NOAA Technical Memorandum NWS SR-219

A RIVER FLOOD CLIMATOLOGY OF THE ARKANSAS AND RED RIVER BASINS

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Arkansas-Red Basin River Forecast Center
Tulsa, Oklahoma

Scientific Services Division
Southern Region
Fort Worth, Texas

June 2002

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Donald L. Evans, Secretary

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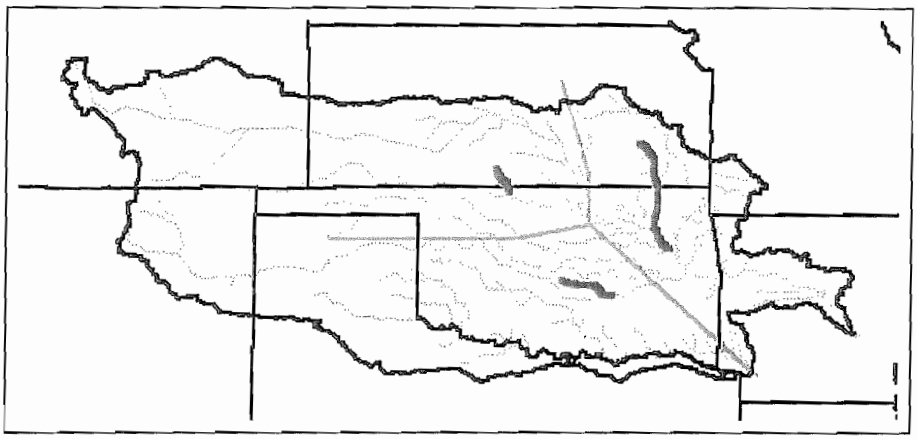


Figure 2. Barrier Separating Three Rivers

2. Interpolation

An ArcView Avenue script was run on each of the resultant monthly data files. An Inverse Distance Weighting (IDW) method of interpolation was used. ArcView's IDW method allows for the inclusion of several variables. For this project: the *power* variable was set to one to generate a linear interpolation between stations, the number of *neighboring stations* used in the interpolation was set to two to try to find the closest upstream and downstream stations and a *maximum distance* variable of 100 miles was used to limit the distance to look for surrounding stations. After each interpolation, the resultant grid (Figure 3) was masked to only describe the rivers (Figure 4). Once each of the 26 subsets of masked and gridded products was created, all were merged together. The result was a monthly ABRFC-wide gridded product. These monthly products were then summed and divided to arrive at seasonal and annual products (Appendix A).

