Magnesium plus Calcium to Bicarbonate

The areal distribution of the milliequivalent ratio of magnesium plus calcium to bicarbonate ($MgCa:HCO_3$) in water from the alluvial aquifer and permeable zone A shows that the ratio ranges from 0.03 to 365 (table 1). The $MgCa:HCO_3$ ratio in the alluvial aquifer has no apparent trend and ranges from 0.2 to 2 with most ratios near 1 (fig. 17). The $MgCa:HCO_3$ ratio in permeable zone A, from the Sabine arch eastward to southeastern Mississippi and Louisiana, ranges from 0.10 around Lake Pontchartrain to 2 near the downdip limit of the data in southeastern Louisiana. However, in most of the area east of the Sabine arch, the $MgCa:HCO_3$ ratio ranges from 0.50 to 1 with no apparent pattern or trend. Between the Sabine arch and the San Marcos arch the $MgCa:HCO_3$ ratio generally decreases from 1 in updip areas to 0.50 in downdip areas. From the San Marcos arch southwestward to the Rio Grande the $MgCa:HCO_3$ ratio generally is 2 in updip areas, decreases to 0.50 at middip, and then increases to 1 near the downdip limit of data except in southern Texas, where it increases to 100.

Magnesium plus Calcium to Sodium plus Potassium

The areal distribution of the milliequivalent ratio of magnesium plus calcium to sodium plus potassium (MgCa:NaK) in water from the alluvial aquifer and permeable zone A shows that the ratio ranges from 0.02 to 76.4 (table 1). The MgCa:NaK ratio in the alluvial aquifer generally ranges from 0.5 to 20 with the largest ratio usually adjacent to the Mississippi River (fig. 18). There is a general decrease in the MgCa:NaK ratio from north to south. In permeable zone A from the Mississippi River eastward to southeastern Mississippi and Louisiana the MgCa:NaK ratio generally decreases from about 1 along the updip limit to 0.10 near middip and then increases to about 0.50 at the downdip limit of the data. From the Mississippi River westward to the Sabine arch the MgCa:NaK ratio generally decreases from 10 in an updip area in Avoyelles Parish, Louisiana, to 0.10 near the downdip limit of the data in southeastern Louisiana. Between the Sabine arch and the San Marcos arch the MgCa:NaK ratio decreases from about 2 along the updip limit to about 0.10 along the downdip limit of the data. From the San Marcos arch southwestward to the Rio Grande the MgCa:NaK ratio ranges from 1 to 0.10 with no specific trend or pattern.

Bicarbonate to Sulfate

The areal distribution of the milliequivalent ratio of bicarbonate to sulfate ($HCO_3:SO_4$) in water from the alluvial aquifer and permeable zone A shows that the ratio ranges from less than 0.01 to 5,010 (table 1). The $HCO_3:SO_4$ ratio in the alluvial aquifer generally ranges from 10 to 1,000. Ratios of up to 1,000, occur east of the Mississippi River along the boundary of the alluvial aquifer (fig. 19). West of the Mississippi River the $HCO_3:SO_4$ ratio generally ranges from 10 to 50. In permeable zone A from the Sabine arch eastward to southeastern Mississippi and Louisiana the $HCO_3:SO_4$ ratio ranges from about 10 along the updip limit to more than 1,000 along the downdip limit of the data. Between the Sabine arch and the San Marcos arch the $HCO_3:SO_4$ ratio generally ranges from 10 to 50 with three localized areas of 200. From the San Marcos arch southwestward to the Rio Grande the $HCO_3:SO_4$ ratio ranges from 0.10 to 10 with one localized area of 50.

Bicarbonate to Chloride

The areal distribution of the milliequivalent ratio of bicarbonate to chloride ($HCO_3:Cl$) in water from the alluvial aquifer and permeable zone A shows that the ratio ranges from less than 0.01 to 299 (table 1). The $HCO_3:Cl$ ratio in the alluvial aquifer generally ranges from 50 to 100 along the eastern boundary and 5 to 10 along the western boundary (fig. 20). There is no indication of a specific trend in the $HCO_3:Cl$ ratio from north to south in the alluvial aquifer.

