

streams of the district were well up and rising. May was an exceptionally wet month; in fact, the total precipitation for the month exceeded that of the previously wettest month of record (June, 1899) by 0.61 inch. Heavy showers occurred at frequent intervals, now here, now there, causing large fluctuations in the volumes of water moving downstream, especially in the upper and central portions of the rivers. At some stations flood stages were attained two and three times during the month. The run-off was smaller than the amount of precipitation would indicate, and it is probable that drainage into the main channels was prevented or at least retarded by rank vegetation.

At the close of May the Trinity was falling in its lower reaches and rising again in its upper. The Brazos was falling in its upper reaches and rising in its lower. The Sabine and Neches were rising in their lower portions, and the Colorado, Guadalupe, and Rio Grande were falling.

While the streams were well out of banks, they were much below high-water mark, except the lower Trinity which attained a width of from four to six miles at Liberty with maximum stage at that place 0.2 foot higher than the previous high-water mark of June, 1908.

The rains and freshets caused considerable damage in all parts of the State, and farmers were greatly alarmed. Roads and fields were badly washed and water-soaked. Cultivation became impossible and crops were smothered by grass and weeds. Much corn and cotton was damaged and will require replanting. Train service was interrupted by washouts and softened roadbeds, county bridges were washed away, and much other damage was done. The losses from these freshets so far reported exceed \$1,700,000, but in the aggregate will be much larger, as the returns are far from complete. The heaviest losers were the farmers in the Trinity, Brazos, Colorado, and Guadalupe valleys. Along the Trinity the losses reported aggregate \$465,000; Brazos, \$299,000; Colorado, \$732,000; and Guadalupe, \$126,000. A small per cent of the railroad and telephone companies reported a total loss of \$94,000. The savings effected from warnings, so far as reported, aggregate \$124,000. Live stock was driven from the danger zone upon receipt of the warnings and nearly all saved. Eleven persons were drowned in the swollen streams as a result of accident or foolhardiness.—
After B. Bunnemeyer, Section Director.

The maximum stages were as follows:

Logansport on Sabine.....	Flood stage, 25.0 feet; 34.4 feet on 10th.
Rockland on Neches.....	Flood stage, 20.0 feet; 23.2 feet on 17th.
Liberty on Trinity.....	Flood stage, 25.0 feet; 28.3 feet on 23d.
Booth on Brazos.....	Flood stage, 39.0 feet; 42.0 feet on 13th.
Columbus on Colorado.....	Flood stage, 24.0 feet; 35.8 feet on 28th.
Gonzales on Guadalupe.....	Flood stage, 22.0 feet; 32.0 feet on 23d.
Mission on Rio Grande.....	? ? 23.3 feet on 29th.

Total loss by flood during May, 1914.

Texas rivers.....	\$1,716,000
Oklahoma district:	
Bridges.....	500,000
Farms and crops (estimated).....	377,000
Shreveport district:	
Crops.....	100,000
Stoppage of petroleum production.....	50,000
Detroit, vicinity of:	
Tangible property.....	50,000
Loss of wages and loss due to shut down of plant.....	1,815,000
Arkansas River (in Kansas):	
Bridges, buildings, etc.....	11,400
Crops.....	5,600

Arkansas River (in Colorado):	
Farms and farm property, including live stock and prospective crops.....	\$25,675
Tangible property.....	54,715
Colorado River:	
Tangible property.....	50,000
Farms and farm property, including prospective crops.....	25,000
Gunnison River:	
Farms and farm property, including prospective crops.....	3,000
Grand total.....	4,783,390

FLOODS IN THE DENVER DISTRICT, MAY, 1914.

By **FREDERICK H. BRANDENBURG**, District Forecaster.

THE CANADIAN.

Heavy rains, torrential in localities, in northeastern New Mexico from April 29 to May 1, 1914, caused a severe flood in the Canadian River from its upper reaches to its junction with the Arkansas in Oklahoma. The upper drainage of the Canadian embraces the counties of Colfax, Mora, and parts of San Miguel, Guadalupe, Quay, and Union Counties; this region for the most part is mountainous, favorable to a large run-off which quickly filled the arroyos and creeks draining into the Canadian.

The greatest rainfall reported for the three days was 9.55 inches at Clayton, which lies close to the parting between the Canadian and the Cimarron, to the northward. The average for the three-day period for 42 stations in the area was 4.54 inches.

Apparently the rainfall was fully as great on the watershed of the Cimarron if one may judge from the record at Campo, Baca County, Colo. At this station the total for the three days was 7.20 inches.

The only river station in operation on the headwaters of the Canadian is located at Logan on the Chicago, Rock Island & El Paso Railroad, not far from the Texas border. During the first 24 hours after rain began the gage at Logan stood at 3 feet. After this the rise was rapid. On May 1 at 10 a. m. the river was at 18 feet; 11 a. m., 24 feet; 2:30 p. m., 29 feet; 3:15 p. m., 30 feet, the highest stage attained. By 5 p. m. it had fallen to 27 feet, and by 8 a. m. of the 2d the stage was 11 feet, and at 2 p. m., 8 feet. The maximum discharge has been estimated at 200,000 second-feet. The stages given are all from the gage on the railroad bridge, the gage upstream having been under water during most of the freshet. The highest attained, 30 feet, is 8 feet below the stage reached during the severe flood of September 30, 1904.