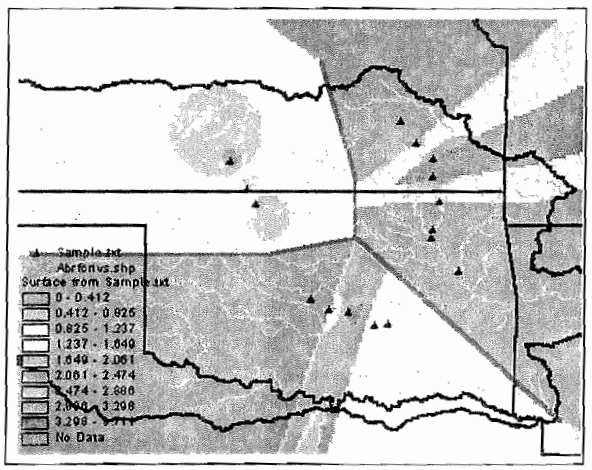


Figure 3. IDW Interpolation

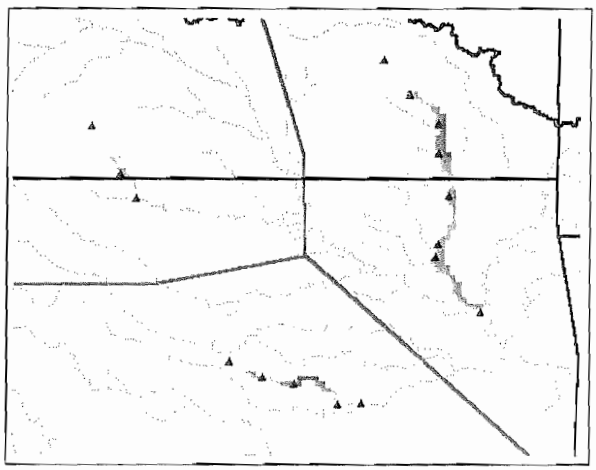


Figure 4. IDW Interpolation Result Masked to River

C. Flood Frequency

The results from the database queries were also used to generate a number of statistics for the ABRFC as a whole and also for individual river stations. For the entire ABRFC, the averages for the number of flood days per month and the number of river stations with flooding per month were computed (Figure 5). For individual stations, the *average number of flood days per month*

and *flood days per year* were calculated. The results were ranked and the "Top 5" are displayed in Tables 1, 2 and 3.

