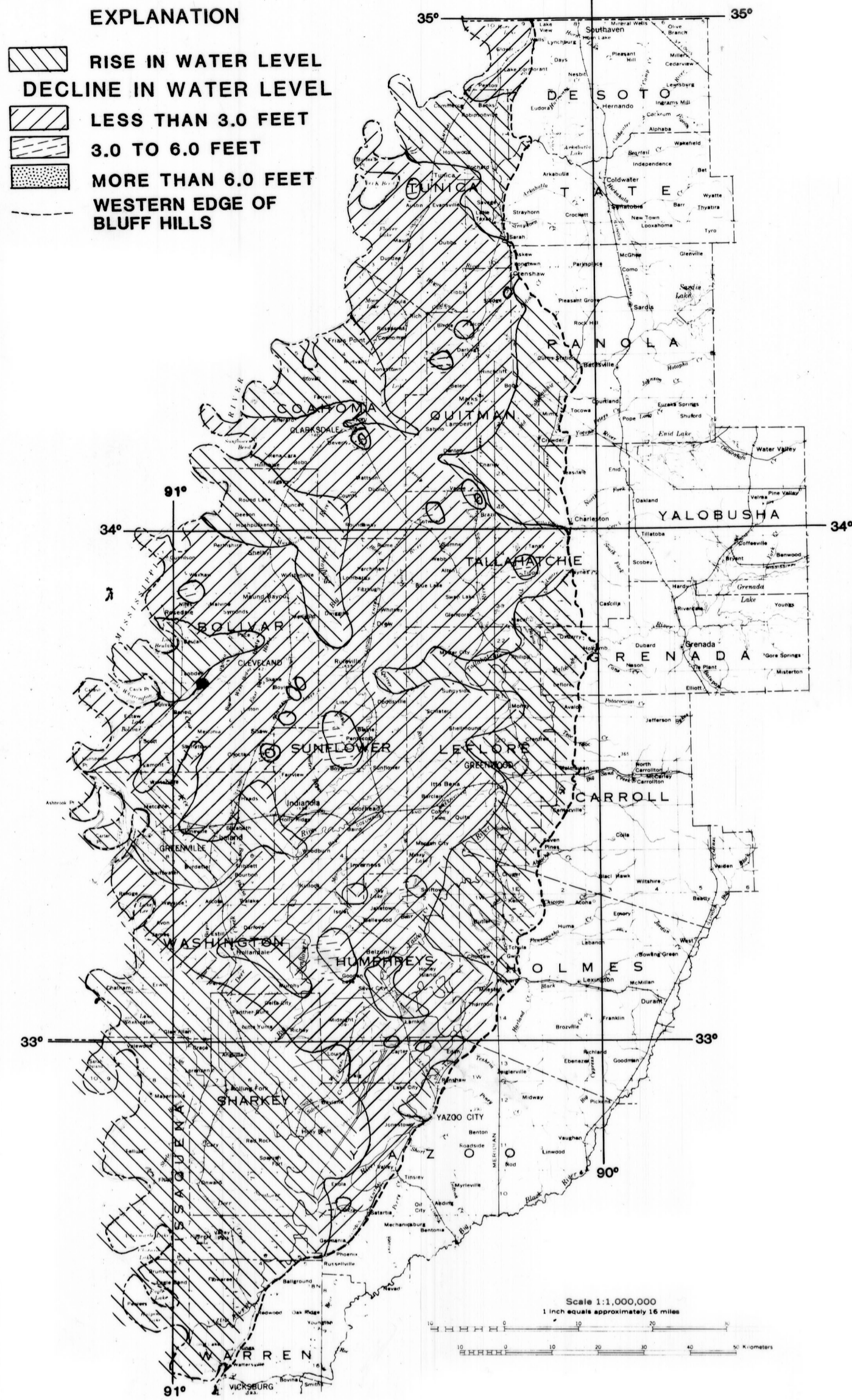


### WATER-LEVEL CHANGE SEPTEMBER 1981-SEPTEMBER 1982



### INTRODUCTION

The alluvial plain of the Mississippi River in northwestern Mississippi includes about seven thousand square miles of farmland in the lower part of the Yazoo basin. The area, known locally as "the Delta", is a nearly flat southward sloping surface characterized by oxbow lakes, abandoned stream channels, natural levees, backswamp areas, and bayous. The study area extends from near Memphis, Tennessee, south to Vicksburg, Mississippi, and is bordered on the west by the Mississippi River and on the east by the Bluff Hills.

This report shows the altitude of ground-water levels and changes in water-levels in the Delta where large quantities of ground water are withdrawn for irrigating rice and other crops, aquaculture and industrial use. Water-level altitudes in observation wells and altitudes of some stream stages were used to determine water-level altitudes shown on the water-level map. The depth-to-water map was prepared using water-level measurements made in September 1982. The water-level change map was prepared using water-level measurements made in September 1982 and September 1981. The hydrologic maps in this report were prepared by the U.S. Geological Survey in cooperation with the Mississippi Bureau of Land and Water Resources, using water-level measurements made in about 500 wells in the alluvial aquifer in September 1981, April 1982, and September 1982.

### ALLUVIAL AQUIFER

The alluvial aquifer is commonly composed of two parts. Clay, silt, and fine sand make up the upper, less permeable part of the aquifer, and sand and gravel make up the highly permeable lower part of the aquifer. The aquifer which ranges in thickness from less than 50 feet to more than 150 feet, is thin near the eastern edge of the Delta and in some areas along the Mississippi River. Because of the thickness and high permeability of the lower sand and gravel part of the aquifer, the Mississippi River valley alluvium yields large quantities of water to wells. Large irrigation wells that pump in excess of 2,000 gallons per minute are common in the area.

