

Exceedance Probability Analysis for the Oklahoma Rainfall Events of April - June 2015



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The Hydrometeorological Design Studies Center (HDSC) analyzed annual exceedance probabilities (AEPs) for the Oklahoma rainfall events that occurred during April - June 2015. AEP is probability of exceeding a given amount of rainfall for a given duration at least once in any given year at a given location. It is an indicator of the rarity of rainfall amounts and is used as the basis of hydrologic design.

Multiple rainfall events in the month of May delivered rainfall amounts that exceeded 20 inches in some locations. The rarity of these amounts is illustrated in four figures below. Figure 1 shows how the maximum observed rainfall amounts for durations from 1 to 60 days compared to corresponding rainfall frequency estimates for AEPs from 1/2 (50%) to 1/1000 (0.1%) for a rain gauge in Oklahoma - US1OKCV0082, Newalla 7.1 SW (35.3346°N, 97.2670°W, 1194 ft elevation). This rain gauge is part of the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS). The AEP estimates are from the [NOAA Atlas 14, Volume 8](#). The upper bound of the 90% confidence interval for 1/1000 AEP is also shown in the figure to illustrate uncertainty associated with the calculation of AEPs, which increases as the AEP becomes smaller. As can be seen from Figure 1, observed rainfall amounts have probabilities of less or equal to 1/1000 for durations above 18 days. Rainfall amounts across all durations are below the upper bound of the 90% confidence interval of corresponding 1/1000 AEP estimates.

The maps in Figures 2 - 4 show the areas that experienced rainfall magnitudes with AEPs ranging from 1/10 (10%) to smaller than 1/1000 (0.1%) for the 20-day, 30-day and 60-day duration, respectively. Rainfall amounts are derived from the National Centers for Environmental Prediction, Environmental Modeling Center's [Stage IV analysis dataset](#). Rainfall frequency estimates are from the [NOAA Atlas 14, Volume 8](#).