IV. Results

A. ABRFC Flood Climatologies – Histogram

1. ABRFC Average Flood Days, Stations with Flooding and Flood Duration per Month

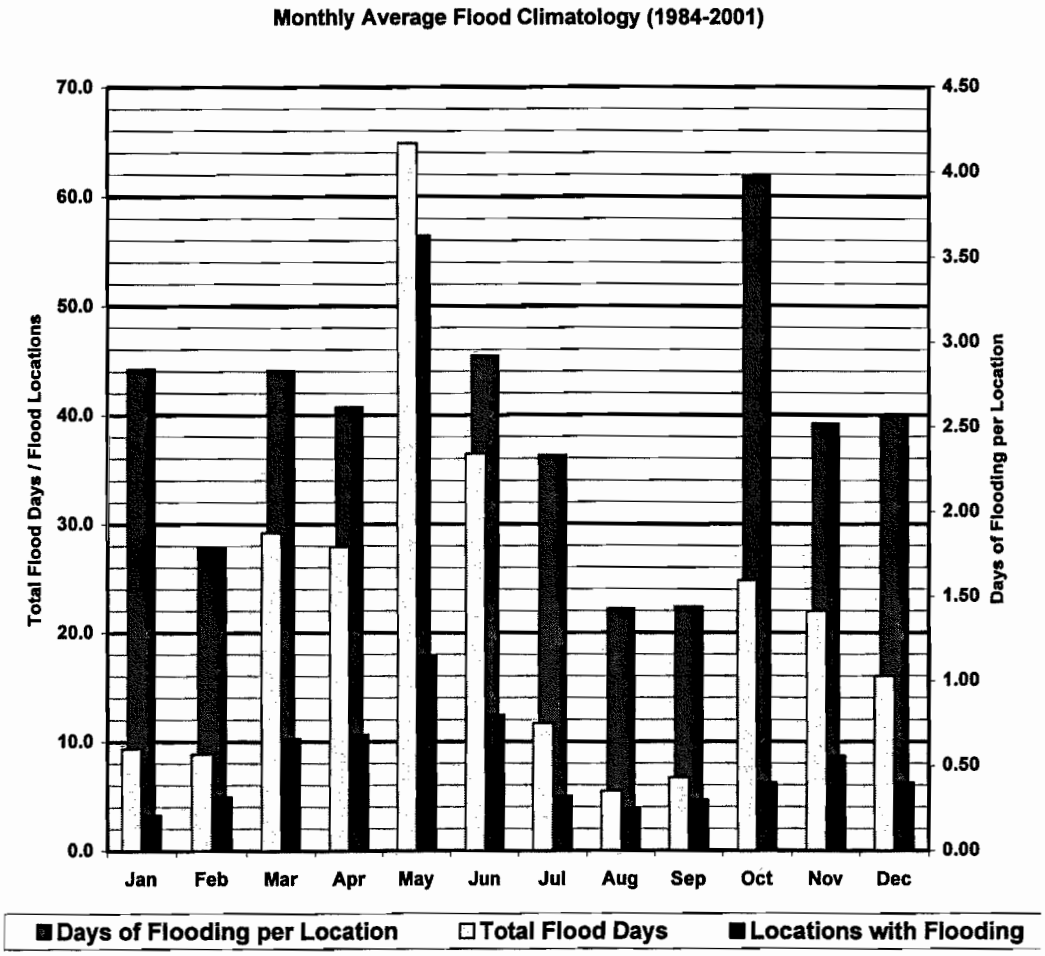


Figure 5. ABRFC Monthly Average Flood Climatology

2. *Table 1: Top 5 Flood Sites Per 3-Month Season*

Spring	(days/season)	Summer	(days/season)
Arkansas River @ Van Buren, AR	17.44	Arkansas River @ Van Buren, AR	5.07
Deep Fork River @ Beggs, OK	12.00	Deep Fork River @ Beggs, OK	4.33
Fourche La Fave @ Houston, AR	7.54	Neosho River @ Commerce, OK	4.03
Neosho River @ Commerce, OK	6.62	Neosho River @ Parsons, OK	1.69
Little River @ Tecumseh, OK	3.38	Little River @ Tecumseh, OK	1.59
Fall	(days/season)	**Winter**	(days/season)
Neosho River @ Commerce, OK	4.05	Arkansas River @ Van Buren, AR	5.25
Arkansas River @ Van Buren, AR	3.67	Fourche La Fave @ Houston, AR	4.72
Deep Fork River @ Beggs, OK	2.96	Deep Fork River @ Beggs, OK	3.83
Neosho River @ Parsons, OK	2.05	Neosho River @ Commerce, OK	2.04
Caney River @ Ramona, OK	2.03	Arkansas River @ Dardanelle, AR	1.87

3. *Table 2: Top 5 Annual Flood Sites*

River Station	(days/year)
Arkansas River @ Van Buren, AR	31.43
Deep Fork River @ Beggs, OK	23.12
Neosho River @ Commerce, OK	16.74
Fourche La Fave River @ Houston, AR	14.43
Neosho River @ Parsons, OK	7.58

4. *Table 3: Top 5 Average Number of Months with Flooding Per Year*

River Station	(months/year)
Little River @ Tecumseh, OK	4.32
Neosho River @ Commerce, OK	3.63
Deep Fork River @ Beggs, OK	3.35
Arkansas River @ Van Buren, AR	3.24
Petit Jean River @ Danville, AR	3.06

VI. WFO-specific River Flood Climatologies

In order to provide these graphics with more detail, a website has been designed to allow users to tunnel down from the ABRFC level to the WFO level. Each hydrological station's average flood days per month (Figure 6) and flood days per year (Figure 7) are also presented as individual histograms on the flood climatology website. WFO and station-specific graphics and tables are available at *http://www.srh.noaa.gov/abrfc/floodclimate/index.shtml*.