The aquifer is recharged by the Mississippi River and streams that flow through the Delta and by precipitation on the land surface. Higher water levels in September 1982 may have resulted from higher stages of the Mississippi and Yazoo Rivers. Progressively lower water levels in the central part of the Delta may have resulted from continued drought conditions from the summer of 1980 through the summer of 1982 and continued heavy pumping.

### WATER-LEVEL CHANGE MAP SEPTEMBER 1981-SEPTEMBER 1982

The water-level change map shows the net change in ground-water levels between September 1981 and September 1982. Ground-water levels generally rose in areas along the Bluff Hills, the Mississippi River and the lower part of the Yazoo River; areas not heavily pumped for irrigation. However, in the central part of the Delta where the aquifer is heavily pumped for aquaculture and irrigation, water levels have continued to decline since the drought conditions of 1980.

Of the 355 wells measured in September 1981 and September 1982, water levels declined in 204 wells, rose in 150 wells, did not change in one well, and averaged 0.08 feet lower in September 1982 than in September 1981. The declines ranged from near zero to about 8 feet. The largest declines occurred in areas of heavy pumping for aquaculture.

### WATER-LEVEL MAP SEPTEMBER 1982

The water-level map for September 1982 shows the approximate altitude of the water surface in the aquifer as of September 14-28, 1982. Water-level measurements were made near the end of the pumping season and represent static water levels. The two large cones of depression in the Sunflower-LeFlore County area and in Humphreys County are where large volumes of water are being pumped from the alluvium. Because the stage of the Mississippi River was unusually low in September, ground-water levels were also relatively low in areas adjacent to the River and near streams in the southern part of the Delta which are affected by low river stages. Water levels in areas along the Bluff Hills and near oxbow lakes were generally higher than in the interior of the Delta. These are areas of recharge to the aquifer and areas where ground-water withdrawals are often small. Water levels along the Bluff Hills were higher than in most areas in the Delta. Higher water levels or mounds also were associated with oxbow lakes along the Mississippi River.

