

Wilson Creek near Adako, North Carolina

(Miscellaneous ungaged site in the Yadkin basin,
USGS North Carolina Water Science Center)

Review of peak discharge for the flood of August 13, 1940

Location: This flood was located about 1.6 mi northwest of Adako, N.C. at 35.9161N and 81.7292W.

Published peak discharge: The peak discharge for the August 13, 1940, flood, as published in U.S. Geological Survey (1949), is 99,000 ft³/s. The computed peak is described as “reliable” in the slope-area narrative statement, only identified by the initials H.J., written May 2, 1941.

An old gaging station, at latitude 35°55'10", longitude 81°44'00", as described in the 1950 compilation report (U.S. Geological Survey, unpub. data, 1950), was operated from 1921 to 1922. The field visit of August 25, 2003, places the indirect site at about 35°54'58", 81°43'45", by GPS, which is slightly downstream of the gaging station. However, there is no direct evidence that this is the correct location because the original field notes for the 1940 indirect measurement can not be located. The Collettsville 7.5-minute quadrangle was used for location purposes.

Remnants of an old low-water dam were located just upstream of Brown Mountain Beach at latitude 35°54'33", longitude 81°43'38" (GPS). This probably is the dam used by Granite Falls Manufacturing Co. (permittee in FPC Project No. 81). This dam is about 0.6 mi downstream of the probable location of the slope-area measurement. A statement in the compilation report for this reach of Wilson Creek indicates “uncomprehensible scour of the river bed and the valley hill sides.” This would indicate that the dam may have been washed out by the 1940 flood, thus increasing the peak discharge and volume of the flood’s capacity to exacerbate scour downstream of the dam.

Drainage area: A drainage area of 65.5 mi² for the 1921 gaging station was measured in 1924 on the 1905 Morganton quadrangle, scale 1:125,000. According to the 1950 compilation report (U.S. Geological Survey, unpub. data, 1950), the drainage area was rounded to 66 mi² for “published records,” and this is the drainage area published in U.S. Geological Survey (1949). The drainage area may be in error because of the map scale used for the original determination. A recomputation of drainage area using 1:24,000 maps is advisable.

Data for storm causing flood: Two distinct, but separate storms occurred in August 1940. The first storm is commonly referred to as the mid-August storm, and is the storm that caused the peak discharge on Wilson Creek. This storm resulted from a hurricane in the Atlantic Ocean about August 8. Precipitation greater than 15 in. for the entire storm,

and 8 in. for a single day was measured at numerous points in North Carolina. In Avery County, a total of 8.98 in. was recorded on August 13, and a 4-day storm total of 15 in. was recorded at the Crossnore station. In Caldwell County, two precipitation stations at Lenoir recorded storm totals of 8.8 and 11.1 in., respectively. The Wilson Creek basin covers much of both counties. A photograph taken during the 2003 review and described herein is provided in figure A149.

Method of peak discharge determination: The peak discharge for the August 13, 1940, flood was determined by a three-section slope-area measurement. The field notes and computations for this measurement can not be found, and therefore, a detailed review can not be made. A copy of the original review notes for the measurement is available. This review was made by someone with the initials “H.J.,” and the review was made on May 2, 1941, more than 8 months after the flood.

The review notes by H.J. stated that a second slope-area measurement was attempted farther upstream but was not used because the roughness coefficients that were applied resulted in “excessive velocities and unreasonable discharges.” The review also indicates there was “very excessive turbulence” in this reach. The writer also hints at the possibility that a critical depth computation may have been tried, but this is not certain, and H.J. did not give any results.

A rating-curve plot for the flow range greater than 10,000 ft³/s was found. It was apparently developed for the 1950 compilation report (U.S. Geological Survey, unpub. data, 1950) to define the peak discharge for the 1916 flood, another very large flood for Wilson Creek. The station analysis indicates that this is a very large revision of the previous high-stage part of the rating curve. Other than the 1940 slope-area measurement, there are no other discharge measurements for definition of this rating. It appears to be a largely empirical or hand-drawn rating based on the 1940 indirect measurement and some type of velocity-area analysis for stages lower than the 1940 flood.

Possible sources of error: The fact that the original slope-area measurement has been lost and can not be reviewed in detail makes it difficult to determine possible sources of error. The field visit of August 25, 2003, to the probable location of the measurement did not reveal any obvious sources of error. The reach is straight for a long distance, with fairly steep banks. The streambed consists of gravel, large cobbles, and some small- to medium-size boulders.

The number and quality of high-water marks may be a source of uncertainty because it is not known exactly when the marks were flagged or when the slope-area measurement was made. If the field work was done soon after the flood, high-water marks may have been of good quality. However, the review was written more than 8 months after the flood, and the date of the flagging and (or) survey is not given, so the high-water marks are an uncertainty. The review does not mention high-water marks, so this omission may be an indication that the high-water marks were good.

In the extreme upstream reaches where the small tributaries come off the mountain slopes, some debris slides and flows may have occurred because they are common in this area. However, by the time the flood reached the site of the indirect measurement, most of the debris load should have been deposited. At the community of Mortimor, N.C., about 6 mi upstream of the slope-area site, buildings, roads, and railroads had been washed away during the flood. Old photographs posted in the Wilson Creek Visitors Center that were taken during the flood at Mortimor show flow and sedimentologic conditions that appear to be a water flow. There is no evidence of debris flows.

Recommendations of what could have been done differently: The main recommendation would be to properly preserve and archive all original surveys, measurements, field notes, and other material.

Site visit and review: A field visit to the probable site of the slope-area measurement and to several points upstream, including the Wilson Creek Wild and Scenic River Visitors Center, was made on August 25, 2003, by Vernon Sauer and Gene Barker (USGS Asheville Water Science Center field office). Photographs were taken at several places. Wilson Creek was declared a Wild and Scenic River in August 2000 by President Clinton. The visitors center contains information about the 1916 and 1940 floods, including photographs and various written and personal accounts.

Recommendations: The original peak discharge of 99,000 ft³/s should be accepted as published on the basis of the field inspection and the rating should be an “estimate.” The drainage area should be checked using 1:24,000-scale maps.

The writer (H.J.) of the original review of the indirect measurement states that the measurement results are reasonable and reliable. Because the measurement is not available at this time, there is nothing to contradict or support the reliability of the measurement.



Figure A149. View looking upstream of slope-area reach, Wilson Creek near Adako, North Carolina, August 25, 2003. No original photographs of 1940 flood were found.