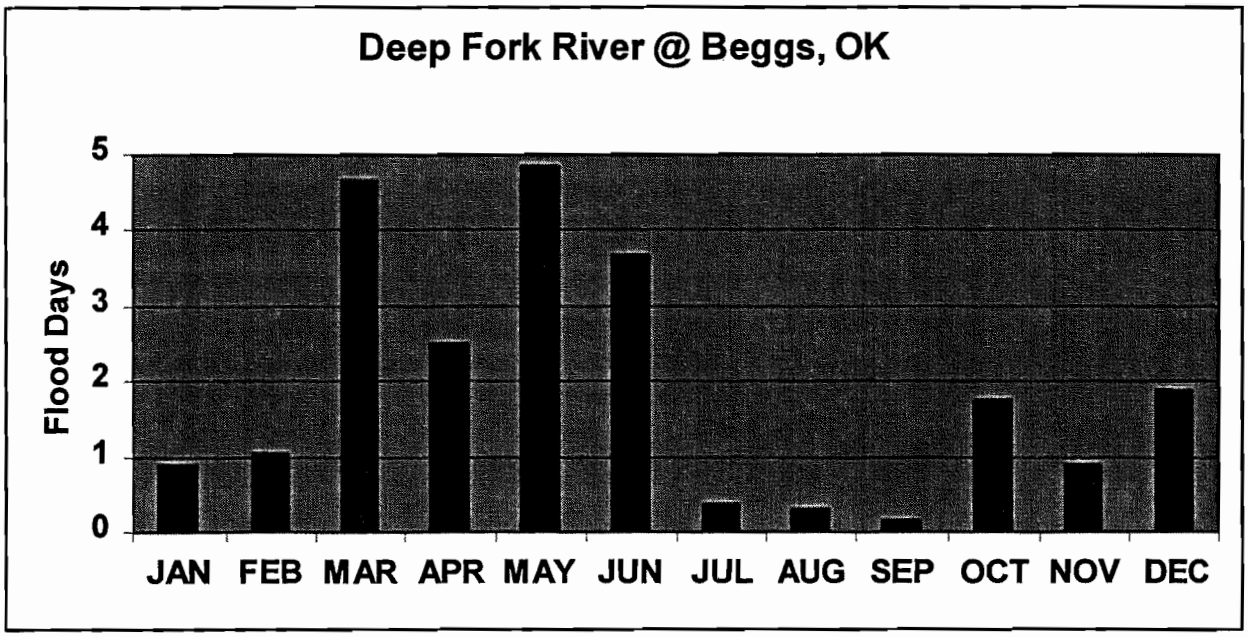


Figure 6. Average Number of Flood Days per Month

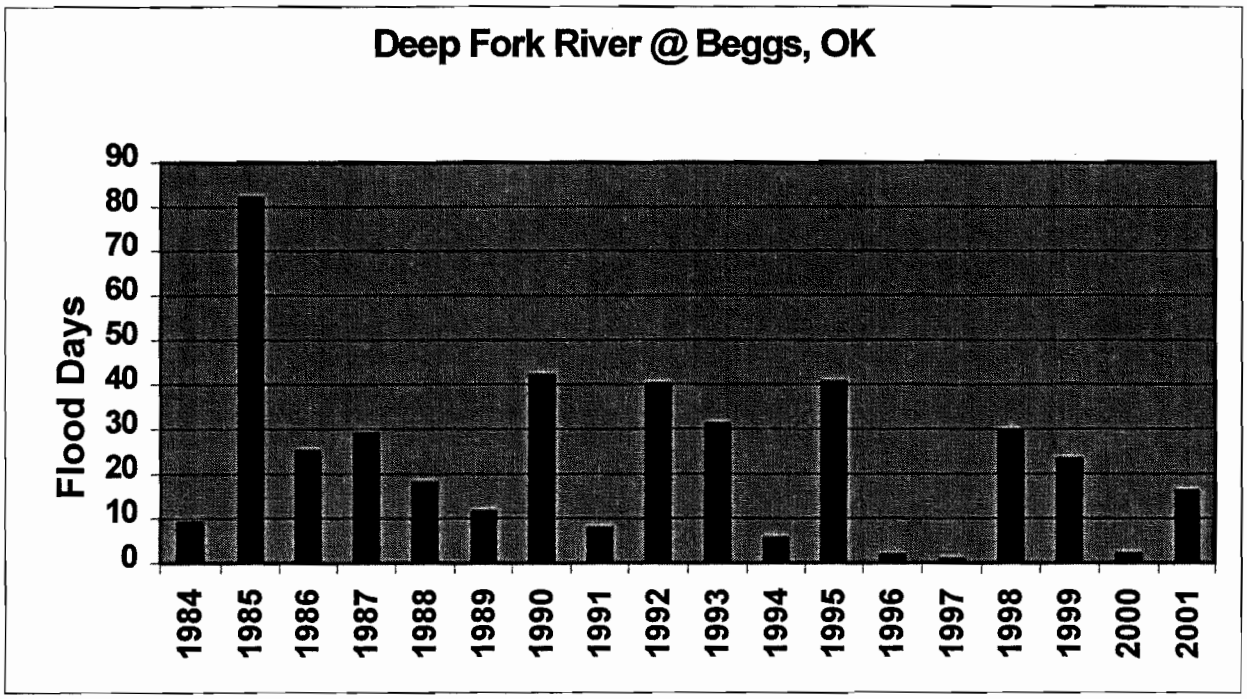


Figure 7. Number of Flood Days Per Year

VII. Potential Uses

A. Verification

The genesis of this project was to find a way to assess the "forecastability" of rivers in order to explain the fluctuation of hydrological verification statistics. The Sacramento Soil Moisture

Accounting Model is calibrated empirically. Therefore, the greater the number of flood events at a given station, the more data available to calibrate the model. Additionally, flood events of long duration are typically easier to forecast with less error than floods of short duration. These analyses will assist in the explanation of hydrological verification metrics.

