

No storm warnings were issued during July, and there were no storms without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

The temperature was above the normal over the greater portion of the district during the month. There was a period of showers from the 9th to the 13th, inclusive, but for the month as a whole the rainfall was considerably below the normal. No general storm occurred along the west Gulf coast, and no warnings were issued.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The main features of the month were two periods of excessive heat, which prevailed from the 5th to the 10th and from the 15th to the 25th, inclusive. These prolonged heat waves were due to the persistence of high pressure areas over the southwestern quarter of the United States, and caused much suffering and many prostrations. The rest of the month, however, was quite cool, and thunderstorms were quite frequent after the 8th, especially in Kentucky. Occasional thundershowers gave temporary relief locally even during the heated periods, except previous to the 9th when it was not only hot but very dry.

Three or four general storms past over the Ohio Valley during the month, spreading general showers and some locally excessive rains.

A severe thundersquall past over the city of Louisville the afternoon of the 9th which unroofed many houses, destroyed hundreds of trees and spread destruction generally to the amount of many thousands of dollars. One man was killed and some twenty persons injured, also some twenty or more horses were killed by falling trees or live electric wires.

No special warnings were issued during the month, and none was called for.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The frequency of showers and thunderstorms generally thruout the north-central and northwestern States was a feature of the month.

Temperatures averaged high. Periods of excessive heat were, however, of short duration.

Severe gales were not experienced on the upper Lakes. Squalls calculated to imperil vessels were forecast. Storm warnings ordered on the 15th of the month for indicated dangerous squalls on Lake Michigan were not verified by wind velocities reported at stations of observation.

Frost was not reported in the agricultural districts.—*E. B. Garritt, Professor of Meteorology.*

DENVER FORECAST DISTRICT.

Temperatures during the month were slightly below normal to the west of the Continental Divide, and practically normal on the eastern slope. Rainfall was in excess over Arizona, southern Utah, and the eastern plains region in Colorado and Wyoming, and much below normal in New Mexico.

Special warnings were issued for the rise in the Arkansas river that followed the excessive rain of the 26th. No other warnings were issued or required.—*P. McDonough, Local Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

Light showers occurred in California on July 2 in connection with a moderate depression, apparently of the secondary order, which developed suddenly over Oregon. The usual summer low over the valley of the Colorado was in evidence early during the month, and thunderstorms with showers in the mountains of southeastern California and Arizona were frequent.

There were no storm nor frost warnings issued during the month.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

Near the close of the month a short hot spell of unusual severity prevailed west of the Cascade Mountains, and temperatures of 100° or more were common in many localities.

There were more than the usual number of thunderstorms, and the rainfall averaged above the normal, except along the southern border of the district, where it was slightly less than usual.

There were no damaging winds or frosts during the month, and no warnings were issued.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The only flood of consequence occurred about the middle of the month in the Des Moines and Illinois valleys and in that portion of the Mississippi Valley between the mouths of the Des Moines and the Missouri rivers. It was caused by the heavy rains that fell on the 9th and 10th and from the 14th to the 21st inclusive, especially on the 14th and 15th. While flood stages were not general there was a great amount of damage done, chiefly to growing corn, vegetables, and unthrashed wheat. Some portions of the city of Des Moines, Iowa, were flooded, as was also a great portion of the unprotected bottom lands. All levees remained intact, and none was at any time considered in danger. Stock and other portable property were removed, as the Weather Bureau warnings were issued in ample time to permit this.

Damage of the same character was done along the rivers of eastern Kansas and along the Missouri River from St. Joseph southward, and stages from 1 to 3 feet above the flood stage were general. Warnings were issued for these floods at the proper time.

A moderate flood in the Trinity River of Texas from the 12th to the 15th, inclusive, was also well forecast on the 11th, a stage of 30.3 feet, 5.3 feet above the flood stage, occurring at Dallas, Tex., on the 13th and 14th.

In addition to these floods in the larger rivers, there were numerous floods in the smaller streams at the same time. It was impracticable to issue warnings for these floods, except along the Tygarts Valley River of West Virginia, where a warning from the local office of the Weather Bureau at Elkins, W. Va., proved to be of much benefit, altho great damage was done to houses, roads, and bridges of all kinds, and to growing crops.

