

Floods on the Llano River - 2018

Were they the 100-year flood?



Llano River at Interstate 10 Bridge
Junction, Texas - October 9, 2018

During September and October 2018, record rainfall totals fell across the Llano River watershed. The community of Valley Spring (14 miles WNW of Llano) received more than 22 inches during these months, with more than 10 inches of rain occurring in a 48-hour period in October. Precipitation runoff over saturated soils across the watershed resulted in severe flooding in numerous locations. The Llano River at Llano peaked at 40.17 feet or 278,000 cubic feet per second (cfs), the second highest flood in recorded history at this location. Upstream of Llano, the James River in Mason County peaked at 112,000 cfs (26.42 ft) while Johnson Fork in Kimble County crested at 107,000 cfs or 32.6 ft.

How do these floods compare historically to other floods in the Llano watershed and, statistically, how often can one expect to see floods of this magnitude? This report compares the recent floods on the Llano against previous floods to provide a historic perspective to landowners and other river users about the flood capacity of the Llano.

Recurrence Interval

Hydrologist use recurrence intervals to calculate the severity of floods. This statistically-derived result estimates the probability of a flood’s occurrence over a given period of time, often 100 years. The 100-year recurrence interval, often mistakenly referred to as the “100-year flood”, predicts a flood to have a 1 in 100 (1:100) probability of occurring during a given year. Looked at another way, a 1:100 recurrence interval also means that over the course of 20 years, there is a 1:5 chance that such a flood will occur. The term “100-year flood” is a misnomer because it suggests that such a flood only occurs once every 100 years.

Floods of 2018

Table 1 presents the US Geological Survey recurrence intervals for selected stream gages in the Llano watershed¹. The Fall 2018 flood on the **Llano at Llano has a recurrence interval close to 1:50**, while the flood on the **Llano near Mason was less than a 1:25 event**. While none of the listed events have a 1:100 recurrence interval, other reports show that the flood on the **James River (112,000 cfs) exceeded the 1:100 recurrence interval** of 101,000 cfs,² while the flood on **Johnson Fork (107,000 cfs)**, near the community of Segovia, **exceeded the 1:100 event** calculated by Heitmuller to be about 101,000 cfs.³

Gage	1:2	1:5	1:10	1:25	1:50	1:100	Peak Flood Event	Fall 2018
N Llano near Junction	10,300	35,300	58,700	92,300	118,000	143,000	102,000	28,000
Llano near Junction	13,700	50,100	88,200	149,000	202,000	258,000	319,000	121,000
Llano near Mason	25,700	75,300	125,000	208,000	283,000	369,000	380,000	193,000
Llano at Llano	30,500	78,400	126,000	207,000	284,000	374,000	380,000	278,000

Figure 1. Recurrence Intervals and Fall 2018 peaks for selected gages in Llano Watershed (from Asquith, et al.)

¹Asquith, William H, R.M. Slade, and Jennifer Lanning-Rush, *Peak-flow frequency and extreme flood potential of streams in the victim of the Highland Lakes, Central Texas, U.S. Geological Survey Water Resources Investigations Report 96-4072, 1996.*

²Tinkler, L.J. 2001, *The case of the missing flood: The unrecorded flood of 1935 on the James River, Mason County, Texas.* Geomorphology 39: 239-50.

³Heitmuller, Franklin T., Hudson P.F., Asquith W.H., 2015. *Lithologic and hydrologic controls of mixed alluvial-bedrock channels in flood-prone fluvial systems : Bankfull and macrochannels in the Llano River watershed, central, Texas, USA.* Geomorphology 232 1-19.