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## SECTION IV.—RIVERS AND FLOODS.

### RIVERS AND FLOODS, MAY, 1914.

By ALFRED J. HENRY,

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Destructive floods occurred in the first week of the month over a widely extended area in the Southwest from Kansas on the north to Texas in the south. The region of greatest flood intensity was along the South Fork of the Canadian, in Oklahoma. A second period of great flood frequency occurred on the 12th, 13th, and 14th in the smaller streams of southern Michigan and northwestern Ohio. The annual spring rise in both the Colorado and the Columbia was in progress in the lower reaches of those streams at the close of the month. The Colorado flood promises to be a rather full one, while that of the Columbia does not promise more than an ordinary flood.

According to press dispatches the loss of life in the southwestern floods aggregated 19 persons—3 in Kansas, 5 in Oklahoma and 11 in Texas. Property loss in the Oklahoma floods was large, especially in the matter of railway and county bridges; the loss due to bridges alone will aggregate close to half a million dollars.

The newly organized river service of Oklahoma, Section Director J. P. Slaughter in charge, was able to give timely notice of the coming of the floods in that State. Such notice was the more valuable by reason of the relative infrequency of floods in the rivers of that State and the further fact that the precipitation which caused it occurred on the headwaters of the Canadian in New Mexico and Colorado. No floods of equal magnitude have occurred since 1904. Some of the maximum stages are as follows:

#### MAXIMUM STAGES.

Canadian, Tex., 10 feet, 9:30 a. m., 2d.  
 Camargo, Okla., 11.5 feet, 11:30 p. m., 2d.  
 Bridgeport, Okla., 19 feet, noon, 3d.  
 Union City, Okla., 10.6 feet, midnight, 3d.  
 Purcell, Okla., 12-14 feet, about 2:30 a. m., 4th.  
 Tyrola, Okla., 22-24 feet, about noon, 4th.  
 Calvin, Okla., 18 feet (about), 3:30 p. m., 4th.  
 Eufaula, Okla., 16 feet, about 3 a. m., 5th.

The principal damage caused by this flood, outside of the destruction of bridges, was the loss of prospective crops in the bottom lands and damage to agricultural lands due to a deposit of sand which was left upon them in some localities.

A moderate flood occurred in the lower White River of Arkansas on the 8th. This flood was due to the combined effect of the floods in the Black and Upper White about 8 or 10 days earlier. Moderately high water also occurred in the Red River and its tributaries in Texas and Arkansas during the early days of the month. Flood stages were reached and passed as follows:

Fulton, Ark., 30.6 feet, May 3, flood stage 28 feet.  
 Finley, Tex., 28.1 feet, May 2, flood stage 24 feet.  
 Springband, Ark., 30.9 feet, May 10, 11, and 12, flood stage 29 feet.

The money loss to crops due to this flood is estimated at a little more than \$100,000.

#### FLOOD IN THE ARKANSAS RIVER.<sup>1</sup>

Almost simultaneously with the severe floods in the Canadian, a flood of more than usual magnitude passed down the Arkansas during the first week in May. In that portion of the river between Dodge City, Kans., and the Kansas-Colorado line the river was out of its banks on the 2d and 3d. The crest of the flood at Dodge City, Kans., 6.7 feet, was reached at 9:30 p. m. of the 3d. This is 1.2 feet higher than previously recorded. The high water reached Wichita, Kans., on the 5th, cresting at 2.4 on the 6th, with a second crest of the same amount on the evening of the 7th. The amplitude of the flood wave at Dodge City was 7.1 feet; at Wichita, 6.5 feet—a remarkably small decay for the long stretch of river between Dodge City and Wichita. The property loss in the Arkansas Valley from the Colorado line to Wichita is estimated at \$11,460, the bulk of which was occasioned by the river overflowing its banks and destroying prospective crops. Other lesser flood waves moved down the Arkansas in eastern Colorado during the last half of the month.

A trough-shaped depression, much like the one that caused the torrential rains of March 24-27, 1913, moved slowly eastward over northern Illinois, northern Indiana, and Ohio and northern Michigan on the 11th and 12th, passing over Pennsylvania and southern New York on the 13th. This disturbance gave continuous rainfall for about 24 hours during its eastward movement, and as a result caused a moderate flood in the Illinois River above Peoria. Owing to the slow progress of flood waves in this stream, the flood stage was not reached in the lower reaches of the river until the 24th and 25th.

The rivers of southeastern Michigan, including the Maumee of northwestern Ohio, overflowed their banks on the 12th, and the lowlands generally from Monroe, Mich., to Toledo, Ohio, were badly flooded. In the suburbs of Detroit much damage resulted from the failure of the sewers to carry off the water, the greatest individual sufferer being the Ford Motor Co., which was obliged to shut down its plant for three days. As the storm moved eastward the precipitation diminished, although it was sufficient to cause a moderate flood in the upper reaches of the Susquehanna.

#### FLOODS IN TEXAS RIVERS.

All streams of Texas from the Rio Grande to the Sabine were more or less flooded during May. The Trinity and Brazos were already out of banks during the latter part of April at Dallas and Waco, respectively, from heavy rains in April, with maximum stages of 37.8 feet at Dallas on April 29 and of 28.0 feet at Waco on April 28. The other

<sup>1</sup> See report of District Forecaster Brandenburg on Freshets in the Arkansas.

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.