rise, and, if the warm weather was attended by rain, that freshets would occur.

During the afternoon of January 10 rain began falling generally throughout western Oregon, and by the next morning a marked change to warmer weather had occurred.

The morning weather map of January 11, 1901, contained the following announcement: "The rains with mild temperatures will continue in this district for 24 hours longer, and there is danger of a small freshet occurring in the Willamette River, ample notification of which will be given by special bulletins should it prove likely to cause damage."

The rains with mild temperatures continued until the 15th, when they ceased. The quantities measured from January 10 to 15, inclusive, are graphically presented on the inclosed chart; they amount to between 4 and 5 inches, and their distribution is quite uniform throughout the entire Willamette drainage area.

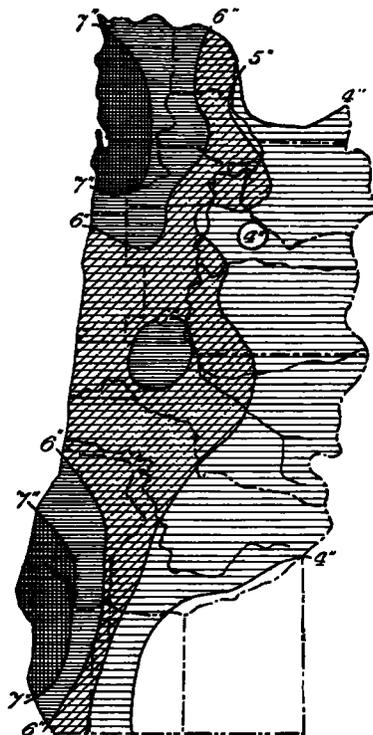


FIG. 1.—Rainfall in western Oregon, January 10-15, inclusive, 1901.

The flood crest was 77 hours in reaching Portland from Eugene, Ore., which is a distance by water of 140 miles; it was 43 hours in reaching Portland from Albany, Ore., a distance by water of 89 miles, and 32 hours from Salem to Portland, Ore., which is a distance of 59 miles.

The river gage at Salem was washed away during the afternoon of January 15, and the height of the flood crest and exact time of its occurrence at Salem are unknown, but are believed to be 31.5 feet at about 9 p. m. January 15, 1901.

Following the first announcement of a possible flood in the morning weather map of January 11, 1901, river forecasts were issued daily thereafter until the danger had passed; the last river forecast was issued at 8 p. m., January 19, 1901, and read as follows: "The river at Portland reached a stage of 15 feet at 5:45 p. m., local time, Saturday, and it will continue to fall for the next few days."

On January 14 it was estimated that the maximum height of the river at Portland would be about 18 feet and be reached the next afternoon. The estimate was increased the next morning to 19 feet, and then later to about 20 feet. The maximum height reached was 20.9 feet at 5 a. m., local time, January 17, 1901.

Owing to the timely warnings very little damage occurred at Portland, Ore., but a number of bridges were washed away and some logs were lost at places up the river. Many landslides were reported, with much resulting damage to railroads and some minor injuries to a few persons.

The highest and lowest water, mean stage, and monthly range at 127 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 extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Precipitation is expressed in inches and temperature in degrees Fahrenheit.

**Alabama.**—The mean temperature was 46.0°, or 1.4° above normal; the highest was 75°, at Healing Springs on the 11th, at Eufaula on the 12th, and at Bermuda on the 23d, and the lowest, 19°, at Valleyhead on the 18th and at Decatur on the 31st. The average precipitation was 5.32, or 0.49 above normal; the greatest monthly amount, 11.72, occurred at Lock No. 4, and the least, 2.26, at Livingston.—*F. P. Chaffee.*

**Arizona.**—The mean temperature was 47.5°, or 3.1° above normal; the highest was 82°, at Sentinel on the 22d and 25th, and the lowest, 6° below zero, at Fort Defiance on the 2d. The average precipitation was 1.29, or 0.53 above normal; the greatest monthly amount, 4.01, occurred at Pinal Ranch, and the least, 0.02, at Walnut Grove.—*W. G. Burns.*

**Arkansas.**—The mean temperature was 45.6°, or 6.5° above normal; the highest was 78°, at Bee Branch on the 14th and at Rison on the 15th, and the lowest, 7°, at Winslow on the 1st. The average precipitation was 2.21, or 2.20 below normal; the greatest monthly amount, 4.89, occurred at Elon, and the least, 0.76, at Pond.