There was much damage due to flooding of lands adjacent to the river, and in localities not affected by the river overflow, but where the drainage facilities were unable to carry off the unusual run-off. Railroad companies, irrigation companies, farmers, the towns, and counties suffered monetary loss. The approximate value of the property damaged or destroyed, with loss due to suspension of business and wages of employees, is placed at \$132,000.

At 11:30 a. m. of May 1 warnings were telegraphed to Tascosa, Tex., and railroad officials operating the Denver City & Fort Worth Railroad; also to the official in charge of the Weather Bureau office at Oklahoma City.

The table of precipitation below was furnished by the section director, Santa Fe, N. Mex.

Precipitation over northeastern New Mexico, April 29-May 3, 1914.

Station.	County.	April.		May.			Total.
		29	30	1	2	3	
Aurora.....	Collax.....	1.14	1.20	0.88	0	0	Inches. 3.22
Black Lake.....	do.....	(*)	1.70	0.93	0	0	2.63
Cimarron (near).....	do.....	2.04	1.54	0.04	0	0	3.62
Dawson.....	do.....	0.28	1.18	1.56	0	0	3.02
Elizabethtown.....	do.....	0	1.10	0.80	0	0	1.90
Johnson's Park.....	do.....	0.04	1.70	2.10	0.18	0.01	4.03
Maxwell (near).....	do.....	0	3.08	1.28	0	0	4.36
Misani.....	do.....	0.27	0	2.40	0	0	2.67
Raton.....	do.....	0.75	1.20	0.42	0.53	0	2.90
Springer.....	do.....	0.05	0.65	1.30	0	0	2.00
Taylor.....	do.....	0.11	0.53	1.33	0	0	1.97
Vermejo Park.....	do.....	0.05	2.00	0.72	0	0	2.78
Abbott.....	Mora.....	0.07	1.97	0.52	0	0	2.56
Chacon.....	do.....	(*)	2.11	0.75	0	0	3.06
Fort Union.....	do.....	0	0.40	0.97	0	0	1.37
Hoosier ranch.....	do.....	T.	6.08	2.25	0	0	8.33
Johnson's ranch.....	do.....	0.40	4.75	1.85	0	0	7.00
Mills (near).....	do.....	0	3.00	1.90	0	0	4.90
Palo Verde.....	do.....	0.08	4.35	2.55	0	0	6.98
Pleasant View.....	do.....	0.40	5.48	3.05	0	0	8.93
Roy.....	do.....	0	5.00	2.40	0	0	7.40
Solano.....	T.....	3.90	3.75	0	0	0	7.65
Wagon Mound (near).....	do.....	0.05	0.58	1.25	0	0	1.88
Bell ranch.....	San Miguel.....	0	3.01	3.80	0	0	6.81
Cabeza.....	do.....	0	2.75	2.56	0	0	5.31
Campana.....	do.....	(*)	2.20	3.95	0	0	6.15
Rocafada.....	do.....	0	1.83	0.64	0	0	2.47
Trementina.....	do.....	(*)	2.60	1.85	0	0	4.45
Cuervo.....	Guadalupe.....	0	2.00	2.50	0	0	4.50
Albert.....	Union.....	0.48	2.15	3.00	0	0	5.63
Clayton.....	do.....	(*)	6.20	3.35	0	0	9.55
Folsom.....	do.....	0.06	2.05	1.40	0	0	3.51
Hayden (near).....	do.....	0.12	0.78	3.56	0.03	0	4.49
Pasamonte.....	do.....	1.57	4.15	0.64	0	0	6.36
Rosebud.....	do.....	1.10	3.54	0.10	0	0	4.74
Vance (near).....	do.....	1.00	1.21	3.07	0	0	5.28
Kappus.....	Quay.....	0.55	1.80	1.30	0.20	0	3.85
Logan.....	do.....	0.05	2.00	3.63	0	0	5.68
Montoya.....	do.....	0	0.40	4.20	0	0	4.60
San Jon.....	do.....	0.33	0.85	1.18	T.	0	2.36
Tucumcari.....	do.....	(*)	1.80	0.33	0	0	1.93
Nara Visa.....	do.....	0.01	5.08	3.11	0	0	8.20

*Measurement included in next day.

THE ARKANSAS RIVER.

During May stages higher than usual occurred on a number of dates in the Arkansas River in Colorado. These high stages were in part due to temperature conditions favorable to uninterrupted melting of snow in the upper reaches during the latter part of April. But the principal cause of the prevalence of high water was the heavy rainfall, especially in the eastern part of Colorado. Several freshets occurred, but their duration was short and but little damage resulted, except from the freshet of May 1 and 2.

A tabulated statement of the rainfall on this watershed from April 29 to the end of May 3 is appended.

Daily precipitation, April 29 to May 3, inclusive, 1914, in watershed of the Arkansas in Colorado.

