Magnesium

The concentration of dissolved magnesium in water from permeable zone D, based on the median values of all samples in each 100-square-mile area, ranges from 0.07 mg/L in areas from outcrop to middip to 1,310 mg/L in a downdip area in southeastern Texas (table 1). The areal distribution pattern of the concentration of dissolved magnesium (fig. 9) is similar to that of dissolved calcium (fig. 8).

The concentration of dissolved magnesium in the outcrop area generally ranges from 1 to 10 mg/L except in southwestern Alabama where it exceeds 100 mg/L. In the area from outcrop to near middip and extending from about midway between the Sabine arch and the San Marcos arch eastward to southwestern Alabama the concentration generally ranges from 1 to 100 mg/L. At middip in this area the concentration increases to 500 mg/L. From middip to the downdip limit of the data the concentration decreases from 500 to about 100 mg/L in three areas. In the area from about midway between the Sabine arch and the San Marcos arch and extending southwestward to the Rio Grande the concentration generally ranges from 10 to 100 mg/L from the outcrop to near middip. From middip to the downdip limit of the data the concentration ranges from 100 to about 1,000 mg/L near the coastline of southern Texas.

Sodium

The concentration of dissolved sodium in water from permeable zone D,based on the median values of all samples in each 100-square-mile area, ranges from 1.4 mg/L in the outcrop area of southwestern Alabama to 85,300 mg/L in the Continental Shelf area off the southeastern coast of Louisiana (table 1). The concentration generally increases from the outcrop to the downdip limit of the data (fig. 10).

The concentration of dissolved sodium generally ranges from 10 to 50 mg/L in the outcrop area that extends from the Sabine arch eastward to southwestern Alabama. The exceptions are an area adjoining the Mississippi River where the concentration is greater than 100 mg/L and an area in southwestern Alabama where the concentration exceeds 1,000 mg/L. From the Sabine arch southwestward to the Rio Grande the concentration in the outcrop area ranges from about 10 mg/L at the Sabine arch to more than 1,000 mg/L near the Rio Grande.

The concentration of dissolved sodium generally ranges from 10 to 100 mg/L from outcrop to near middip in the area that extends from the Mississippi River eastward to southwestern Alabama. In this area at middip the concentration ranges from 1,000 to 30,000 mg/L and increases to more than 50,000 mg/L downdip and in the Continental Shelf area off the coast of southeastern Louisiana. In the area from the Mississippi River westward to the San Marcos arch and from outcrop to near middip the concentration ranges from about 50 to 1,000 mg/L. In this area at middip the concentration ranges from 1,000 to 10,000 mg/L and downdip it is more than 30,000 mg/L near the coastline. In the area from the San Marcos arch southwestward to the Rio Grande and from the outcrop to near middip the concentration generally ranges from 100 to 1,000 mg/L. In this area at middip the concentration ranges from 1,000 to 10,000 mg/L and downdip it ranges from 10,000 to more than 30,000 mg/L near the coastline in southern Texas. The areas that have concentrations of dissolved sodium larger than 10,000 mg/L generally are coincident with the deeper parts of the permeable zone and with the location of salt domes (fig. 4).

Potassium

The concentration of dissolved potassium in water from permeable zone D, based on the median values of all samples in each 100-square-mile area, ranges from 0.1 mg/L in outcrop and middip areas east of the Mississippi River to 489 mg/L in the Continental Shelf area off the southern coast of Louisiana (table 1). The concentration generally increases from the outcrop to the downdip limit of the data (fig. 11).

The concentration of dissolved potassium is less than 5 mg/L in the outcrop area east of the Sabine arch except in La Salle Parish, Louisiana, where it exceeds 10 mg/L. From the Sabine arch southwestward to the limit of data, the concentration ranges from about 5 to 200 mg/L in the outcrop area.

From the Sabine arch eastward to southwestern Alabama and in the area from outcrop to near middip the concentration of dissolved potassium ranges from less than 5 mg/L to 10 mg/L except for an area west of the Mississippi where the concentration ranges from 5 to 100 mg/L. At middip in the area east of the arch the concentration is about 100 mg/L and increases in a downdip direction to more than 400 mg/L in the Continental Shelf area. From the Sabine arch southwestward to the San Marcos arch the concentration generally ranges from about 5 mg/L at the outcrop to about 200 mg/L near the downdip limit of the data except for an area near the San Marcos arch that extends from the outcrop to the downdip limit of the data where the concentration is about 200 mg/L. From the San Marcos arch southwestward to the limit of data, the concentration ranges from less than 5 to about 100 mg/L but the range is probable limited due to the absence of data.

Bicarbonate

The concentration of dissolved bicarbonate in water from permeable zone D, based on the median values of all samples in each 100-square-mile area, ranges from 3 mg/L in the outcrop area of southwestern Alabama to 1,900 mg/L in the Continental Shelf area off the southeastern coast of Louisiana (table 1). The concentration generally increases from outcrop to the downdip limit of the data except in the area from the San Marcos arch to the Rio Grande where it decreases from outcrop to downdip limit of the data (fig. 12).

