Department of the Interior
United States Geological Survey

Prepared in cooperation with the
Mississippi Department of Natural Resources
Bureau of Land and Water Resources

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 81-1123

EXPLANATION

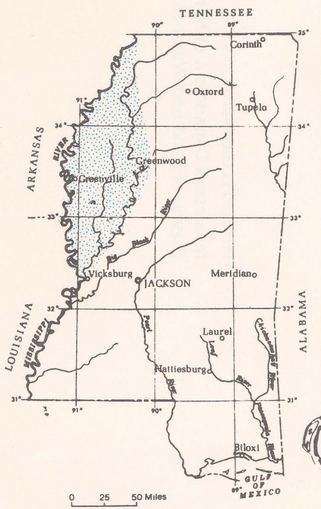
120 — WATER LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval is 5 feet. Datum is National Geodetic Vertical Datum of 1929. Based on measurements of water-level altitudes in wells and water-surface altitudes of lakes and streams in and near outcrop area.

• OBSERVATION WELL.

◉ OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN.

▲ POINT AT WHICH ALTITUDE OF WATER SURFACE IN STREAM WAS USED TO DEFINE THE WATER-LEVEL SURFACE OF AQUIFER.

WESTERN EDGE OF BLUFF HILLS.



LOCATION OF STUDY AREA IN MISSISSIPPI

GEOHYDROLOGIC SECTION FROM ISSAQUENA COUNTY TO YAZOO COUNTY, MISSISSIPPI (FROM DALSIN, 1978).

DATA FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL WEATHER SERVICE, 1980-81.

HYDROGRAPHS OF WELLS IN THE ALLUVIAL AQUIFER

WATER-LEVEL MAP OF THE MISSISSIPPI DELTA ALLUVIUM IN NORTHWESTERN MISSISSIPPI, APRIL 1981

DAPHNE DARDEN

1981

WATER-LEVEL MAP OF THE MISSISSIPPI DELTA ALLUVIUM IN NORTHWESTERN MISSISSIPPI, APRIL 1981

by Daphne Darden

Introduction

The water-level map on the left was prepared by the U.S. Geological Survey in cooperation with the Mississippi Bureau of Land and Water Resources, Department of Natural Resources. The map represents the surface of the ground water as it was measured in 454 wells in the alluvial aquifer during April 13-24, 1981. The measurements were made near the beginning of the 1981 planting season after a year-long drought.

ALLUVIAL AQUIFER

The Yazoo River basin includes seven thousand square miles of rich farmland, commonly called "the Delta". This area is underlain by the Mississippi River valley alluvial aquifer, the most productive aquifer in northwestern Mississippi. Thickness of the alluvium ranges from a few feet to about 200 ft and averages about 140 ft (Harvey, 1956). Clay, silt, and fine sand make up the upper, less permeable part of the aquifer. Sand and gravel make up the highly permeable lower part of the aquifer that ranges in thickness from less than 50 ft. to more than 150 ft. The irregular thickness of the aquifer is shown in the geohydrologic section A-A. The aquifer 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 as much as 2,000 gallons per minute are common in the area.

Precipitation on land surface and percolation of rainfall through the soil is the source of most of the recharge to the Mississippi River valley alluvial aquifer. Locally, however, the aquifer may receive recharge from streams during periods of high stream stages. From September 1980 through April 1981, recharge to the aquifer and the attendant increase in water levels were less than normal because rainfall was deficient.

GROUND-WATER SURFACE

The contours on the map represent approximate lines of equal altitude of the ground-water surface at the time the water levels were measured. Areas of higher water levels were located near lakes or bayous and near the Bluff Hills which border the Delta on the east. Areas of lower water levels were generally near major rivers and streams. One small area of depression is located near Vicksburg where pumping for the city water supply is heavy. Other areas of depression are attributed to irrigation of rice. The ground-water surface rises in winter and spring when there is little or no pumping for irrigation and rainfall is generally high. Of the 438 water wells measured in September 1980, 380 were measured again in April 1981. Of the remeasured wells, 59 percent showed a rise in water level. The median water level rise was about 2.4 ft and the mean water level rise was about 3.1 ft. Forty-one percent of the wells showed a decline in water level. The median water level decline was about 2.1 ft. Water levels in wells located near rivers or streams showed the largest decline. Water levels in wells located near the Bluff Hills showed the largest rise. Contours around streams, lakes, and rivers reflect surface-water and ground-water levels. Where hydraulic continuity prevails, surface-water levels are good indicators of ground-water levels.

The water-level-change map depicts areas of decline and recovery in water levels. Recovery of water level occurred in areas throughout the Delta; however, the northern part shows more recovery than other areas. Most water wells located near the Bluff Hills also show recovery. Most declines in water levels were in the southern part of the Delta. The map clearly shows that declines were small in most areas and that areas of largest declines were near rivers.