Watershed.	April.		May.			Total.	
	29	30	1	2	3		
Canon City.....	Arkansas.....	0.06	1.60	1.30	0.42	0.00	Inches. 3.38
Colorado Springs.....	Fountain.....	1.35	2.03	0.54	0.00	0.07	3.99
Eads.....	Big Sandy.....	1.00	2.00	1.50	0.00	0.00	4.50
Florence.....	Arkansas.....	0.55	1.55	0.78	0.00	0.00	2.88
Freemont Experiment Station.....	Fountain.....	0.42	0.91	0.71	0.21	0.00	2.25
Hamps.....	Big Sandy.....	0.30	1.75	0.77	0.03	0.02	2.87
Hoehne.....	Purgatoire.....	0.58	0.98	1.88	0.00	T.	3.44
Holly.....	Arkansas.....	0.52	1.62	0.96	0.00	0.00	3.10
La Junta.....	do.....	0.41	2.30	1.00	0.01	T.	3.72
Lake Moraine.....	Fountain.....	0.12	0.40	0.35	0.16	0.05	1.08
Lamar.....	Arkansas.....	0.18	0.77	3.30	0.00	0.00	4.25
La Veta Pass.....	do.....	0.00	0.98	0.00	0.00	T.	0.98
Limon.....	Big Sandy.....	0.25	1.48	0.70	0.00	T.	2.43
Madrid.....	Purgatoire.....	0.17	1.10	1.58	0.00	0.00	2.85
Maxey.....	Arkansas.....	1.00	2.00	4.10	0.00	0.00	7.10
Monument.....	Fountain.....	(*)	1.79	0.00	0.00	T.	1.79
North Lake.....	Purgatoire.....	0.06	2.76	0.90	0.00	0.12	3.84
Trinidad.....	do.....	0.35	0.91	1.70	T.	T.	2.96
Two Buttes Reservoir.....	Arkansas.....	0.20	1.05	2.79	0.00	0.00	4.04
Yoder.....	do.....	0.16	1.61	0.42	0.04	0.06	2.29

*Measurement included in next day.

Flood of May 1 and 2.—The precipitation of April 30 and May 1 was excessive in many localities on the Arkansas watershed in the eastern part of the State. High stages occurred almost simultaneously on May 1 from Oxford Farmer's Dam, near Nepesta, eastward to the Kansas line. The flood subsided on May 3. East of La Junta the flooding of bottom lands resulted in much damage to farm lands, crops, live stock, bridges, and railroad property. The greatest damage occurred in the extreme eastern part of the State, where flood conditions were most pronounced. Timely warnings were issued for all high-water conditions.

On May 1, at 5 a. m., the river at Oxford Dam, near Nepesta, was 3.6 feet, or 0.4 below flood stage. At the same time the Purgatoire, a tributary joining the Arkansas above Fort Lyon, was rising rapidly. At 8 a. m. this river at Higbee was 8 feet, a rise of 6 feet in the preceding 24 hours. At the same time the Arkansas at Fort Lyon was 6.2 feet, or slightly above flood stage. At 8 a. m. the next day, May 2, the reading of this gage was 7 feet. Farther downstream the rise was more pronounced. At Amity Dam, near Prowers, on April 30, 1 foot of water was passing over the dam; in the evening of May 1 the depth of water passing over the dam was 5 feet, the maximum stage. By night of the 2d the river had fallen to 3 feet. The maximum discharge over the Amity Dam was estimated at 35,000 second-feet.

Flood in Fountain Creek in the vicinity of Pueblo, Colo., May 17-18.—During the night of May 17 a severe thunderstorm accompanied by heavy rainfall occurred in the vicinity of Fountain and Buttes, near the head of Fountain Creek, Colo. Flood conditions resulted in the area embraced by the Fountain watershed. Lowlands were flooded between Fountain and Pueblo, and the property loss was considerable. To the eastward of Pueblo only moderate river stages occurred in the Arkansas River from the Fountain freshet, and no material property damage resulted, except along the Fountain and in the vicinity of Pueblo. Traffic between Pueblo and Denver was suspended for the greater part of two days.

In connection with this flood warnings were issued for places to the east of Pueblo.

COLORADO RIVER, MAY, 1914.

In the upper reaches of the tributaries there were marked rises between the 8th and 12th; a steady flow was then maintained for the next seven days. High stages were general on the 24th and 25th, and practically the same heights were general again at the end of the month. In the San Juan the highest stage at Farmington, N. Mex., occurred on the 24th; in the Grand, at Fruita, on the 25th, and in the Green, at Elgin, Utah, on the 29th and 30th. At Topock, Ariz., near Needles, Cal., the maximum stage, 20.3 feet, occurred on the 31st, while at Yuma the maximum stage, 25.6 feet, occurred on the 29th and 30th.

MAY LAKE LEVELS.

By UNITED STATES LAKE SURVEY.

[Dated Detroit, Mich., June 2, 1914.]

The United States Lake Survey reports the stages of the Great Lakes for the month of May, 1914, as follows:

	Feet above mean sea level.
Superior.....	602.33
Michigan-Huron.....	580.32
Erie.....	572.91
Ontario.....	246.95