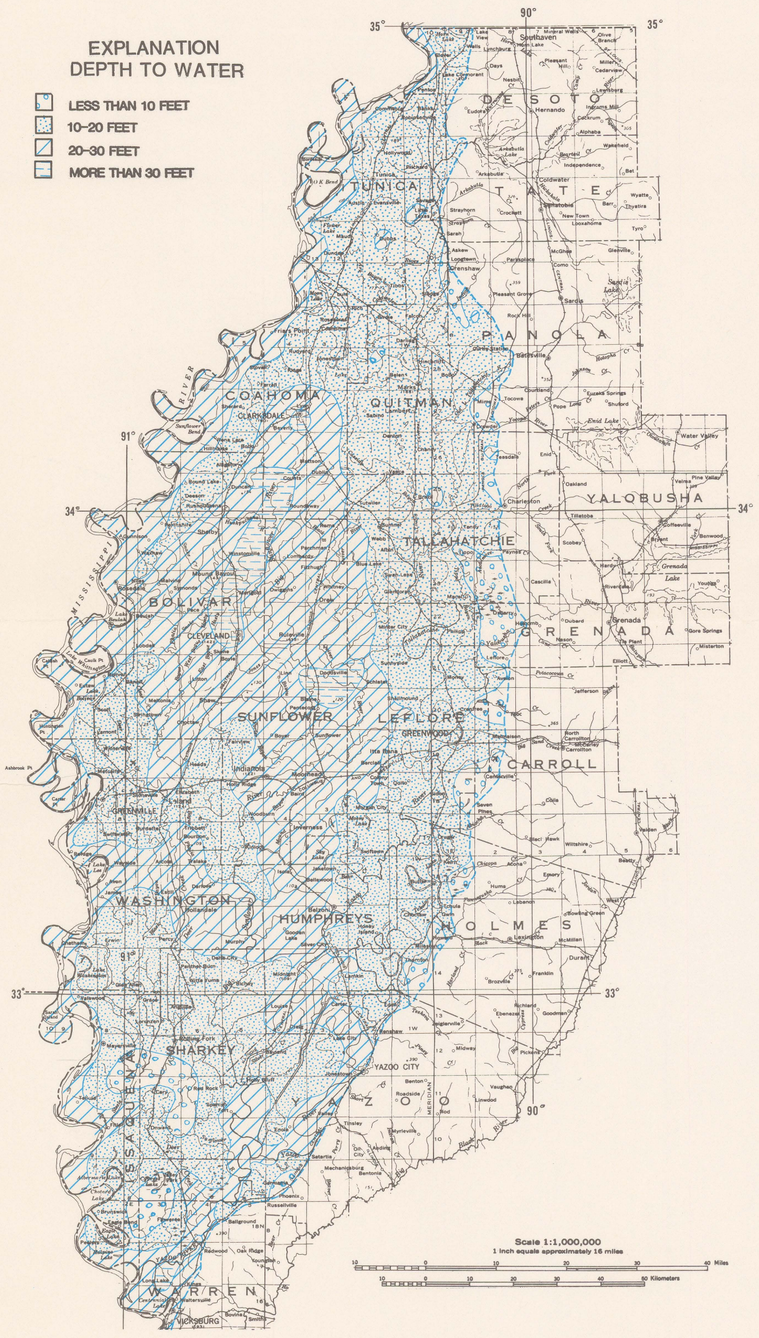
Department of the Interior
United States Geological Survey

Mississippi Department of Natural Resources
Bureau of Land and Water Resources

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 82-574

INTRODUCTION

The study area, locally known as "the Delta", covers the Mississippi River Alluvial Plain in northwestern Mississippi. The Delta is a nearly flat southward sloping surface characterized by oxbow lakes, abandoned stream channels, natural levees, backswamp areas, and bayous.