Ground water in the Delta flows generally from north to south. The direction of movement is influenced locally by major streams. During periods of low flow, ground water is discharged into streams. Conversely, when water rises in streams, water moves from the stream into the aquifer. Because of drought conditions in the winter and early spring, water levels in the aquifer did not fully recover. Ground-water levels peaked in February and March, and by April generally were declining as ground-water discharged into streams. Movement of ground water is perpendicular to water-level contour lines.

When irrigation pumping ends, water moves into pumped areas from umpumped areas, resulting in a moderate rise in water levels in the pumped areas. Later, during the winter and spring rainy season, all water levels rise.

ADDITIONAL INFORMATION

The map showing the results of the April 1981 water-level measurements is the second of a proposed series showing seasonal ground-water levels in the alluvial aquifer of the Delta. Data on the individual wells (water-level measurements, locations, and so forth) in this map may be obtained from the following:

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SELECTED REFERENCES

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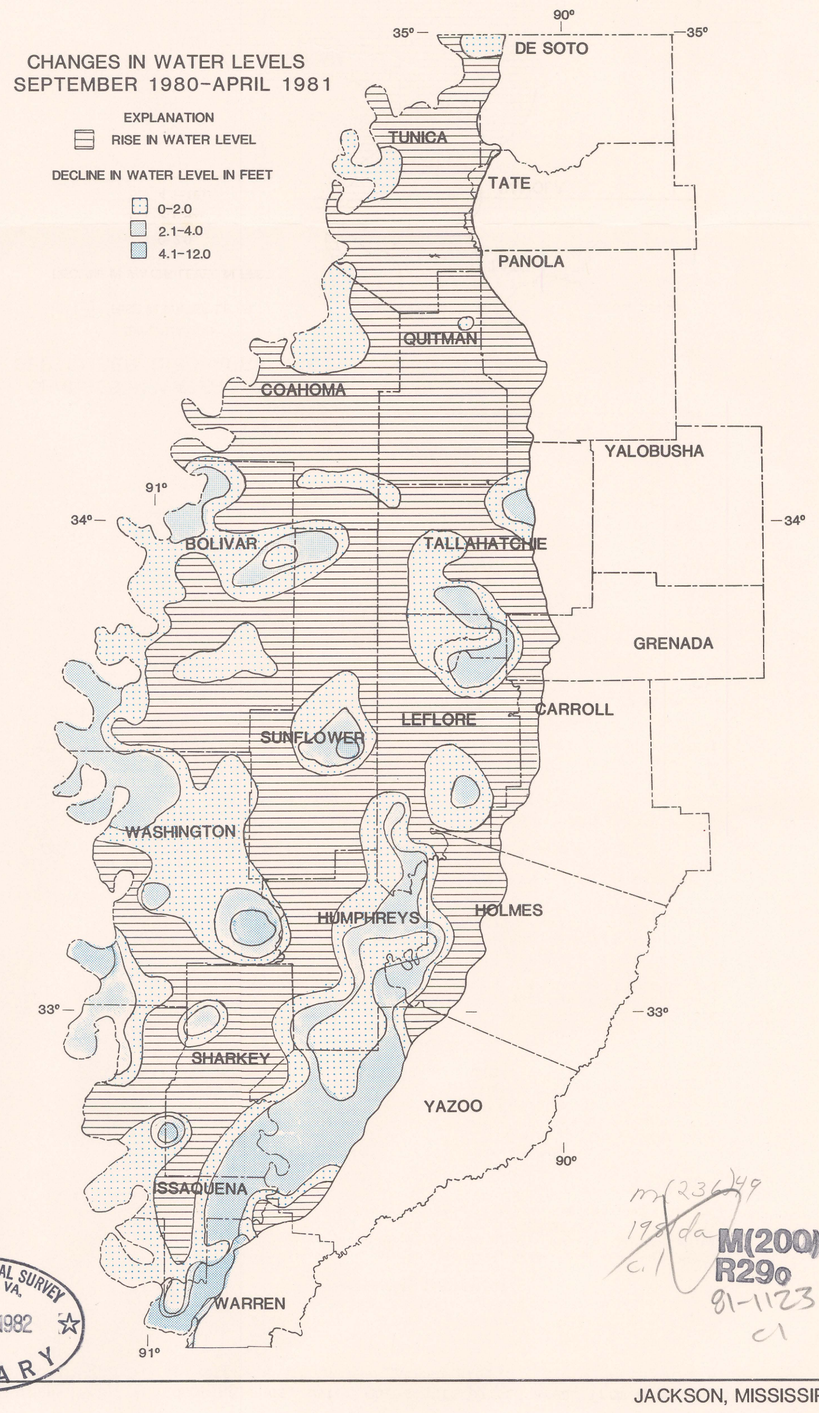

JACKSON, MISSISSIPPI