From the Sabine arch eastward to southeastern Mississippi and Louisiana, the $HCO_3:Cl$ ratio in water from permeable zone A generally ranges from 0.10 to 10. The ratio generally increases from updip to middip and then decreases in downdip areas. The ratio also increases from west to east in the middip area. Between the Sabine arch and the San Marcos arch the HCO3:Cl ratio generally ranges from 0.50 to 1 with two localized areas of 5. No areal trend or pattern is evident in this area. From the San Marcos arch southwestward to the Rio Grande the $HCO_3:Cl$ ratio ranges from about 0.10 to 1 and shows no specific trend or pattern.

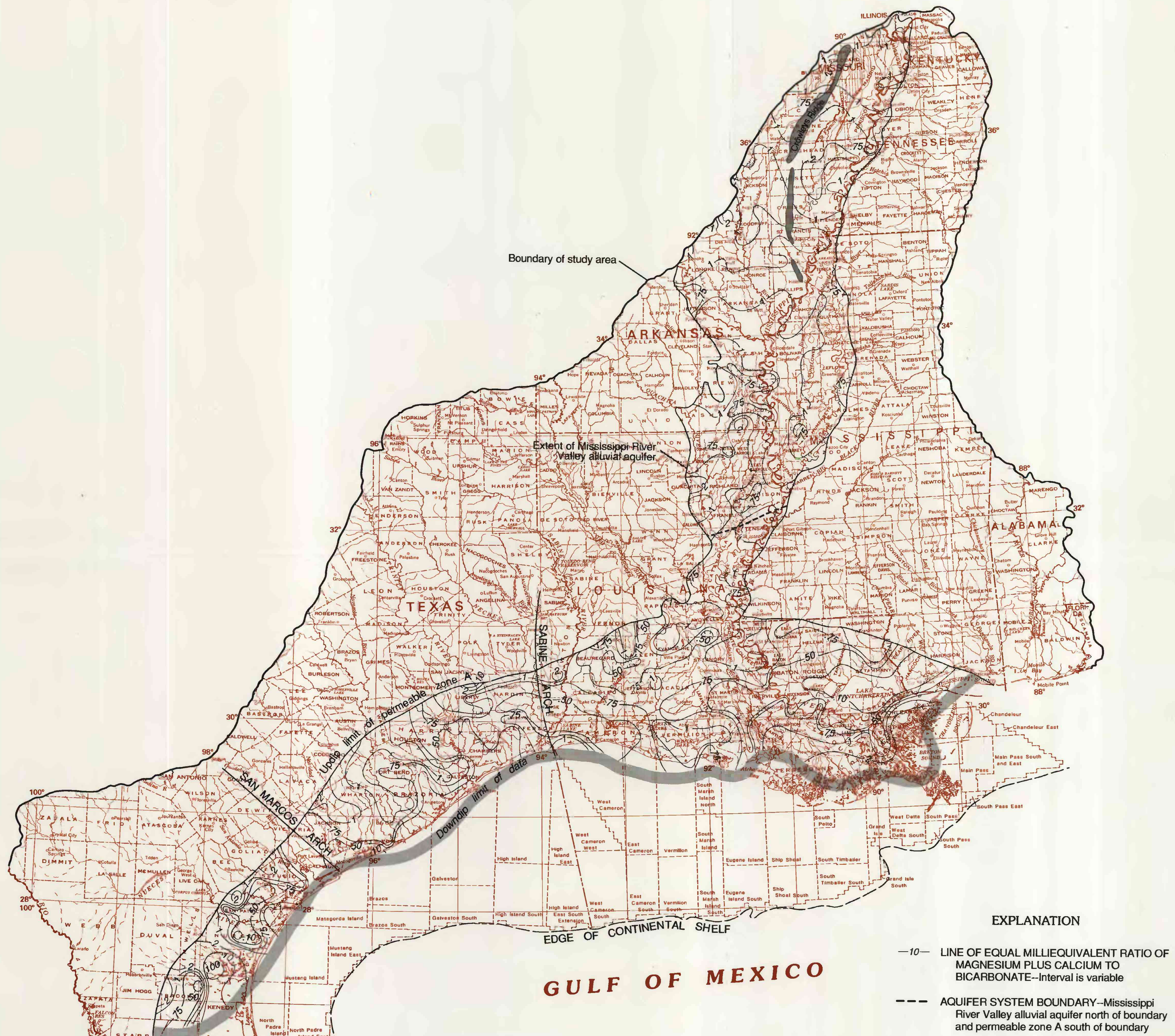

Figure 17.--Ratio of magnesium plus calcium to bicarbonate based on ion concentration per 100-square-mile area.