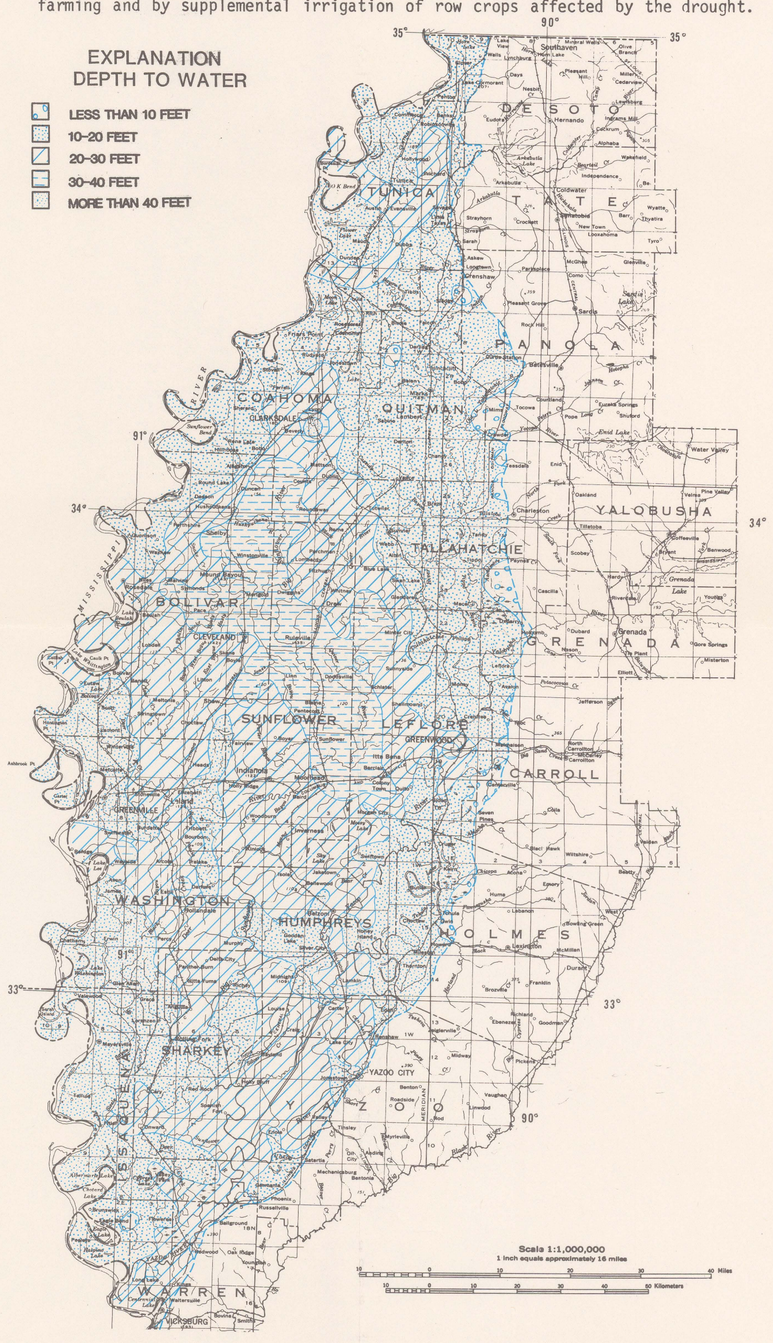


DEPTH TO WATER-APRIL 1981

This map of depth to the water table for April 1981 (Darden, 1981) reflects a water level resulting from less-than-normal rainfall and recharge, and residual drawdown caused by pumping for irrigation and aquaculture during the 1980 growing season. The shallowest depths to water, 11 to 20 feet, were in isolated areas in the eastern part of the Delta near the Bluff Hills, along the Mississippi River, near oxbow lakes, or in areas where pumping was not heavy. The deepest water levels were in areas along the Yazoo River and its larger tributaries and in areas of heavy pumping.

The accompanying maps were prepared to show the effects of ground-water withdrawal on the alluvial aquifer during the growing season of 1981 and to compare water levels in September 1981 with water levels in September 1980. The maps are based on water-level measurements made in over 400 wells that tap the alluvial aquifer, the principal source of water supply for crop irrigation and fish farming in the Delta.

Water levels in April 1981 were lower than normal as a result of less-than-normal rainfall, low stream stages, and residual drawdown caused by pumping for irrigation during 1980. Water levels in September 1981 were lower than in September 1980 because levels were lower than normal at the beginning of the irrigation season, drought conditions continued, and pumping increased. The increase in pumping was caused by the increase in rice acreage and catfish farming and by supplemental irrigation of row crops affected by the drought.