The cross section A-A', across Washington, Sunflower, LeFlore, and Carroll Counties, shows water-level altitudes in the aquifer and in selected wells in September 1982. The highest water-level altitudes were near the Bluff Hills and the lowest levels were in cones of depression in Sunflower and LeFlore Counties. The broad area of low water levels in Sunflower and LeFlore Counties is in an area with a large concentration of wells. The cone of depression in the Greenwood area is due to local pumping for cooling a municipal power-generating plant.

### DEPTH TO WATER

The depth to water map shows the depth to water below land surface near the end of the 1982 growing season. Water levels were generally shallower near the Bluff Hills and the Mississippi River. Deeper water levels were generally concentrated in the central part of the Delta near the Sunflower River and in areas heavily pumped for rice farming and aquaculture. Deep water levels in isolated areas probably reflect local pumping.

### SELECTED REFERENCES

Battandorff, J.M., and Leake, S.A., 1976, Water for industrial and agricultural development in Atala, Holmes, Humphreys, Issaquena, Sharkey, and Yazoo Counties, Mississippi: Mississippi Research and Development Bulletin, 49 p.

Dalsin, G.J., 1978, Water for industrial and agricultural development in Bolivar, Carroll, LeFlore, Sunflower, and Tallahatchie Counties, Mississippi: Mississippi Research and Development Bulletin, 41 p.

Darden, Daphne, 1981, Water-level map of the Mississippi Delta alluvium in northwestern Mississippi, April 1981: U.S. Geological Survey Water-Resources Investigations 81-1123.

1982a, Water-level map of the alluvial aquifer, northwestern Mississippi, September 1981: U.S. Geological Survey Water-Resources Investigations 82-574.

1982b, Water-level maps of the alluvial aquifer, northwestern Mississippi, April 1982: U.S. Geological Survey Water-Resources Investigations 82-4061.

Harbeck, Earl, Jr., Golden, H.G., and Harvey, E.J., 1961, Effect of irrigation withdrawals on stage of Lake Washington, Mississippi: U.S. Geological Survey Water-Supply Paper 1460-I, 388 p.