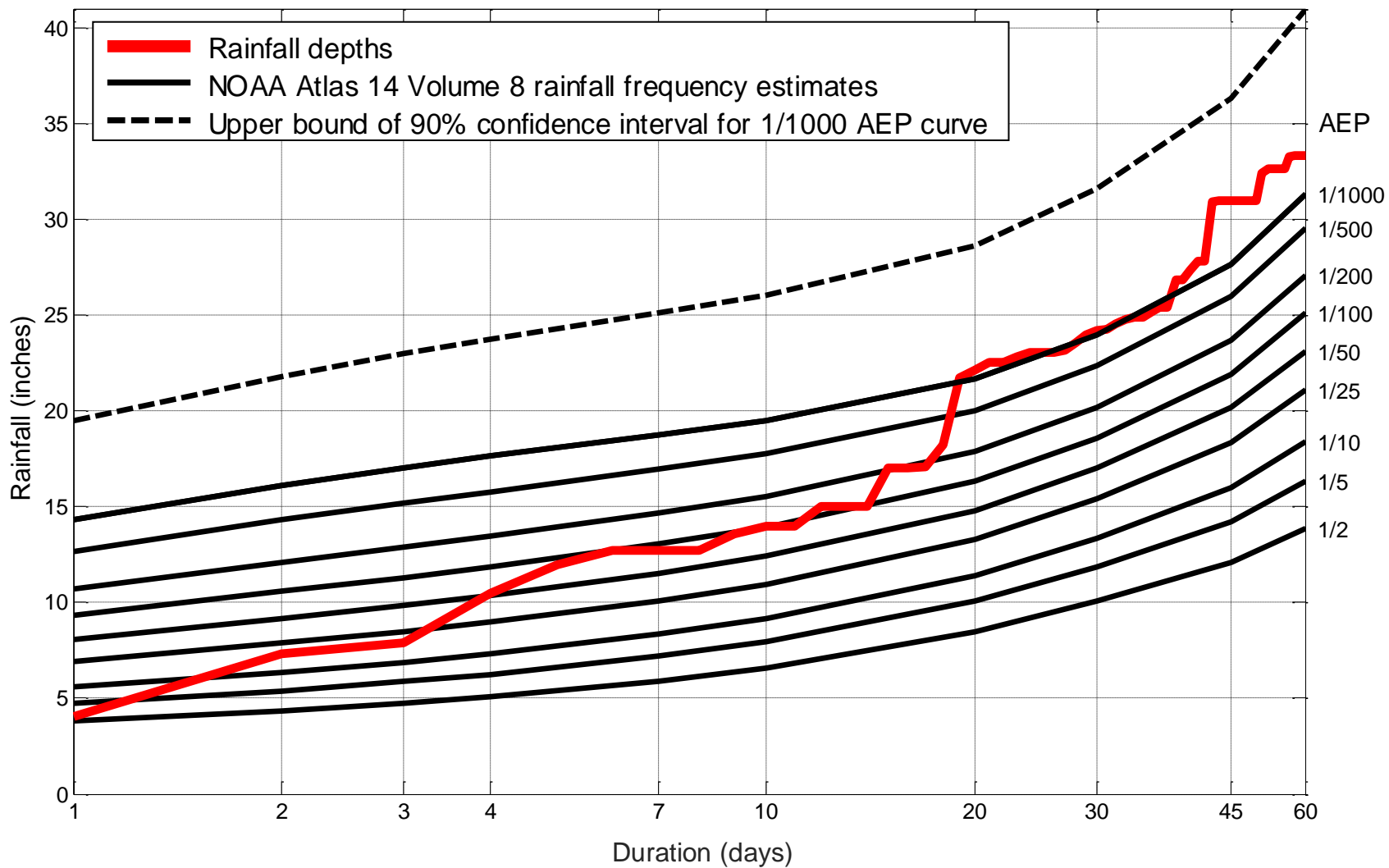


Figure 1. Maximum observed rainfall amounts in relationship to corresponding rainfall frequency estimates for the US10KCV0082 gauge.