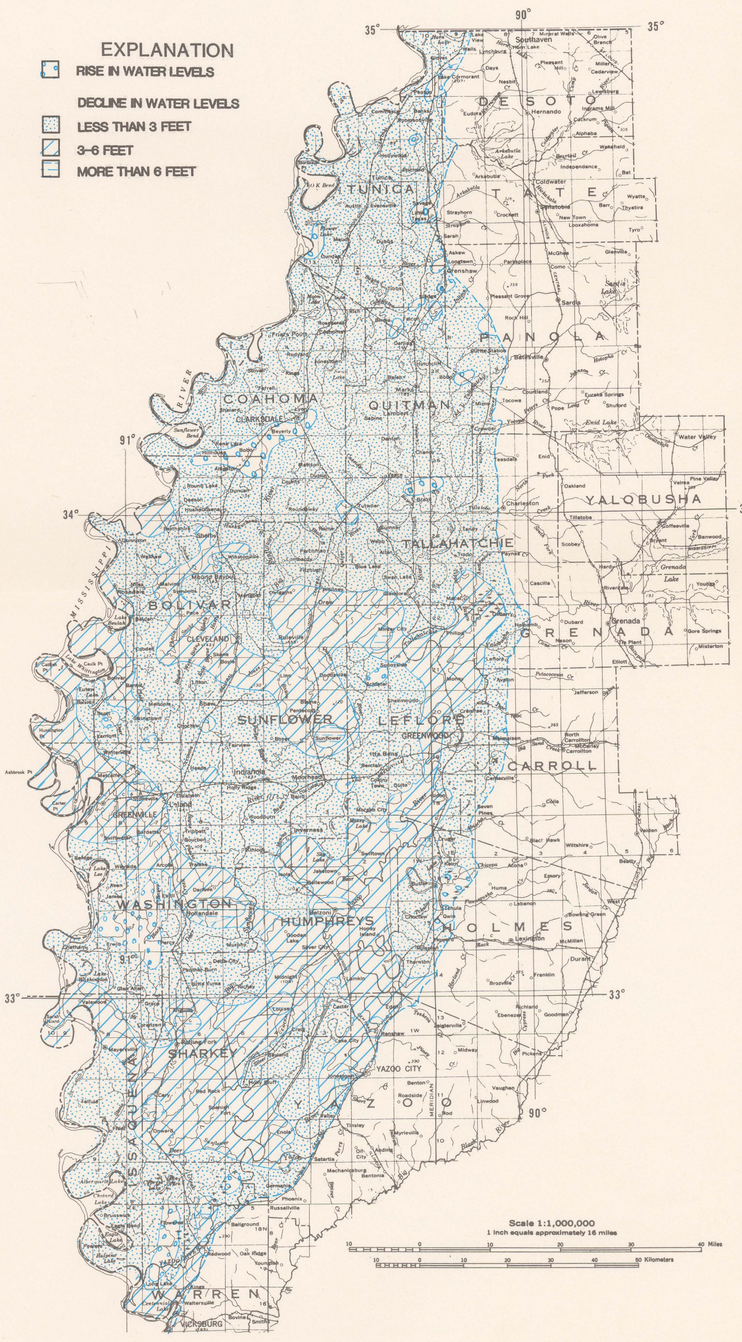


DEPTH TO WATER-SEPTEMBER 1981

Water levels are usually lower in the fall than in the spring. This map, when compared to the depth to water map for April 1981, shows fewer areas of shallow water levels and more and larger depressed areas. Water levels as deep as 40 feet below land surface occur in areas of heavy pumping for industrial cooling and irrigation. Water level depths of 30 feet or more occur commonly in areas of heavy pumping for aquaculture and rice irrigation. Lower ground-water levels are reflected by low stages in streams in the southern part of the Delta where there is ground-water discharge to the streams.