The Willamette River at Portland, Oreg., fell below the flood stage of 15.0 feet on the 16th, marking the end of the rise in the Columbia River for the year 1907. An account of this rise follows:

*The 1907 annual rise in the Columbia River, by Mr. E. A. Beals, in charge of local office, United States Weather Bureau, Portland, Oreg.*

The annual rise of the Columbia River is due almost wholly to the melting of the winter's snow in the mountains and foothills within the drainage area of the river, and there are two conditions governing the height of the flood crests in the lower stretches of the stream.

First. If the weather is sunny and a protracted hot spell occurs in May, high water is almost certain in the lower Columbia River; but if there is more than the usual amount of cloudiness during May and the temperatures are below normal, the snow melts slowly and the flood crest in the lower stream is never very high. There is seldom a year that there is not enough snow in the mountains to cause a serious flood if it melts quickly, therefore it is the manner in which the snow melts, rather than its amount, that ordinarily determines the height of the spring water in the Columbia River.

Second. Should the crest coming down the Snake River join that coming down the upper Columbia River, the lower stream will reach a higher stage than will be the case if the crest in one of these streams passes the junction of the two rivers before the arrival of the other. The Snake River crest usually passes into the Columbia River before the crest from the upper Columbia River reaches the junction point. This is due to

the lower latitude of the Snake River, which results in the increased heat of the spring being felt in that basin before it is felt in the more northern one of British Columbia and northwestern Montana.

The most reliable record of the temperature and precipitation over the drainage basins of the upper Columbia and the Snake rivers is that published in the MONTHLY WEATHER REVIEW under the subheading "Northern plateau". The reporting stations in this district are not situated in the mountains, but they are situated in the habitable valleys near them, and they probably portray, but in somewhat lesser degree, the conditions experienced in the mountains themselves.

The total precipitation and the mean temperatures, together with the departures from normal, in the northern plateau for the months of November and December, 1906, and for January, February, and March, 1907, are given in Table 1.

TABLE 1.—Temperature and precipitation of northern plateau during cold season of 1906-7.

Month.	Temperature.		Precipitation.	
	Mean.	Departure.	Total.	Departure.
1906.				
November.....	45.5	+0.1	8.54	+1.6
December.....	42.6	+0.7	7.03	-1.4
1907.				
January.....	35.1	-4.1	5.68	-1.8
February.....	43.6	+3.1	5.06	-0.6
March.....	42.8	-1.4	3.45	-1.8
	41.9	-1.6	29.76	-4.0

It will be seen by this table that last winter during the period of snowfall there was about 4 inches' deficiency in precipitation and an accumulated deficiency of 1.6° in temperature. Reports gathered at the end of March from snowfall reporters in western Montana, British Columbia, Idaho, and northwestern Wyoming, were to the effect that there was more than the average amount of snow on the ground at that time, and if the amount of snow in the mountains is the only gage for the height of the subsequent flood crest, then unusually high water was to be expected later on.

The mean temperature in the northern plateau during April and May, 1907, was nearly normal, being only 0.3 above normal in April and 0.9 above in May. Also during these months there were no unusual or protracted hot spells; but, instead, the variations from day to day were quite small and uniform.

Table 2 shows the highest water that occurred during the

annual rise this year and its date at all stations in this district, except the stations on the Willamette River above Portland, which are not affected by the annual rise in the Columbia River.

TABLE 2.—Flood crests, Columbia watershed, 1907.

Station.	Height.	Date.	Station.	Height.	Date.
Bonnara Ferry, Oreg.	23.8	July 1.	Celilo, Oreg.....	17.3	June 4.
Newport, Wash.....	16.7	June 15.	The Dalles, Oreg....	34.1	June 5.
Lewiston, Idaho.....	15.6	May 20.	Cascade Locks, Oreg.	26.8	June 9, 10, 11.
Wenatchee, Wash....	34.9	June 4, July 5 and 6.	Vancouver, Wash....	20.1	June 10.
Umatilla, Oreg.....	20.5	June 4.	Portland, Oreg.....	19.2	June 6, 7, 8, and 10.