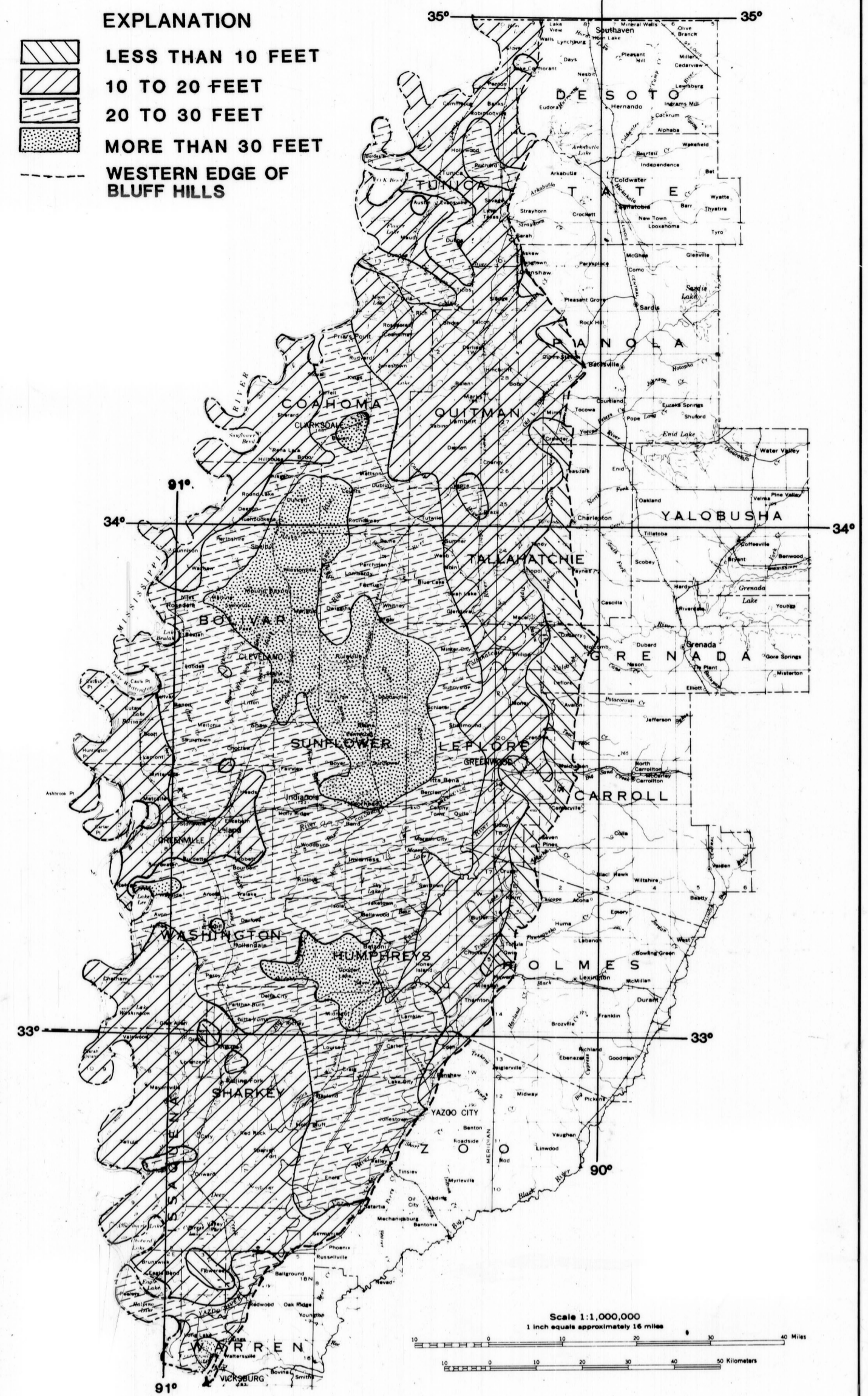
Taylor, R.E., and Thompson, F.H., 1971, Water for industry and agriculture in Washington County, Mississippi: Mississippi Research and Development Bulletin, 21 p.

Wasson, B.E., 1980, Water-level map of the Mississippi Delta alluvium in northwestern Mississippi, September 1980: Bureau of Land and Water Resources Map 90-1.

To convert English units to International units:

Multiply	By	To obtain
million gallons per day (Mgal/d)	0.044	cubic meters per second (m <sup>3</sup> /s)
gallons (gal)	3.785	liters (l)
feet per acre (ft/acre)	.1233	meters per hectare (m/ha)