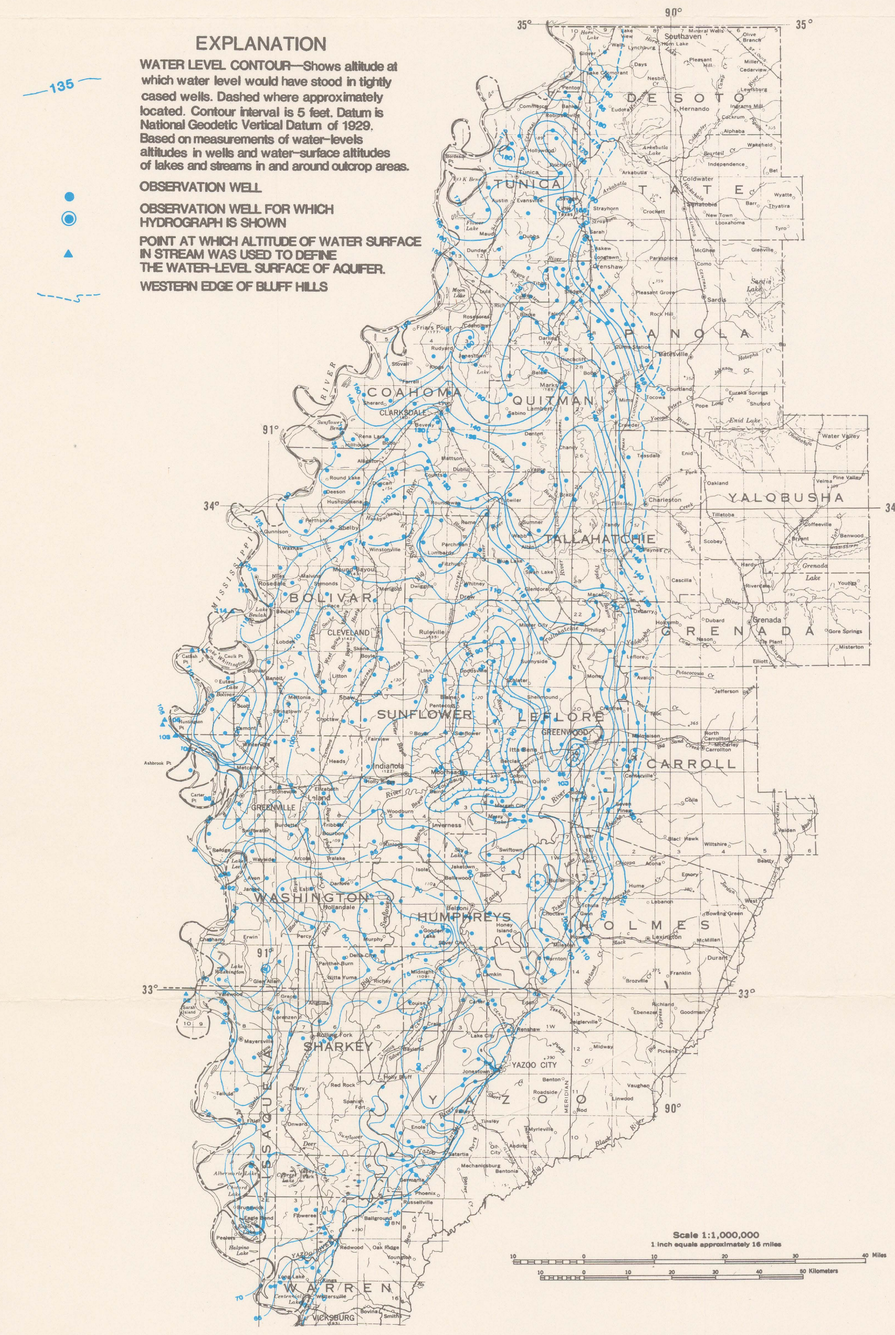
ALLUVIAL AQUIFER

Bordered on the west by the Mississippi River and on the east by the loess-covered Bluff Hills, the Mississippi Delta is underlain by about 140 feet of alluvial clay, silt, sand, and gravel. Gravels and sands at the base that form the alluvial aquifer grade upward into silt and clay. The thickness, high permeability, and favorable recharge conditions make the aquifer one of the most productive in Mississippi.



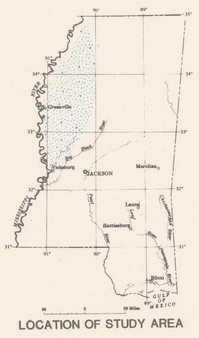
CHANGES IN WATER LEVELS

The water-level change map shows changes in water levels in the alluvium from September 1980 (Wasson, 1980) to September 1981. Of the 438 wells measured in September 1980, 358 were re-measured in September 1981. Observation wells measured in September 1981 indicate that water levels in general averaged lower than in September 1980. Water-level declines averaged 2.8 feet in 312 wells. The range of rises in water levels in 46 wells was from near zero to 11.6 feet and averaged 1.6 feet. About half of the water levels that rose exhibited a rise less than one foot; in only four wells did water levels rise more than 5 feet. The larger rises are attributed to local changes in distribution of pumping. The greatest declines in water levels were in areas of climatic-related stresses and heavy pumping. Heavy pumping for irrigation accentuates seasonal fluctuations in water levels; continual heavy pumping, however, may lower water levels more each passing year.



