

# Lane Canyon near Nolin, Oregon

(Miscellaneous ungaged site in the Umatilla River basin,  
USGS Oregon Water Science Center)

## Review of peak discharge for the flood of July 26, 1965

**Location:** This flood was located about 1 mi southeast of Nolin, Ore., at 45.6729N and 119.0818W.

**Published peak discharge:** The published peak discharge for this flood is 28,500 ft<sup>3</sup>/s and was rated fair.

**Drainage area:** The drainage area is 5.04 mi<sup>2</sup> and is characterized by steep, rocky, sparsely vegetated, erosive side slopes and a steep-gradient channel. The main channel and tributary canyons have numerous reworked fluvial deposits, but the review team agreed that debris flows were unlikely. The storm was so intense and the slopes so steep that infiltration probably was minimal.

**Data for storm causing flood:** A severe “cloudburst” dropped record precipitation over several small drainage basins in the Umatilla River basin in north-central Oregon on July 26, 1965. The State was just recovering from the devastating Christmas flood of December 1964 and January 1965 that destroyed much of the hydrologic data network in areas west of the Cascades Range (Waananen and others, 1971). The July storm covered the entire Lane Canyon basin according to local residents. Spear Canyon, a larger basin about 3 mi west of Lane Canyon, also was hit hard, but only part of the basin was affected by the most severe part of the storm. A house near the mouth of Spear Canyon was washed away by the flood, and one family member drowned. The storm was intense and short in duration. The most intense concentration of rain and hail lasted about 30 minutes (according to Mrs. Stroughton, a long-time local resident). She is sure no storm or flood of this magnitude had occurred in Lane Canyon during the 100+ years her family had lived in the area. (Mrs. Stroughton is a descendent of the Lane family for which the canyon is named.) The flood destroyed a county road bridge and a railroad bridge at the mouth of the canyon. This area is only about 30 mi north of Heppner where the worst flood disaster in Oregon history occurred in 1903. Historical photographs taken after the flood of July 26, 1965, and photographs taken during the 2003 review and described herein are provided in figures A172–A178.

**Method of peak discharge determination:** A two-section slope-area measurement was made in a good reach near the mouth of the canyon on August 17, 1965. The 300-ft reach length was limited by tributary inflow at the upstream end and by backwater from a bridge and road fill at the downstream end. Flow was contained in a straight, steep-gradient, contracting channel. The fall was 3.77 ft between the cross

sections (slope = 0.013 ft/ft). The high-water profile was defined by good quality high-water marks on both banks. There was no significant difference in elevation on either bank.

The main channel is described as “hard pan” with some cobbles and exposed bedrock. The channel upstream of the reach is littered with cobbles, but the high flow swept the slope-area reach clean. At the time of the survey, scour in the reach seemed minimal. The flood likely carried a significant percentage of suspended sediment and may have been a hyperconcentrated flow. This sediment was deposited on the Umatilla River flood plain. Records of the amount of deposition probably could be recovered from the railroad because of the extensive cleanup and repair needed for the railroad bridge.

The Manning’s “*n*” value of 0.032 seems reasonable. If the channel was not so steep-gradient, a smaller roughness coefficient may have been applicable. Manning’s “*n*” for the “hard pan” bed and grassy side slopes was estimated at 0.025 but was increased to 0.032 because of some channel irregularities. Subdivision was considered for both sections during review but was deemed unnecessary. There were no significant overflow areas at either cross section.

The computed average velocity was 27–28 ft/s. Flow was supercritical throughout the reach with Froude numbers in the 1.8 to 1.9 range. This flood probably was a flow “spike” where gradually varied, one-dimensional flow was short lived if it occurred at all.

The Bureau of Reclamation reviewed this indirect measurement and the resulting discharge as part of their project on spillway design for projects in Central Oregon. They developed a topographic map and cross sections for the 400 m of stream channel immediately upstream of the mouth of the canyon and ran a step-backwater analysis. The results indicate 11,000 ft<sup>3</sup>/s as a maximum discharge for a “clearwater” flood (Levish and Ostenaar, 1996).

**Possible sources of error:** The most probable source of error is using a two-section slope-area measurement. There is plenty of slope for another section, and (or) flow in the tributary canyon could have been measured and the reach extended upstream. Timing of peak flow from the tributary is not a problem for storms that are this short in duration.

The flood transported a lot of sediment. The deposits at the mouth of the canyon appear to be extensive.

Sediment concentration is not known but could be in the hyperconcentrated range. Flow may not have been gradually varied as required for the slope-area solution. Selecting “*n*” values for channels this steep is difficult. There is no verification that is universally accepted.

**Recommendations of what could have been done**

**differently:** Another section could have been surveyed between sections 1 and 2. There is plenty of slope, and the sections could have been located a short distance upstream and downstream to allow for a third section. The reach could have been extended upstream by estimating or measuring tributary inflow that was a small percentage of the total discharge. Had this been done, several more sections could have been included in the computation.

**Site visit and review:** The site was visited on April 22–23, 2003, by John Costa (USGS Office of Surface Water), Mike

Nolan (USGS Western Region Surface-Water Specialist), Bob Jarrett (USGS Office of Surface Water), and Glenn Hess and Jim O’Conner (USGS Oregon Water Science Center), John England (Bureau of Reclamation), Joe Weber (Federal Emergency Management Agency), and Gary Gallino (USGS, retired). The field team studied the downstream one-half of the basin looking for evidence of debris-flow deposits. The team concluded that the deposits were reworked alluvium and that the flood was not a debris flow. Some lobes suspected to be debris-flow deposits were observed at the mouth of some small tributaries, but they did not reach the main channel.

**Recommendation:** The original peak discharge of 28,500 ft<sup>3</sup>/s should be accepted as published and the rating should be downgraded to “poor” because of the two-section solution, high Froude numbers, and large amounts of sediment.

The reach is an excellent slope-area site and application of the slope-area technique is appropriate.



**Figure A172.** View looking across Lane Canyon toward Umatilla River Valley, Lane Canyon near Nolin, Oregon, August 1965.



**Figure A173.** View looking downstream from upstream of cross section 1, Lane Canyon near Nolin, Oregon, August 1965.



**Figure A174.** View looking downstream toward mouth of canyon from downstream of slope-area reach, Lane Canyon near Nolin, Oregon, August 1965.



**Figure A175.** View of right bank from upstream of section 1, Lane Canyon near Nolin, Oregon, August 1965. Man is standing at section 1.



**Figure A176.** View looking downstream to left bank with sections 1 and 2 marked with orange signs, Lane Canyon near Nolin, Oregon, August 1965.



**Figure A177.** View looking upstream through slope-area reach, Lane Canyon near Nolin, Oregon, April 23, 2003.



**Figure A178.** View looking downstream through slope-area reach, Lane Canyon near Nolin, Oregon, April 23, 2003.

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