### DEPTH TO WATER SEPTEMBER 1982



### WATER-LEVEL MAP SEPTEMBER 1982

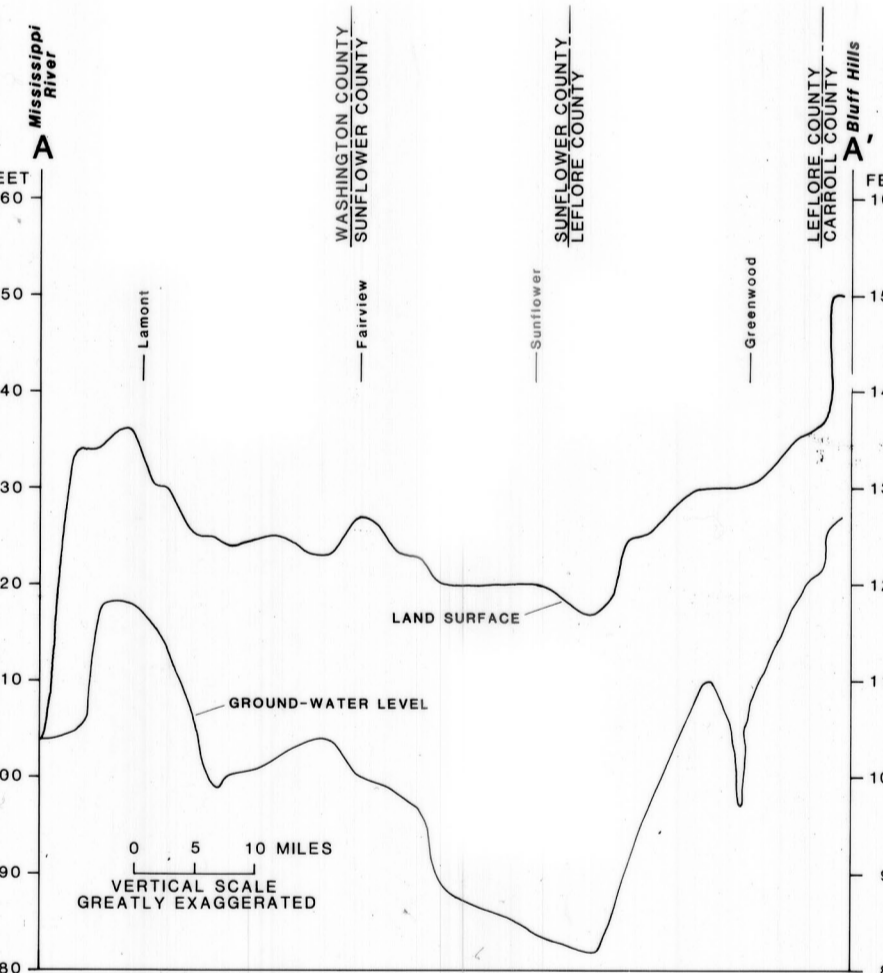
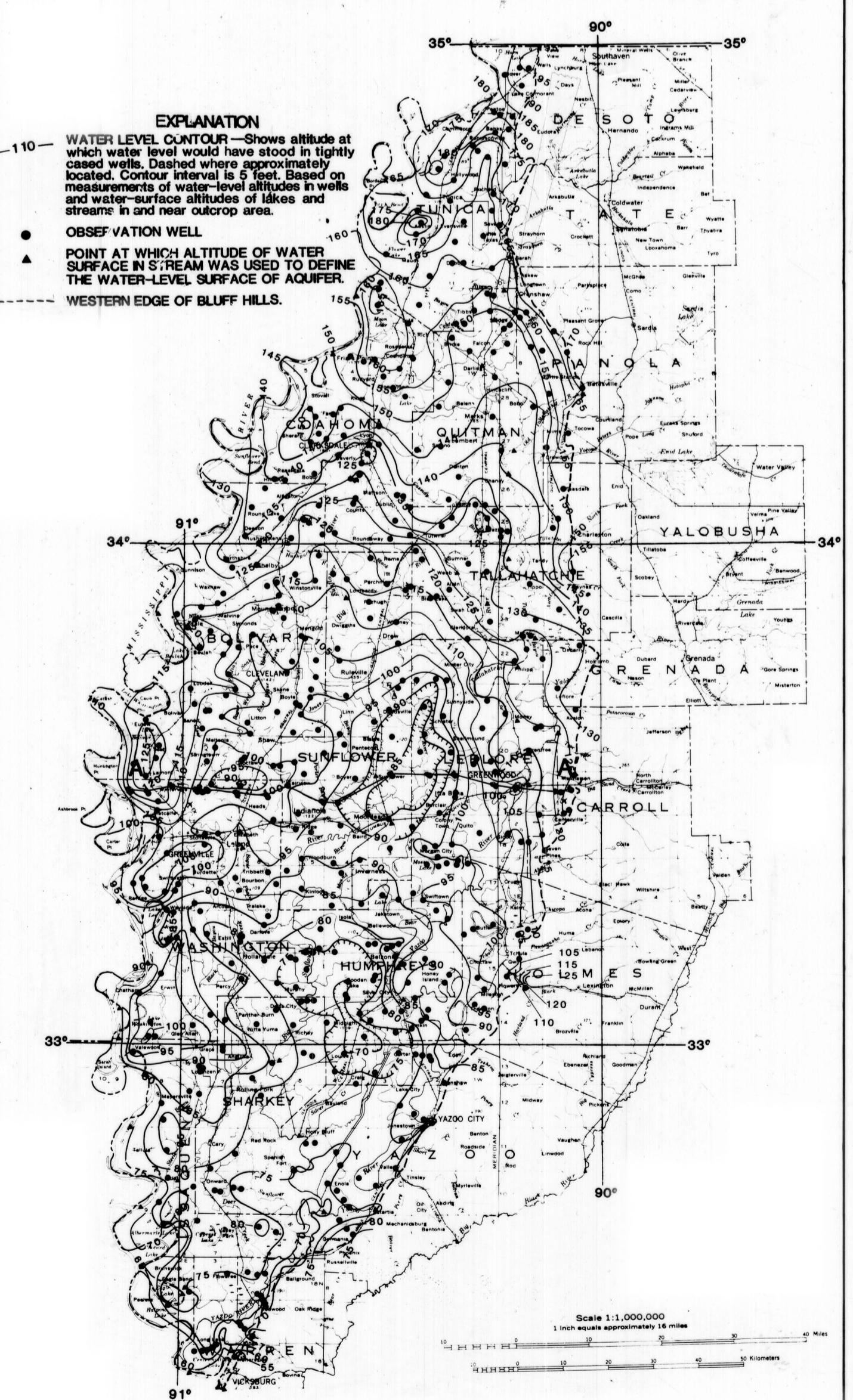