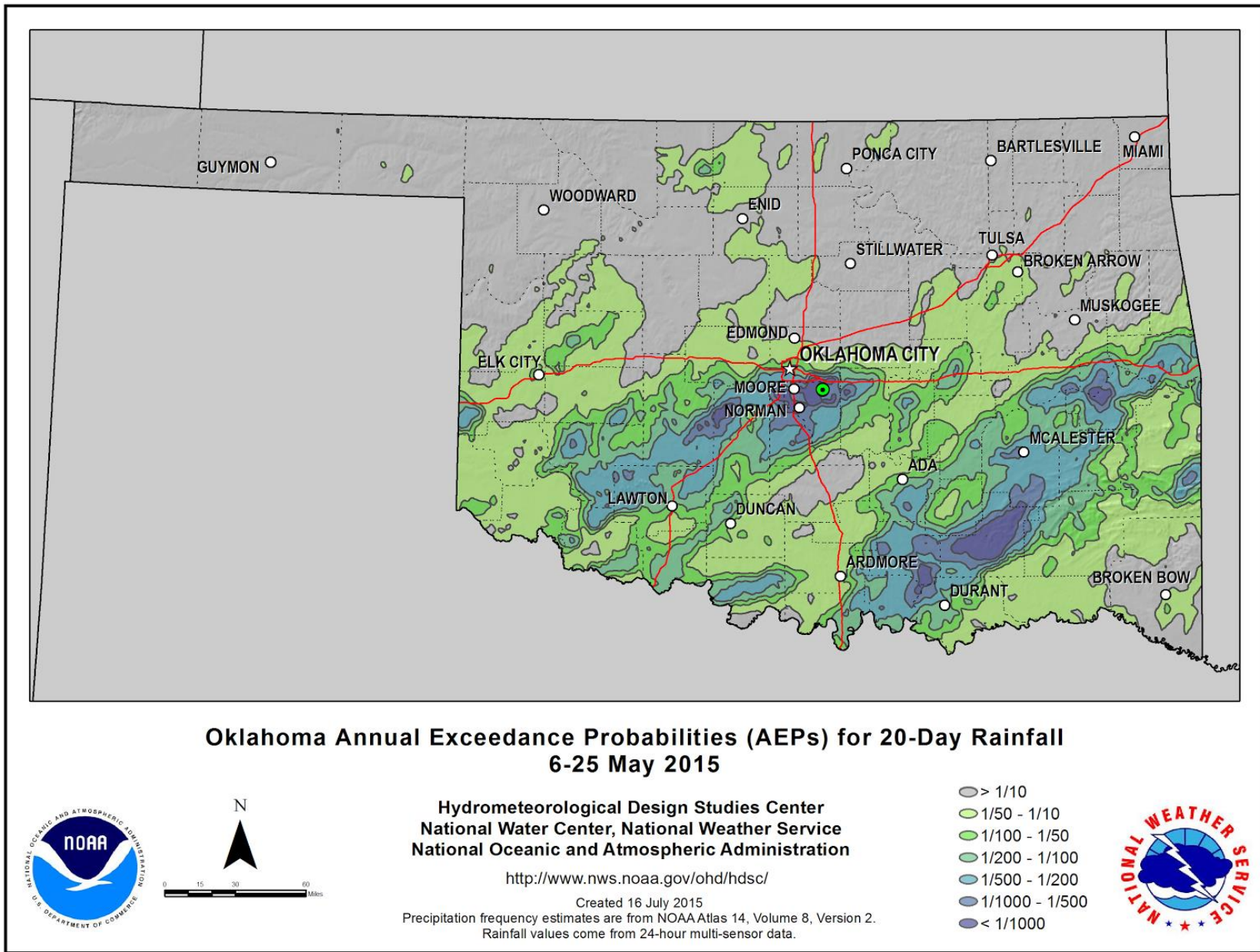


Figure 2. Annual exceedance probabilities for the 20-day rainfall from 6 to 25 May 2015. The green marker is the location of the US10KCV0082 gauge.

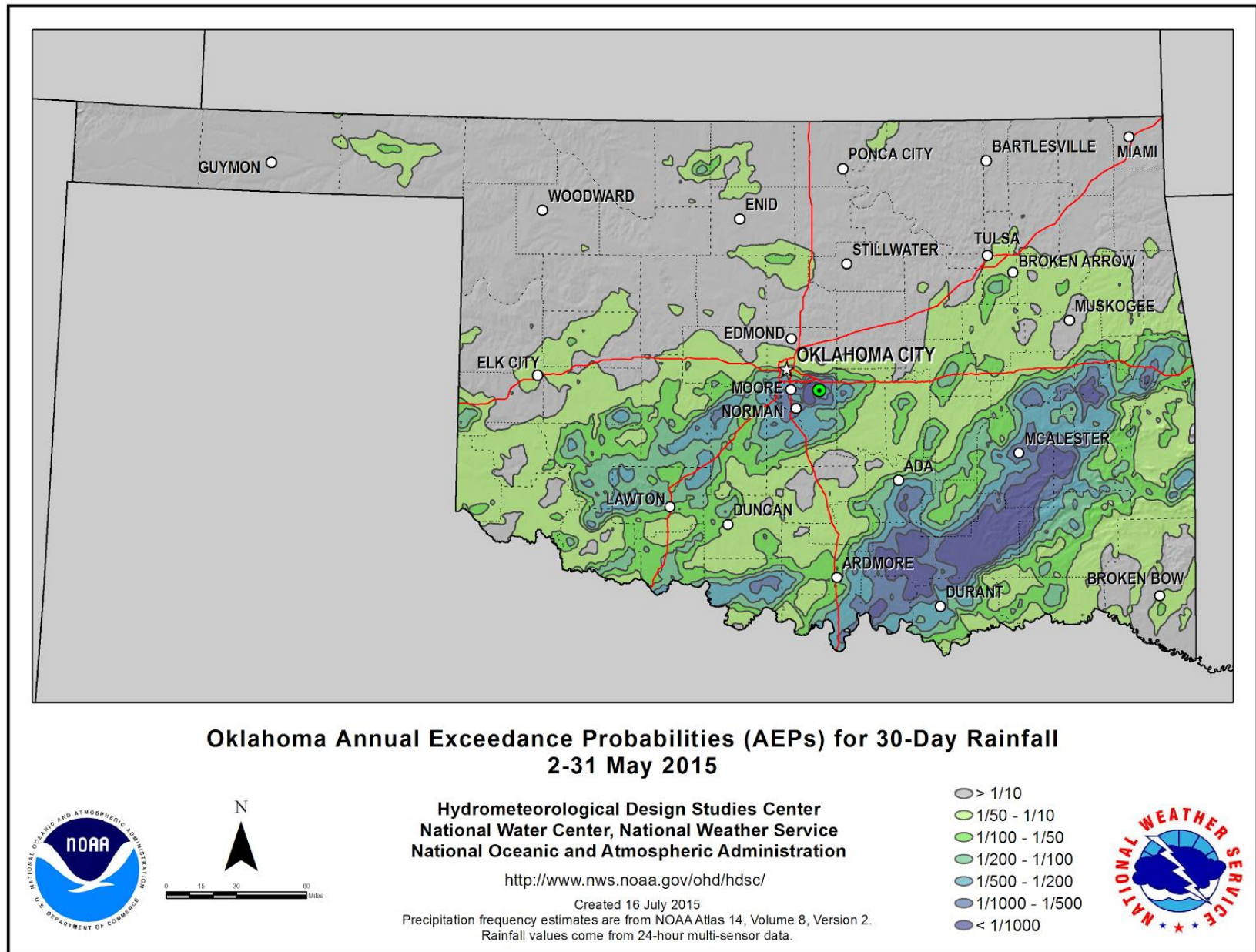


Figure 3. Annual exceedance probabilities for the 30-day rainfall from 2 to 31 May 2015. The green marker is the location of the US10KCV0082 gauge.