The mild, open winter has been favorable to wheat, which has made good progress and looks well. The late sown is doing nicely and looks as good as the early sown. Some little damage is being done in a few localities by the hessian fly.—*E. B. Richards.*

**California.**—The mean temperature was 43.9°, or about normal; the highest was 85°, at Anaheim on the 19th, and the lowest, 26° below zero, at Bodie on the 1st and at Boca on the 10th. The average precipitation was 5.21, or 0.74 above normal; the greatest monthly amount, 24.46, occurred at Summerdale, while none fell at Needles.—*A. G. McAdie.*

**Colorado.**—The mean temperature was 26.7°, or 2.8° above normal; the highest was 83°, at Blaine on the 13th, and the lowest, 45° below zero, at Antelope Springs on the 14th. The average precipitation was 0.55, or 0.22 below normal; the greatest monthly amount, 4.12, occurred at Ruby, while none fell at Crook and Holyoke.—*F. H. Brandenburg.*

**Florida.**—The mean temperature was 57.3°, or slightly below normal; the highest was 91°, at Hypoluxo on the 2d, and the lowest, 22°, at Sumner on the 18th and at Middleburg on the 19th. The average precipitation was 2.45, or 0.27 below normal; the greatest monthly amount, 9.62, occurred at Hypoluxo, and the least, 0.25, at Marco.—*A. J. Mitchell.*

**Georgia.**—The mean temperature was 46.3°, or 0.8° above normal; the highest was 81°, at Quitman on the 11th, and the lowest, 13°, at Duhlo-nega on the 18th. The average precipitation was 4.80, or 0.30 above normal; the greatest monthly amount, 8.02, occurred at Gainesville, and the least, 2.52, at Brent.

The weather was very favorable to agricultural pursuits and interests. Wheat, oats, and rye are generally reported to be in excellent condition. Moisture has been ample to all needs, and much preparatory work on land has been accomplished.—*J. B. Marbury.*

**Idaho.**—The mean temperature was 26.4°, or 1.1° above normal; the highest was 75°, at Idaho City on the 3d, and the lowest, 23° below zero, at Lost River on the 1st. The average precipitation was 1.82, or 0.13 below normal; the greatest monthly amount, 4.65, occurred at Murray, and the least, 0.30, at Blackfoot.

During the first twelve days considerable snow fell in the wheat growing districts. Over the high plateaus the snow fell to sufficient depths to afford protection to the cereal crops, but in the low valleys it quickly disappeared, exposing the wheat to the freezing and thawing processes. The grass on the ranges has afforded good grazing, and the necessity has not yet arisen to feed much hay to the stock.—*S. M. Blandford.*

**Illinois.**—The mean temperature was 30.2°, or 3.5° above normal; the highest was 69°, at St. John on the 16th, and the lowest, 15° below zero, at Kishwaukee on the 1st. The average precipitation was 1.45, or 0.91 below normal; the greatest monthly amount, 2.50, occurred at Rushville, and the least, 0.57, at Martinsville.

The average condition of wheat is favorable, and some improve-

ment over last month is apparent. There has been but little snow protection, especially in the central and southern districts, but, notwithstanding this fact, there has been very little damage by freezing and thawing. Rye is generally in good condition and meadows are looking well.—*M. E. Blystone.*

**Indiana.**—The mean temperature was 30.4°, or 1.8° above normal; the highest was 68°, at Boonville on the 8th, and the lowest, 15° below zero, at Cambridge and Richmond on the 31st. The average precipitation was 1.44, or 1.46 below normal; the greatest monthly amount, 3.19, occurred at Angola, and the least, 0.45, at Boonville.

