

Dam Break Modeling Done

By Robert D. Jarrett and John E. Costa

On July 15, 1982, Lawn Lake Dam, a 26-foot high earthfill irrigation dam built in 1902 in Rocky Mountain National Park, failed due to piping. Cascade Dam, downstream on Roaring River from Lawn Lake Dam, subsequently failed as a result of the flood. Various methods were used to compute indirectly the peak discharge, attenuation of flow, and flood traveltime. Channel cross sections were surveyed and other pertinent hydrologic data collected.

Immediately downstream from Lawn Lake Dam the flood was a wall of water 25 to 30 feet high, but as the flood wave progressed downstream, it attenuated so that approximately 20 minutes separated the leading edge and the flood peak. The channel slope ranged from approximately 0.4 to more than 20 percent. The streambed was scoured, as much as 50 feet deep and 300 feet wide, in the steepest 4.5-mile section of the Roaring River. All flood waters eventually were stored in Lake Estes 12.7 miles downstream from Lawn Lake.

A version of the National Weather Service dam break flood model was used to: (1) Evaluate the model's performance on steep-gradient streams; (2) provide supplemental hydrologic information for these dam failures; and (3) evaluate various scenarios of dam-breach development and the probable impact of the failure of Cascade Dam. Satisfactory results were obtained, but not without significant difficulties in getting the model to run properly. To calibrate the model, Manning n-values between 0.1 and 0.2 were required, and subcritical flow was assumed.

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