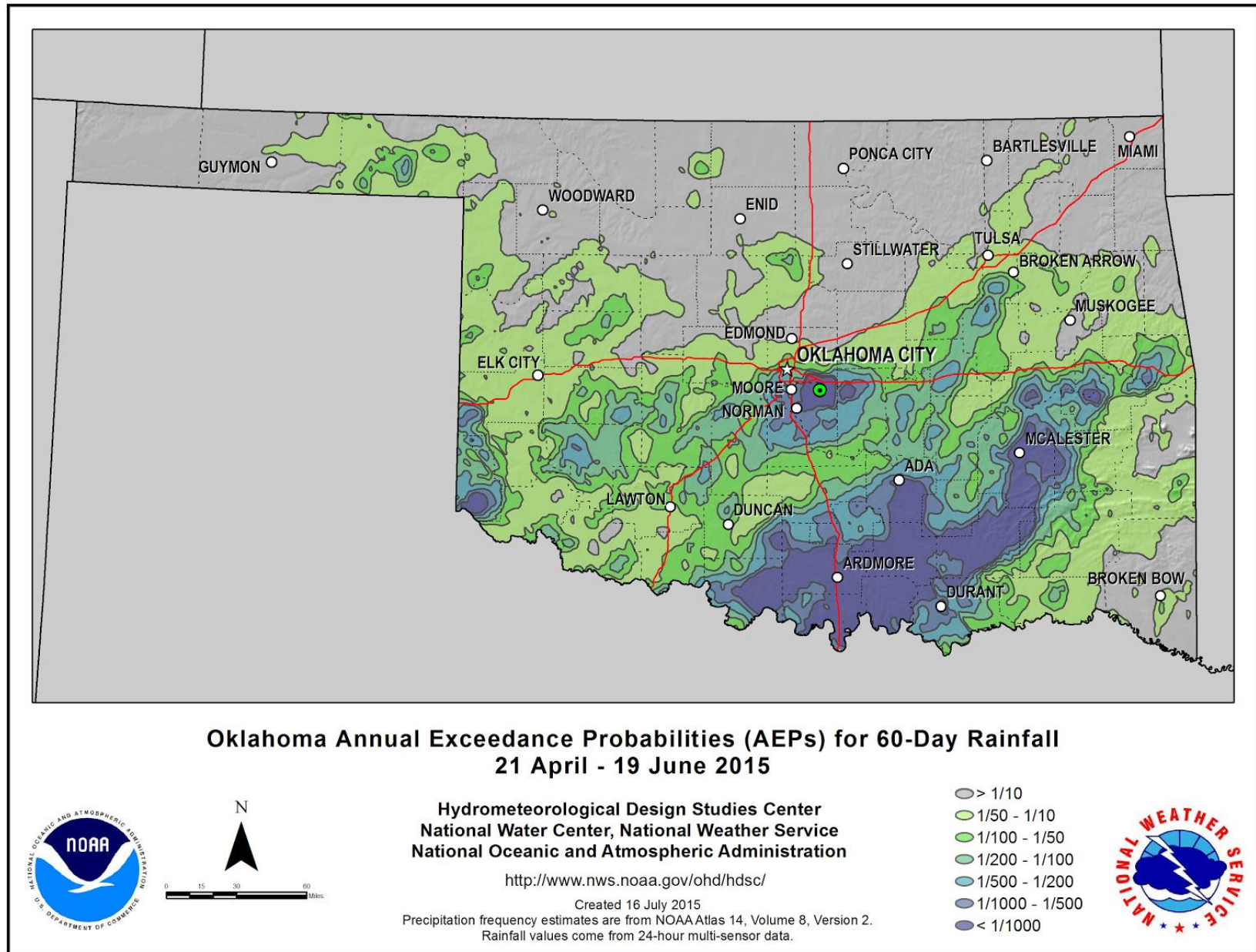


Figure 4. Annual exceedance probabilities for the 60-day rainfall from 21 April to 19 June 2015. The green marker is the location of the US1OKCV0082 gauge.