The concentration of dissolved bicarbonate in the outcrop area generally ranges from 10 to 500 mg/L and exhibits no specific distribution pattern. From the Mississippi River eastward to southwestern Alabama and southeastern Louisiana the concentration generally ranges from about 50 to 200 mg/L in the area from outcrop to middip and from 200 to 1,000 mg/L in the area from middip to the downdip limit of the data. From the Mississippi River westward to the Sabine arch the concentration ranges from about 50 to more than 500 mg/L. The concentration increases from the outcrop to the downdip limit of the data in the area adjoining the Sabine arch. However, about midway between the Mississippi River and the Sabine arch the concentration exceeds 500 mg/L in an area extending from near the outcrop to the Gulf of Mexico. From the Sabine arch to the San Marcos arch the concentration generally ranges from 50 to 1,000 mg/L with the concentration increasing in both a southwestern and downdip direction. From the San Marcos arch southwestward to the Rio Grande the concentration decreases from about 500 mg/L in an area in the outcrop to about 50 mg/L in the area near the coastline in southern Texas.

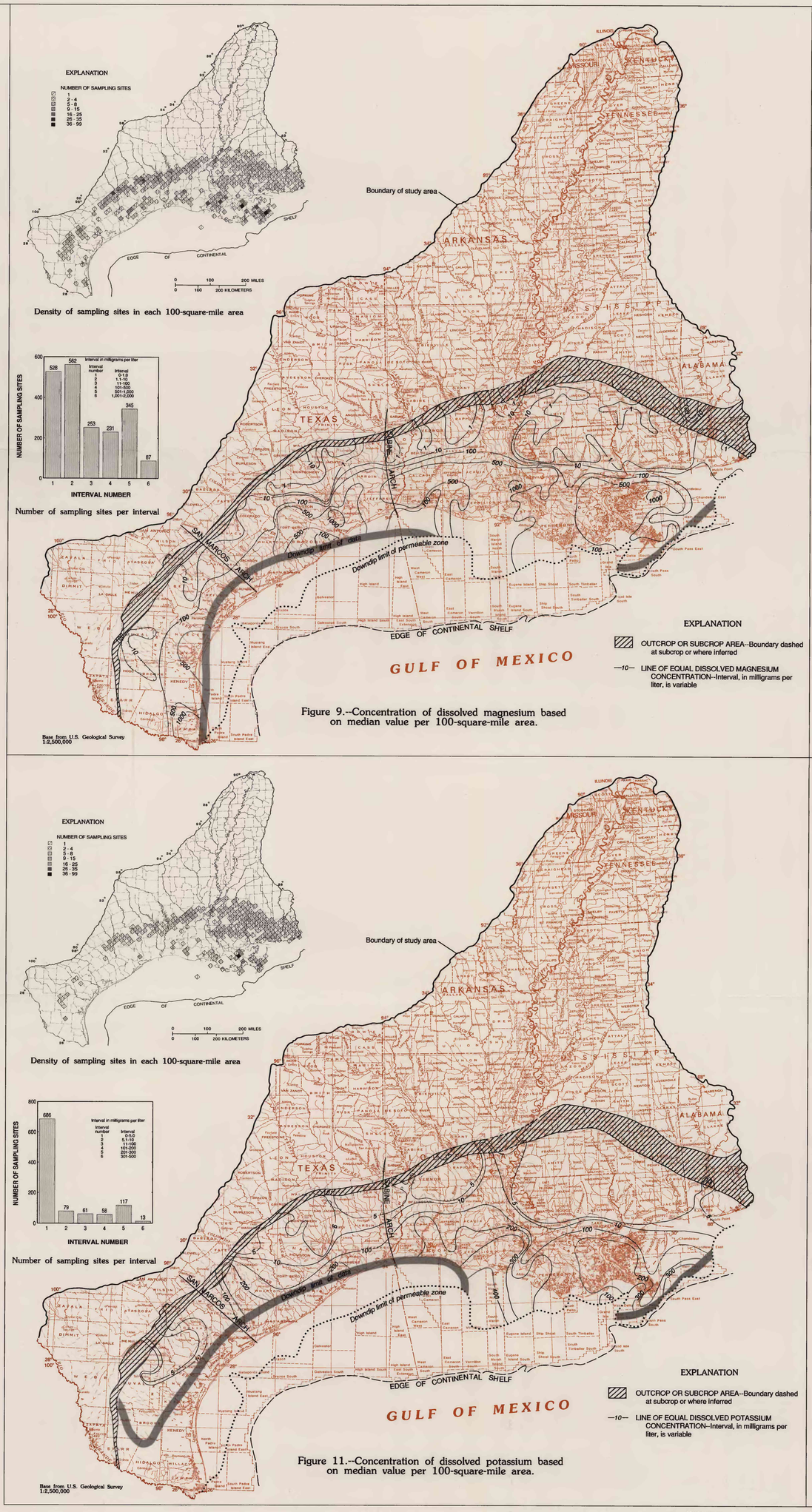

Figure 9.--Concentration of dissolved magnesium based on median value per 100-square-mile area.