At the end of the month wheat is in fair condition; the fly has injured the early sown fields.—*C. F. R. Wappenhans.*

**Iowa.**—The mean temperature was 23.7°, or 6.5° above normal; the highest was 60°, at Keokuk on the 15th, and the lowest, 21° below zero, at Elkader on the 1st. The average precipitation was 0.74, or 0.43 below normal; the greatest monthly amount, 2.34, occurred at Olin, and the least, 0.04, at Murray.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

**Kansas.**—The mean temperature was 32.5°, or 3.5° above normal; the highest was 80°, at Ulysses on the 16th, and the lowest, 21° below zero, at Achilles on the 1st. The average precipitation was 0.41, or 0.45 below normal; the greatest monthly amount, 1.70, occurred at Oswego, and the least, 0.02, at Newton.

Wheat continued in good condition in the eastern, middle, and southern counties; the cold weather the last of December and the first days of January checked its rapid growth, and the dry weather prevented a renewal; it has afforded good pastures in many counties. The fly has injured it in a few of the central counties. In the northwestern and western counties much of the early sown has died, while the later sown remains in the ground dormant. Much spring plowing has been accomplished in the south.—*T. B. Jennings.*

**Kentucky.**—The mean temperature was 36.7°, or 1.3° above normal; the highest was 75°, at Franklin on the 8th and 9th, and at Manchester on the 9th, and the lowest, 4°, at Scott on the 31st. The average precipitation was 1.85, or 2.31 below normal; the greatest monthly amount, 4.06, occurred at Franklin, and the least, 0.47, at Frankfort.

It is thought that wheat was injured to some extent by freezing, owing to almost entire absence of snow protection, but as there were no severe or extended cold spells it is probable that the damage from freezing is not general nor very great. The crop is in bad condition in some localities from attacks of the hessian fly. Mild and comparatively dry weather permitted considerable plowing for corn.—*H. B. Hersey.*

**Louisiana.**—The mean temperature was 53.0°, or 2.3° above normal; the highest was 80°, at Donaldsonville on the 9th, and the lowest, 20°, at Plain Dealing on the 19th. The average precipitation was 3.75, or 1.28 below normal; the greatest monthly amount, 6.51, occurred at Como, and the least, 0.72, at Minden.—*W. T. Blythe.*

**Maryland and Delaware.**—The mean temperature was 32.6°, or 0.7° above normal; the highest was 68°, at Charlotte Hall, Md., on the 9th, at Takoma Park, Md., on the 15th, and at Milford, Del., on the 17th; the lowest, 4° below zero, at Deerpark, Md., on the 20th. The average precipitation was 2.72, or 0.13 below normal; the greatest monthly amount, 6.22, occurred at Deerpark, Md., and the least, 1.14, at Cumberland, Md.—*Oliver L. Fussig.*

**Michigan.**—The mean temperature was 21.4°, or about normal; the highest was 55°, at Traverse City on the 20th, and the lowest, 28° below zero, at Humboldt on the 3d. The average precipitation was 1.77, or 0.52 below normal; the greatest monthly amount, 5.40, occurred at Berrien Springs, and the least, 0.65, at Port Austin.—*C. F. Schneider.*

**Minnesota.**—The mean temperature was 13.2°, or 2.8° above normal; the highest was 49°, at Blooming Prairie on the 14th, and the lowest, 47° below zero, at Pokegama on the 2d. The average precipitation was 0.33, or 0.38 below normal; the greatest monthly amount, 1.00, occurred at Red Wing, and the least, trace, at Leech Lake Dam.

The snow in the timber regions seems to have been more abundant. With moderately cold weather which favored the making of ice roads in the woods the lumbermen have been able to haul their logs satisfactorily.—*T. S. Outram.*

**Mississippi.**—The mean temperature was 48.8°, or 2.0° above normal; the highest was 76°, at Biloxi on the 29th, and the lowest, 18°, at Ripley on the 31st. The average precipitation was 5.23, or about normal; the