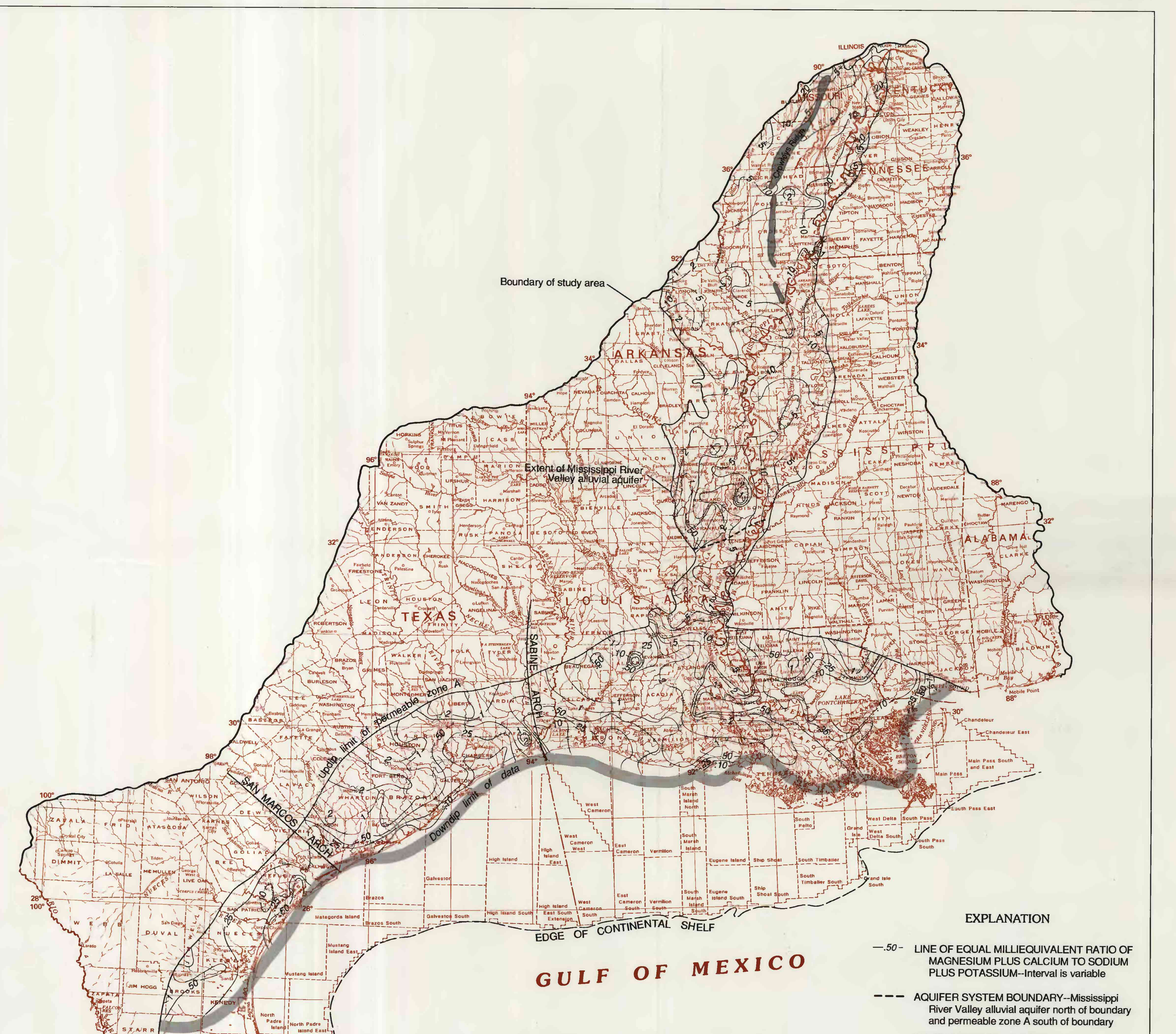

Figure 18.--Ratio of magnesium plus calcium to sodium plus potassium based on ion concentration per 100-square-mile area.