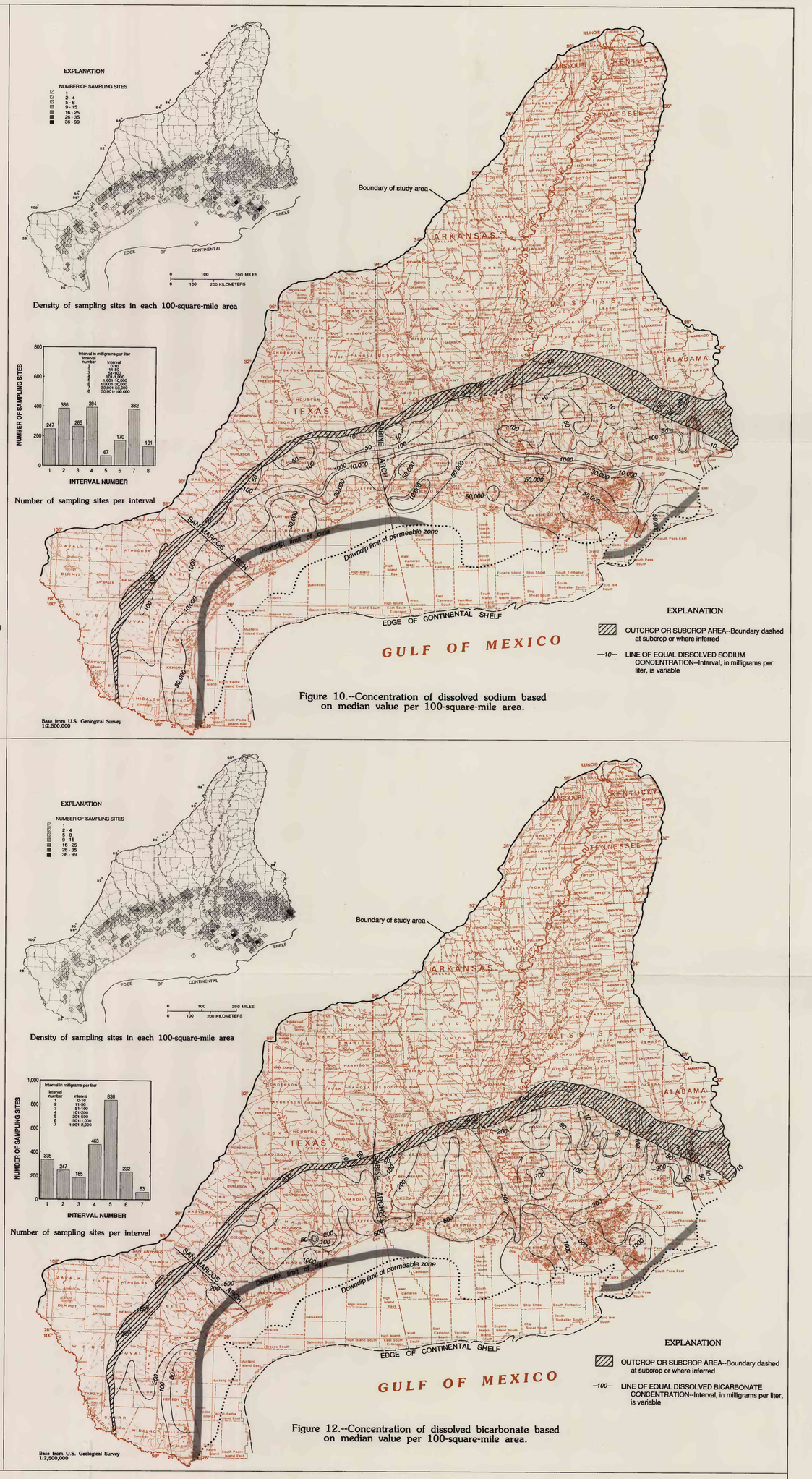

Figure 10.--Concentration of dissolved sodium based on median value per 100-square-mile area.

Figure 11.--Concentration of dissolved potassium based on median value per 100-square-mile area.

Figure 12.--Concentration of dissolved bicarbonate based on median value per 100-square-mile area.

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PROPERTIES AND CHEMICAL CONSTITUENTS IN GROUND WATER FROM PERMEABLE ZONE D (MIDDLE MIOCENE DEPOSITS), COASTAL LOWLANDS AQUIFER SYSTEM, SOUTH-CENTRAL UNITED STATES

by

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