
Precipitation and Discharge Histories, Red and Arkansas River Basins, 1921–1950: Water and the Dust Bowl

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ABSTRACT

The region of the Dust Bowl of the 1930s sits astride the headwaters regions of the Arkansas and Red Rivers in Colorado, Kansas, Oklahoma, and Texas. This paper attempts to discern the connections between precipitation patterns and river discharges during the time interval. Data from the United States Historic Climate Network database have been used to construct maps of annual precipitation and precipitation deficiencies or excesses relative to the 1921–1950 thirty year average in ArcGIS. From these maps, total annual basin precipitation has been calculated providing an estimate of one component of the basinal hydrologic budget. Where data is available, mean annual river discharge was calculated for various stations along the Arkansas and Red rivers and various tributaries.

The maps show a meteorological event was a significant factor in the development of the Dust Bowl. The already arid regions of eastern Colorado that are traversed by the Arkansas River, rainfall was deficient by as much as 50% during the Dust Bowl years. This contributed to historic low discharges on the Arkansas in the period 1933 to 1936. The impact on the Red River was not as pronounced. The headwaters of the Red River drainage basin lie outside the driest areas and the river's tributaries in southern Oklahoma and eastern Texas received nearly normal precipitation. Tentative conclusions from this analysis suggest that although the two drainage basin are adjacent to one another they experience different meteorological (climatic) histories. It is also apparent that despite the prolonged effects of the Dust Bowl in the headwaters of the Arkansas River, the average discharge over the thirty year study interval is only slightly less than the mean discharge for the longer 20th century record.