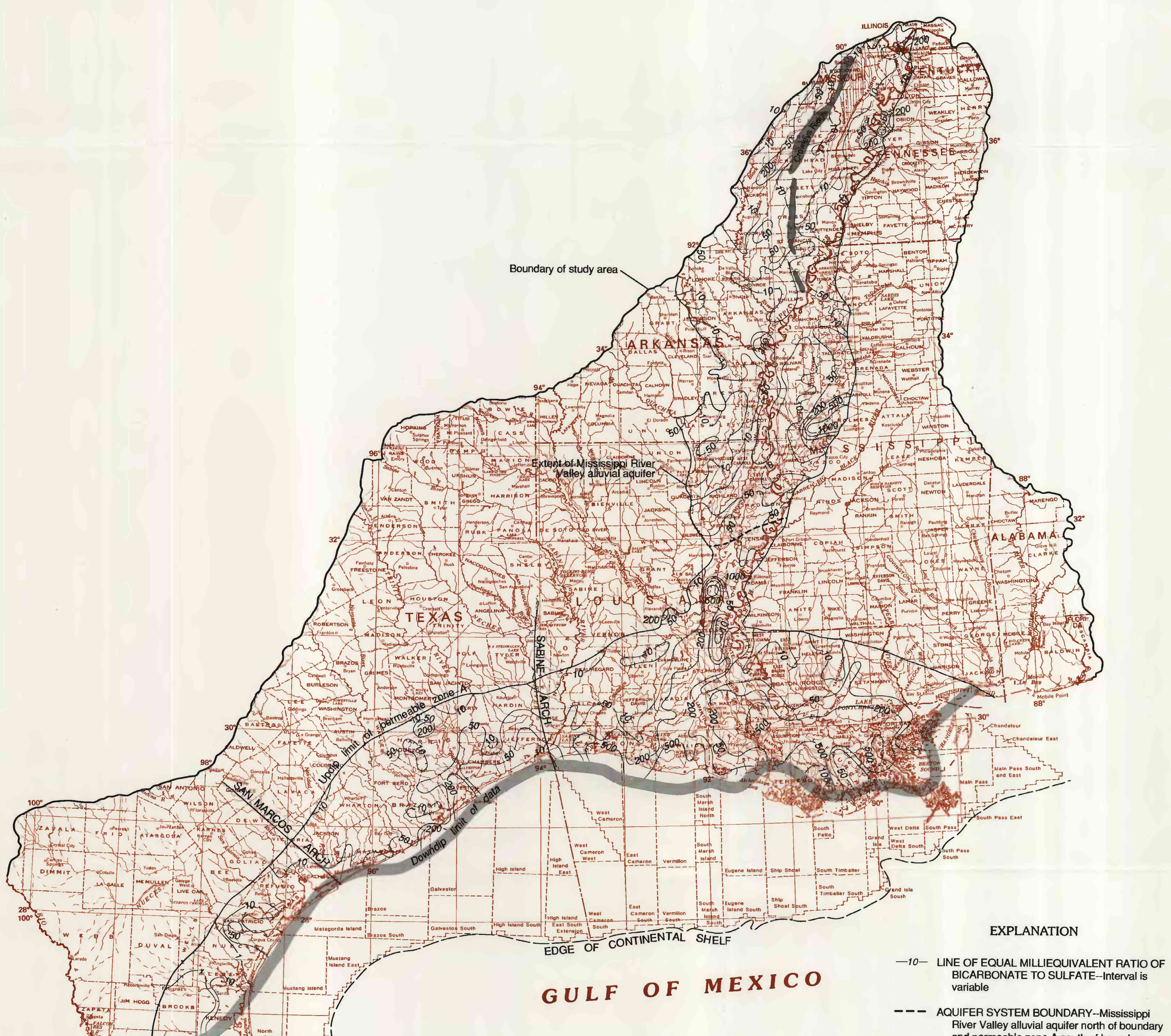

Figure 19.--Ratio of bicarbonate to sulfate based on ion concentration per 100-square-mile area.