In fig. 1 will be found hydrographs showing the behavior of the river at Wenatchee, Wash., which is on the Columbia River, a little over 200 miles above the junction of the Columbia and Snake rivers; at Lewiston, Idaho, on the Snake River, nearly 200 miles from its mouth; and at Portland, Oreg. Portland is on the Willamette River about 10 miles from its mouth, and during the annual rise in the Columbia River backwater causes practically the same stage in the Willamette River at Portland as that in the Columbia River 10 miles below Portland.

For the purpose of comparison, there is submitted herewith Table 3, showing the stages of all the recorded flood crests at Portland due to the annual rise in the Columbia River.

TABLE 3.—Flood crests at Portland, Oreg., during the annual rise of Columbia River.

Year.	Stage.								
1879	19.3	1885	14.5	1891	14.1	1897	23.7	1903	24.0
1880	27.3	1886	20.0	1892	19.3	1898	20.7	1904	20.8
1881	19.7	1887	25.7	1893	22.0	1899	24.2	1905	13.6
1882	26.1	1888	18.2	1894	33.0	1900	17.8	1906	13.4
1883	17.8	1889	10.0	1895	16.3	1901	20.8	1907	19.2
1884	20.2	1890	20.1	1896	23.8	1902	20.7		

The highest and lowest water, mean stage, and monthly range at 212 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. 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, Professor of Meteorology.

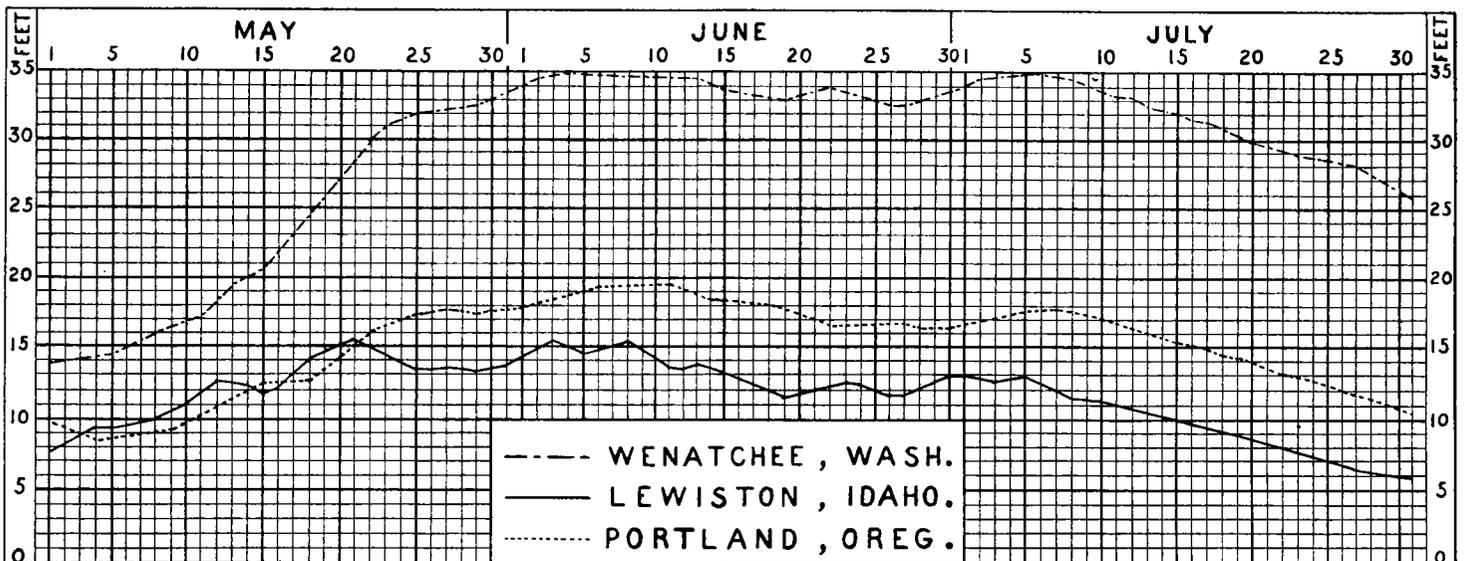


FIG. 1.—Hydrographs showing daily stages, Columbia River system, May, June, and July, 1907.