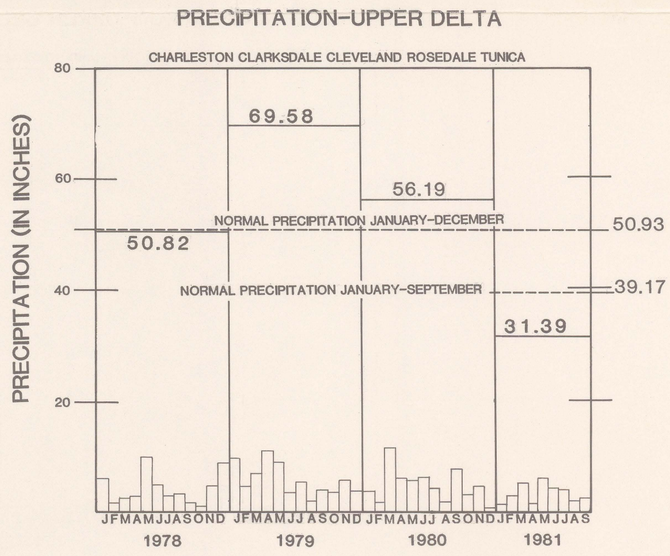
WATER-LEVEL MAP, SEPTEMBER 1981

The blue contours on the water-level map show approximate altitude of non-pumping water levels in wells completed in the alluvium. Closed contours with hachures show cones of depression or relatively lower water-level altitudes. The two large depressions were caused by prolonged heavy pumping for irrigation while two smaller cones of depression at Greenwood are in areas where water is used for industrial cooling. Closed contours without hachures represent higher water-level altitudes or mounds. There are three areas along the Mississippi River in abandoned meanders or stream channels where water levels are high. These abandoned stream channels, Eagle Lake, Lake Washington, and Lake Bolivar, appear to recharge the surrounding areas.

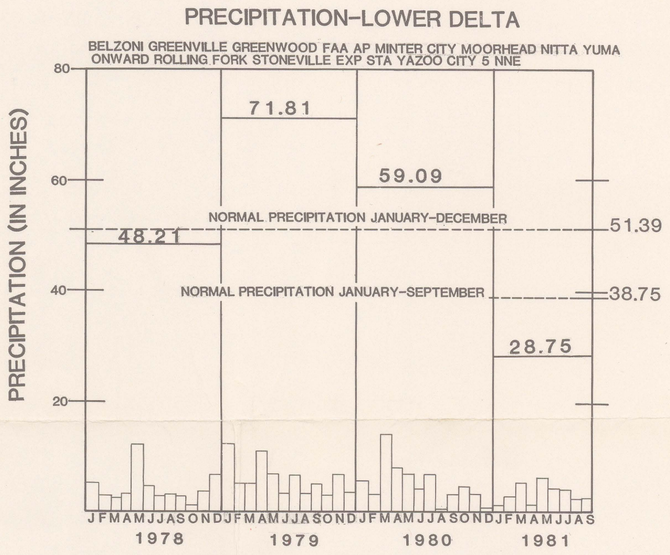


LOCATION OF STUDY AREA

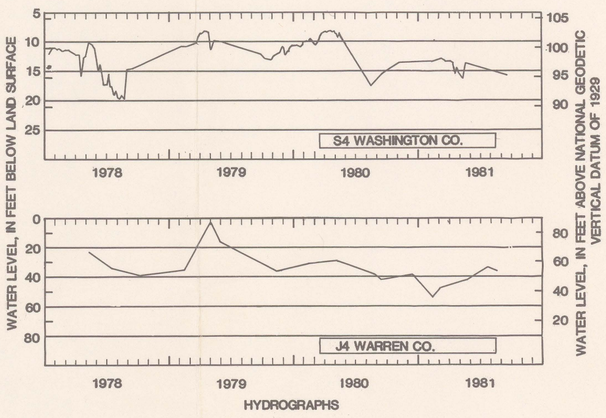
PRECIPITATION-UPPER DELTA



PRECIPITATION-LOWER DELTA



DATA FROM THE NATIONAL OCEANIC AND ATMOSPERIC ADMINISTRATION, 1978-81.



PRECIPITATION GRAPHS AND HYDROGRAPHS

The precipitation graphs, composites for stations in the upper and lower Delta, indicate less than normal rainfall from July 1980 through September 1981. The water-level declines that resulted from reduced recharge, and the increased demand for irrigation water during this drought period are shown by two hydrographs. The hydrographs show higher water levels in response to heavy rainfall in January and April 1979 and March 1980.

ADDITIONAL INFORMATION

The map depicting the results of the September 1981 water-level measurements is the third of a 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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Wasson, B.E., 1980, Water-level map of the Mississippi Delta Alluvium in northwestern Mississippi, September 1980: Bureau of Land and Water Resources, Water Resources Map 80-1, map.

WATER-LEVEL MAPS OF THE ALLUVIAL AQUIFER, NORTHWESTERN MISSISSIPPI SEPTEMBER 1981

DAPHNE DARDEN
1982

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

Jackson, Mississippi