

FLOODS IN COLORADO

BY ROBERT FOLLANSBEE AND LEON R. SAWYER

ABSTRACT

The first records of floods in Colorado antedated the settlement of the State by about 30 years. These were records of floods on the Arkansas and Republican Rivers in 1826. Other floods noted by traders, hunters and emigrants, some of whom were on their way to the Far West, occurred in 1844 on the Arkansas River, and by inference on the South Platte River. Other early floods were those on the Purgatoire, the Lower Arkansas, and the San Juan Rivers about 1859.

The most serious flood since settlement began was that on the Arkansas River during June 1921, which caused the loss of about 100 lives and an estimated property loss of \$19,000,000. Many floods of lesser magnitude have occurred, and some of these have caused loss of life and very considerable property damage.

Topography is the chief factor in determining the location of storms and resulting floods. These occur most frequently on the eastern slope of the Front Range. In the mountains farther west precipitation is insufficient to cause floods except during periods of melting snow, in June. In the southwestern part of the State, where precipitation during periods of melting snow is insufficient to cause floods, the severest floods yet experienced resulted from heavy rains in September 1909 and October 1911.

In the eastern foothills region, usually below an altitude of about 7,500 feet and extending for a distance of about 50 miles east of the mountains, is a zone subject to rainfalls of great intensity known as cloudbursts. These cloudbursts are of short duration and are confined to very small areas. At times the intensity is so great as to make breathing difficult for those exposed to a storm. The areas of intense rainfall are so small that Weather Bureau precipitation stations have not been located in them. Local residents, being cloudburst conscious, frequently measure the rainfall in receptacles in their yards, and such records constitute the only source of information regarding the intensity.

A flood resulting from a cloudburst rises so quickly that it is usually described as a "wall of water." It has a peak duration of only a few minutes, followed by a rapid subsidence. Nearly 90 cloudburst floods in Colorado are described in varying detail in this report. The earliest recorded cloudburst called at that time a waterspout occurred in Golden Gate Gulch, July 14, 1872. The "wall of water" was described as a "perpendicular breast of 10 or 12 feet." A cloudburst flood on Kiowa Creek in May 1878 caused the loss of a standard-gage locomotive, and although search was made by means of long metallic rods, the locomotive was never recovered, as bedrock was about 50 feet below the creek bed.

All available information relative to floods in Colorado, beginning with the flood of 1826 on the Arkansas River, is presented in this report, although for many of the earlier floods estimates of discharge are lacking.

Floods throughout a large part of the State have occurred in 1844, June 1864, June 1884, May 1894, and June 1921. The highest floods of record were on the larger streams and occurred as follows: South Platte River, June 1921; Rio Grande, June 1927; Colorado River, June and July 1884; San Juan River, October 1911.

The greatest floods on the plains streams occurred during May and June 1935 and were caused by cloudbursts. Ranchers living in the vicinity noted rainfalls as high as 24 inches in a 13-hour period, measurements being made in a stock tank.

The effect of settlement on channel capacities can be clearly traced. When settlement began, and with it the beginning of the livestock industry, the plains were thickly covered with a luxuriant growth of grasses. With the development of the livestock industry the grass cover was grazed so closely that it afforded little protection against erosion during the violent rains and resulting floods. The intensive grazing packed the soil so hard as to increase greatly the percentage of rainfall that entered the streams. This condition was noted during the Arkansas River flood of October 1908, when an estimated two-thirds of the 6-inch rainfall appeared almost immediately in the nearby streams.

The development of flood protection was of slow growth and progressed through four stages: (1) Removal of buildings to higher ground; (2) improvement of river channel capacity but without definite objective, owing to lack of knowledge of flood flows to be accommodated; (3) increase of channel capacity to equal measured peak flow of recent outstanding floods; and (4) construction of storage or detention reservoirs to hold back the greatest probable flood. These stages succeeded each other as losses from flood became greater and as the accumulation of meteorologic and hydrologic data permitted a more rational solution of the flood problem.