West Fork Nueces River near Kickapoo Springs, Texas

(Miscellaneous ungaged site in the Nueces River basin, USGS Texas Water Science Center)

Note: This site was originally named "33 miles above Brackettville," later changed to "28 miles above Brackettville," and on some documents just "near Brackettville." The current name "near Kickapoo Springs" was assigned at some later date. The measurement site is officially described as "33 miles above the gage near Brackettville."

Review of peak discharge for the flood of June 14, 1935

Location: This flood was located about 33 mi north of Bracketville, Tex., at 29.7583 N and 100.3958 W.

Published peak discharge: The peak discharge for this miscellaneous site, as published in Asquith and Slade (1995), is 580,000 ft^3/s. The rating is poor.

Drainage area: 402 mi^2.

Data for storm causing flood: Very little information is available for the June 1935 storm in the Nueces River basin. USGS National Water Summary (Paulson and others, 1991) has a short narrative for the South Llano and James River basins, which are just north of the Nueces River basin. Paulson and others (1991) indicate that intense rainfall of more than 18 in. fell during June 9–15, 1935, in the South Llano and James River basins that created record floods at several points in these basins. Otherwise, no information could be found for rainfall in the Nueces River basin. Historical photographs taken after the June 14, 1935, flood and during the 2003 review and described herein are provided in figures A59–A65.

Method of peak discharge determination: The peak discharge for this site is based on a two-section slope-area computation. All flow was in one channel. The original survey defined two cross sections (sections 1 and 3) that were 568 ft apart. Almost 2 years after the original survey, two additional cross sections (2 and 4) were surveyed to confirm the cross-sectional areas. One additional section (section 2) was located between sections 1 and 3, and another section (section 4) was located downstream of section 3. These additional sections apparently were not used to compute the peak discharge because there is no record of them in the files. No additional high-water marks could be found during the second survey.

High-water profiles were defined on both banks, although the right-bank profile is subject to considerable interpretation. Marks on the right bank show large differences (as much as 5 and 6 ft) in the upstream end of the reach. There may have been two or more peak discharges, or there may have been large waves near the right bank. The analyst of the original computations used the upstream high-water marks to define the high-water profiles. The left-bank profile is well defined, but is about 3 ft lower than the right-bank profile.

Roughness coefficients appear reasonable. The field-assigned Manning's roughness coefficient of 0.030 was used throughout the reach. Jarrett's (1994) equation computes a coefficient of 0.025 for section 3 and 0.029 for section 1.

The original files indicate that at least four different computations were used based on different water-surface slopes. Peak discharges ranged from 537,000 to 612,000 ft^3/s. For this review, three separate slope-area computation (SAC) analyses were done. The first analysis used the two original cross sections, and the upstream profile on the right bank. Water-surface elevations were nearly the same as in the original computations. This SAC analysis attempted to duplicate the original computations as closely as possible. A peak discharge of 522,000 ft^3/s was computed. The reach is contracting throughout with Froude numbers of 0.58 (upper) and 0.63 (lower).

The second SAC analysis was the same as the first, except three cross sections were used. The additional cross section (section 2), was inserted. Again, the upstream profile on the right bank was used. The SAC peak discharge, based on three sections, was 523,000 ft^3/s, contracting throughout. Froude numbers ranged from 0.58 (section 1), to 0.60 (section 2), and 0.63 (section 3).

The third SAC analysis used the same three cross sections; however, in this case, the downstream profile on the right bank was used. The third analysis yielded a peak discharge of 486,000 ft^3/s for a three-section computation, contracting throughout, and Froude numbers similar to those from the second SAC analysis.

Possible sources of error: The West Fork Nueces River near Kickapoo Springs, Tex., seems to be a good slope-area site; however, the lack of good high-water profile definition on the right bank is the primary uncertainty in this poor measurement. In addition, the cross sections are too close together, but the reach is contracting throughout, which is a good feature. Froude numbers are reasonable. The most likely source of error for this site is in the interpretation of the high-water profile.

Recommendation of what could have been done differently: A longer reach would have been better, and this was attempted about 2 years after the flood, but high-water marks could not be defined at that time. This measurement received thorough review, including a review by the USGS Chief Hydraulic Engineer in Washington, D.C. On the basis of his review, additional cross sections were surveyed; however, this did not result in a change to the original computed discharge.

Site visit and review: A field visit was made to the site on May 13, 2003, by John Costa (USGS Office of Surface Water), John England (Bureau of Reclamation), and Vernon Sauer and Raymond Slade (USGS). The site was located using latitude and longitude with GPS. Physical markers were not available to locate cross sections.

The channel is about 600 ft wide, relatively flat, and open. It is composed of gravel, large cobbles, and small boulders. Both banks are fairly steep. It appears to be a very good slope-area site, but the measurement is poor.

Recommendation: The original peak discharge of 580,000 ft^3/s should be accepted as published.

The three SAC analyses indicate that the peak discharge is about 10 to 16 percent less than the published peak discharge. This is based on the original interpretations and on reviewers interpretations of the data. In light of the uncertainties in water-surface profiles, the difference is not considered large enough to warrant a revision to the original published peak discharge.

Figure A59. View looking across stream from right bank at upstream cross section, West Fork Nueces River near Kickapoo Springs, Texas, June 1935. Slope-area section for flood of June 14, 1935.

Figure A60. View looking across and upstream of downstream cross section, West Fork Nueces River near Kickapoo Springs, Texas, June 1935.

Figure A61. View looking upstream of downstream cross section, West Fork Nueces River near Kickapoo Springs, Texas, June 1935.

Figure A62. View looking upstream toward slope-area reach, West Fork Nueces River near Kickapoo Springs, Texas, June 13, 2003.

Figure A63. View looking from right to left bank in middle of slope-area reach, West Fork Nueces River near Kickapoo Springs, Texas, June 13, 2003.

Figure A64. View looking upstream near middle of slope-area reach, West Fork Nueces River near Kickapoo Springs, Texas, June 13, 2003.

Figure A65. View looking downstream from right bank looking from middle of slope-area reach, West Fork Nueces River near Kickapoo Springs, Texas, June 13, 2003.