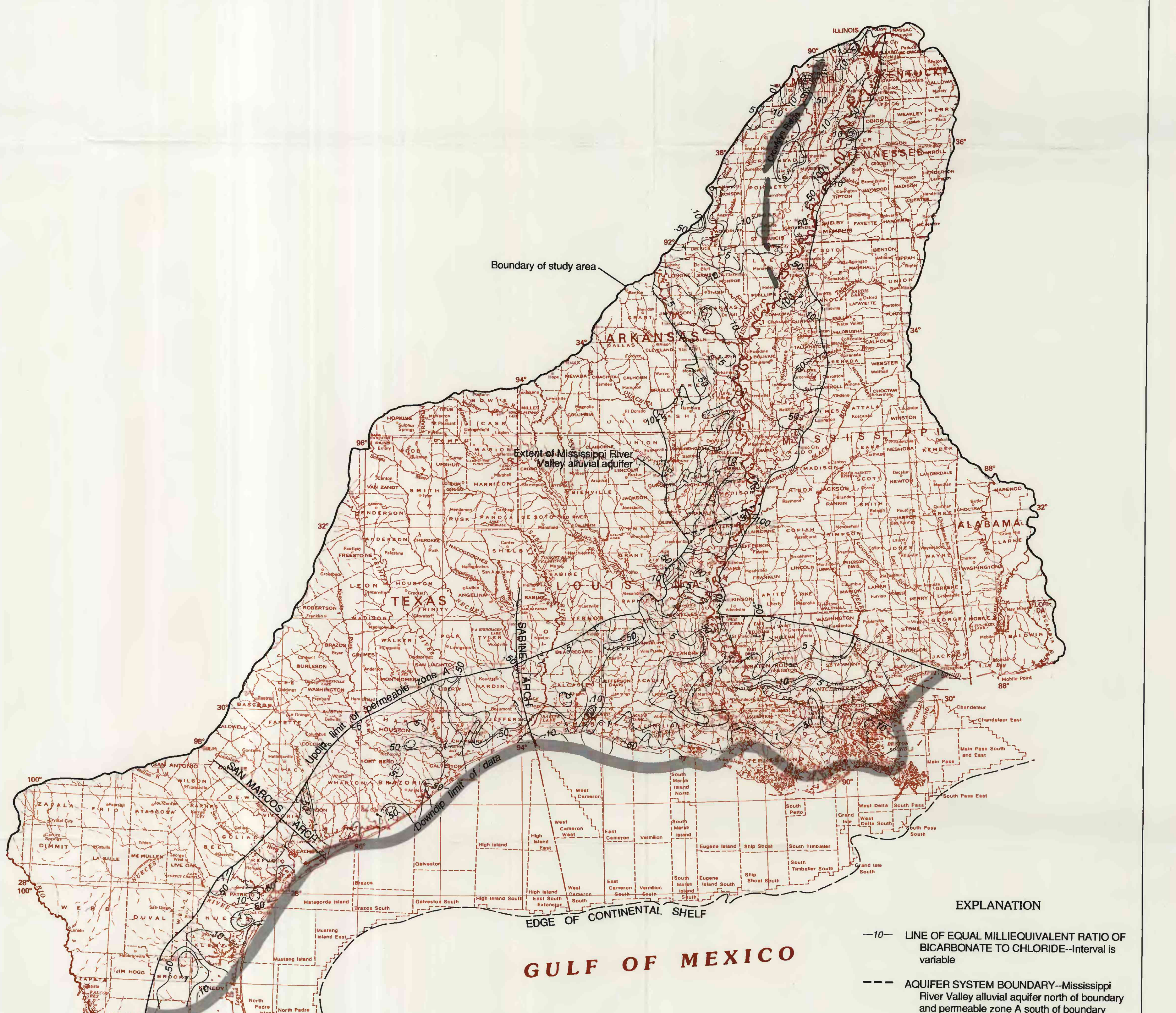

Figure 20.--Ratio of bicarbonate to chloride based on median ion concentration per 100-square-mile area.

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PROPERTIES AND CHEMICAL CONSTITUENTS IN GROUND WATER FROM THE MISSISSIPPI RIVER VALLEY ALLUVIAL AQUIFER AND PERMEABLE ZONE A (HOLOCENE-UPPER PLEISTOCENE DEPOSITS), SOUTH-CENTRAL UNITED STATES.

by

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