B. Training

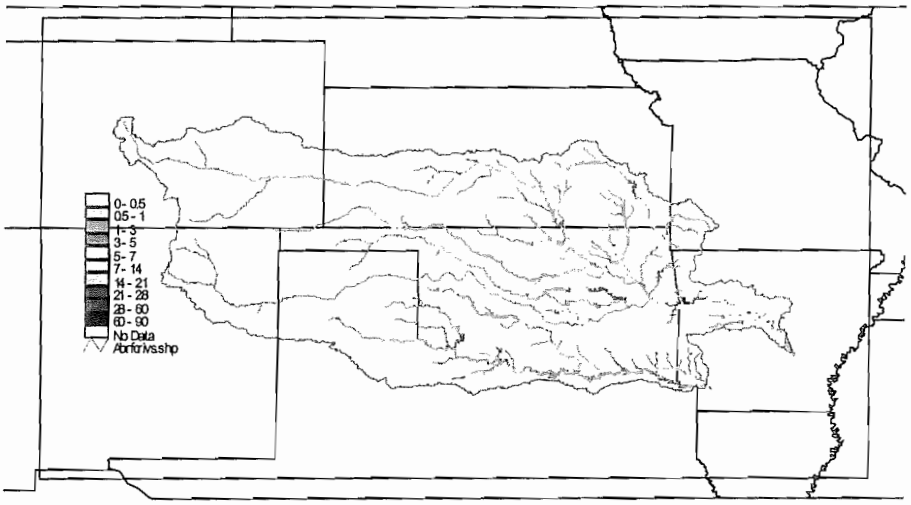
Service Hydrologists and Warning Coordination Meteorologists at the WFO may use these products to brief staff, emergency managers and the general public on the seasonal variability of flooding, as well as the more flood-prone rivers in their Hydrologic Service Areas. Additionally, these products will be used to train new ABRFC employees on the hydrological climatology of the ABRFC area. It is much easier to present and understand this information in a graphical format than by using text.

VIII. Acknowledgments

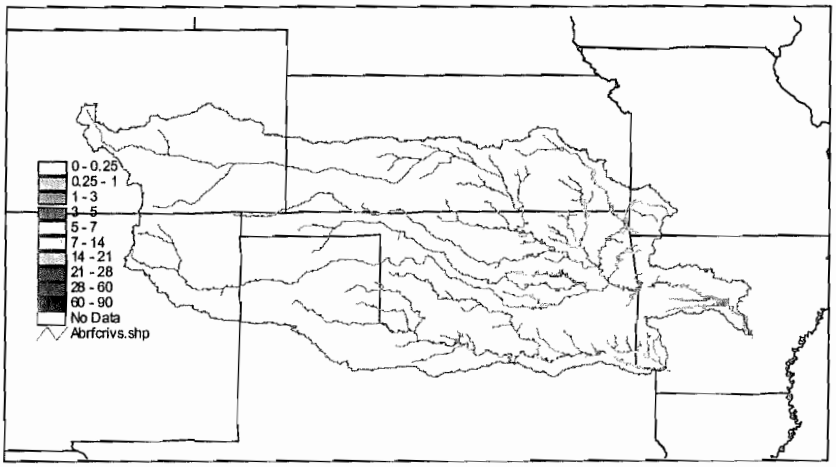
The authors would like to thank Mike Perryman, USACE-Tulsa District, Jan Jones, USACE-Little Rock District and Roberta Ball, USACE-Albuquerque District for their efforts in supplying the ABRFC with a comprehensive set of all the river stage and reservoir pool elevation data they had archived in the ABRFC area of responsibility from 1984 to the present. Some historical data ranged back to the 1940s, but was not applicable to this study.