Figure 1.— Cross section from Washington County to Carroll County, Mississippi.

### ADDITIONAL INFORMATION

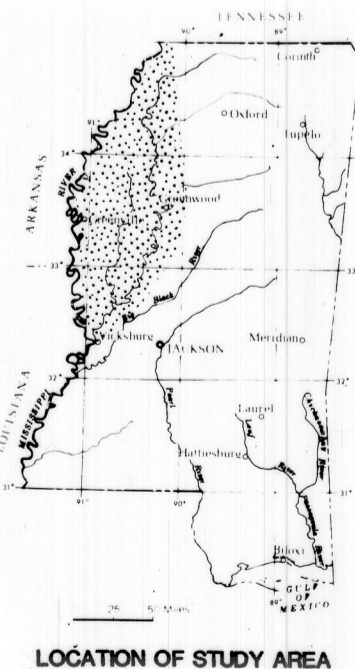
The map showing the results of the April 1982 water-level measurements is the fifth of a series of semi-annual maps showing seasonal ground-water levels in the alluvial aquifer of the Delta. Data describing the individual wells used in this study may be obtained from the following:

Charles Branch, Director  
Mississippi Department of  
Natural Resources  
Bureau of Land and Water  
Resources  
Post Office Box 10631  
Jackson, Mississippi 39209  
(601) 961-5200

Gerald G. Parker, Jr.  
District Chief  
U.S. Geological Survey  
Water Resources Division  
Suite 710, Federal Building  
100 West Capitol Street  
Jackson, Mississippi 39269  
(601) 960-4600

Copies of this report can be purchased from:

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Western Distribution Branch  
U.S. Geological Survey  
Box 25425, Federal Center  
Lakewood, Colorado 80225  
(303) 234-5888



## WATER-LEVEL MAPS OF THE ALLUVIAL AQUIFER, NORTHWESTERN MISSISSIPPI SEPTEMBER 1982

BY DAPHNE DARDEN

U. S. GEOLOGICAL SURVEY

Base maps modified  
from U.S. Geological  
Survey Map of  
Mississippi, 1972