

Is there a Significant Hydraulic Connection between the Mississippi River, Nearby Oxbow Lakes, and Groundwater within the Mississippi Alluvial Aquifer?

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ABSTRACT

Water levels between rivers and nearby wells have been observed to be related to each other. However, usually these studies usually involve wells nearby to the river within a few meters to hundreds of meters. The question to consider is there a connection between a large river, the Mississippi River, and wells potentiometric levels and oxbow lake levels for lakes or wells a few kilometers to tens of kilometers from the Mississippi River as a result of the Mississippi Alluvial Aquifer, which is highly conductive.

The area of study includes portions of eastern Arkansas, northeastern Louisiana, northwestern Mississippi, southeastern Missouri, and western Tennessee. Water levels in oxbow lakes (Lake Saint John near Waterproof, Louisiana; Lake Washington near Marathon, Mississippi; and Reelfoot Lake near Tiptonville, Tennessee) and wells (near Barton, Cash, Fisher, Rice Research Center, UAPB Lonoke Farm, and Watson, Arkansas; and in Bolivar and Sunflower counties, Mississippi; and East Prairie, Sikeston, and Steele, Missouri) were considered in relation to Mississippi River water levels. Correlations between well or lake water level and the Mississippi River water level at nearby observations points are completed. There appears to be a statistically significant correlation between peaks and troughs for lake levels or potentiometric levels in wells relative to Mississippi River peaks and troughs of water level at nearby sites including Helena and New Osceola, Arkansas; Hickman, Kentucky; Greenville, Natchez, and Tunica River Park, Mississippi; and Birds Point and Caruthersville, Missouri, were determined.