Appendix A. Graphical River Flood Climatologies

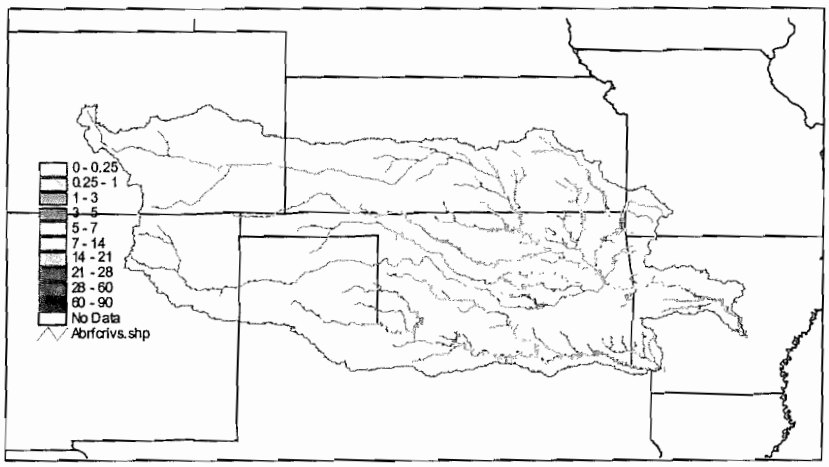
1. Average Annual Flood Days 1984-2001



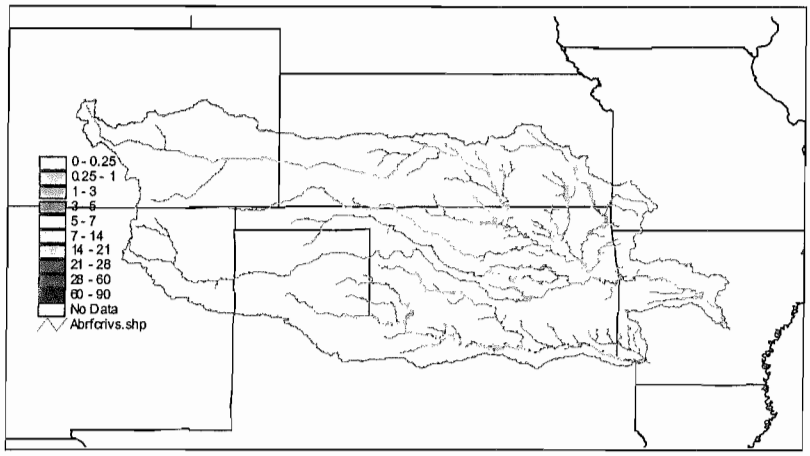
2. Average Winter Flood Days 1984-2001



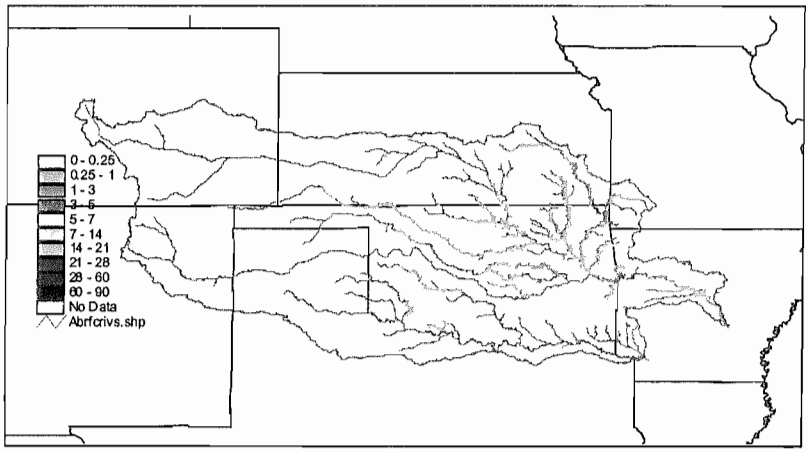
3. Average Spring Flood Days 1984-2001



4. *Average Summer Flood Days 1984-2001*



5. *Average Fall Flood Days 1984-2001*



6. *Average Number of Months per Year with Flood From 1984-2001*