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# Impact of Agriculture on the Distribution of Chloride, Nitrate, and Other Ion Concentrations in the Mississippi Alluvial Aquifer in Northeastern Louisiana

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## ABSTRACT

The Mississippi River Alluvial Aquifer is the principal to sole aquifer supplying groundwater in northeastern Louisiana. In the past fifty years, groundwater use has increased in terms of the number of gallons and percentage of all water used in the nine-parish study area. This was mainly caused by a large increase in the number of acres of cropland irrigated. Has this large increase in groundwater use for irrigation affected the water quality of the Mississippi Alluvial Aquifer (MAA) in northeastern Louisiana?

Past studies noted pockets of saltwater, as indicated by high chloride concentrations that lie in an axis from eastern Morehouse Parish to central Franklin Parish and another area of elevated chloride concentration is in Concordia and Tensas parishes. The Morehouse to Franklin Parish region is possibly a result faults allowing upwelling of chloride rich waters from below into the MAA. A decade long study at a few wells indicates there has been a trend of increasing chloride concentrations. Other studies have noted high concentrations of nitrates with a two values exceeding the U.S. EPA drinking water standard for concentration of nitrate.

Approximately 100 groundwater samples have been collected throughout the MAA. The water wells were purged as needed. Two samples were collected for later analytical analysis. Ion chromatography by Standard Method 9056A was used for the analysis of: bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate. Nitrates and phosphate were also analyzed in the field HACH Pocket Colorimeters.

It is apparent from sample collection that West Carroll–Franklin Parish samples have higher concentrations of chloride, than samples from elsewhere, which has been observed by others earlier. Elsewhere results are similar to results from earlier studies. In general, concentrations of chloride, total dissolved solids and specific conductance have increased from earlier major studies complete approximately 20 and 40 years ago. In terms of nitrate concentration, this is the first major study since mid–1990s. The share of samples, which nitrate concentrations exceed US. EPA drinking water standard has increased from approximately 1 out of 40 to approximately 1 out of 10.

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