

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GROUND-WATER DATA FOR GEORGIA, 1981

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Open-File Report 82-904

Prepared in cooperation with the
Georgia Department of Natural Resources
Environmental Protection Division
Georgia Geologic Survey



Doraville, Georgia

1982

UNITED STATES DEPARTMENT OF THE INTERIOR

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PREFACE

Data used in this report were collected by the U.S. Geological Survey in cooperation with the State of Georgia; Chatham County; Glynn County; the cities of Brunswick and Valdosta; and the Albany Water, Gas, and Light Commission.

Records of all water-level measurements and water-quality data made in observation wells used in this report may be obtained upon request from the U.S. Geological Survey, Water Resources Division, 6481 Peachtree Industrial Boulevard, Suite B, Doraville, GA 30360

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM OF METRIC UNITS (SI)

<u>Multiply</u>	<u>By</u>	<u>To obtain</u>
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
gallon per minute (gal/min) (gpm)	0.06309	liter per second (L/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m ³ /s)
	43.81	liters per second (L/s)

National Geodetic Vertical Datum of 1929. A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. It was formerly called mean sea level. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

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ABSTRACT

More than 2,000 water-level measurements made in Georgia in 1981 provide the basic data for this report. Daily mean water-level fluctuations and trends are shown in hydrographs for the previous year (1980) and fluctuations of the monthly mean water levels are shown for selected years in some observation wells in Georgia. Water-quality samples are collected periodically throughout Georgia and analyzed as part of areal and regional ground-water studies. Along the coast, chloride concentrations have remained stable around Savannah, but invasion of brackish water into the aquifer at Brunswick has increased the chloride concentration.

Mean annual water levels throughout Georgia ranged from 3.42 feet higher to 12.68 feet lower in 1981 than in 1980, and in some areas were the lowest on record.

E X P L A N A T I O N
RESERVOIRS AND WELL YIELDS

- 5** MASSIVE DOLOMITE—Most wells yield 5 to 50 gallons per minute, maximum reported yield 1500 gallons per minute
 LIMESTONE, SANDSTONE, MUDSTONE, AND CHERT—Most wells yield 1 to 20 gallons per minute, maximum reported yield 50 to 300 gallons per minute
- 4** PRINCIPALLY GRANITE, GNEISS, AND METASEDIMENTARY ROCKS—Most wells yield 1 to 25 gallons per minute, maximum reported yield 470 gallons per minute
- 3** SAND AND GRAVEL—Most wells yield 50 to 1200 gallons per minute, maximum reported yield 3300 gallons per minute (Cretaceous aquifer)
- 2** SAND AND LIMESTONE—Most wells yield 250 to 600 gallons per minute, maximum reported yield 1800 gallons per minute (Clayton—principal artesian aquifers)
- 1** LIMESTONE AND SAND—Most wells yield 1000 to 5000 gallons per minute, maximum reported yield 11,000 gallons per minute (principal artesian aquifer)

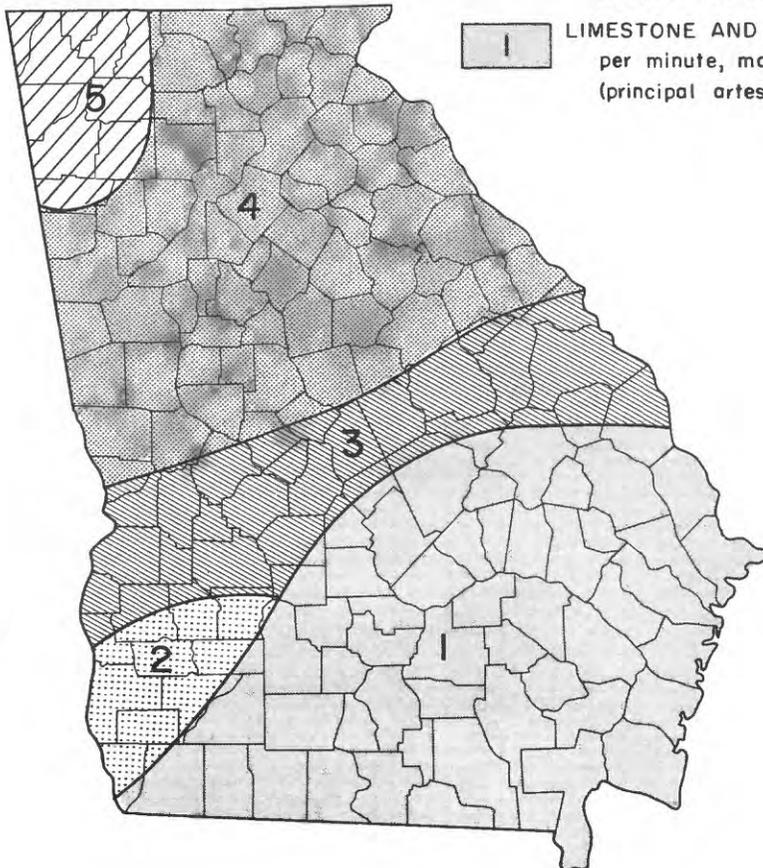


FIGURE 1.0-1.—GROUND-WATER RESERVOIRS

1.0 INTRODUCTION

An Expanded Format, Combining Text and Graphics in Two-Page Units

This report continues a publication format that annually presents both water-level and water-quality data. In this format the information is presented in two-page units: the left page presents a text which summarizes the information for an area or subject and the right page consists of one or more illustrations. Daily mean water-level fluctuations and trends are shown in hydrographs for the previous year and fluctuations of the monthly mean water level are shown for a period of record in selected observation wells in Georgia. The selected wells best illustrate the effects of changes in recharge and discharge in the various ground-water reservoirs in the State. A short narrative explains fluctuations and trends in each hydrograph.

Monitoring water-quality and ground-water levels is essential to the understanding of storage and other changes in a ground-water reservoir or aquifer. Fluctuations and long-term trends in water levels occur as a result of recharge to and discharge from the reservoir. Varying rates of recharge occur chiefly as a result of varying rates of precipitation, evapotranspiration, and surface-water infiltration into the ground-water reservoir. Discharge occurs as natural flow from the aquifer to streams and springs, direct ground-water evapotranspiration, and as manmade withdrawal from wells.

Ground-water levels have been monitored in Georgia for at least a hundred years. Most of these data were used in areal reconnaissance studies, and published, usually as tables, with a few graphs of water-level trends. These data had limited value, especially considering the time lag between data collection and publication. With the advent of continuously

monitoring recorders and computer processing of data, this information can now be presented to the user in an understandable and timely manner.

The cooperation and assistance of the following agencies in collecting water-quality and water-level data during 1981 are gratefully acknowledged: Georgia Department of Natural Resources, Georgia Geologic Survey; Chatham County; Glynn County; the cities of Brunswick and Valdosta; and the Albany Water, Gas, and Light Commission.

2.0 WATER-LEVEL MEASUREMENT PROGRAM, 1981

More than 2,000 water-level measurements made in Georgia in 1981 provided the basic data for this report.

2.1 Locations of Observation Wells and Availability of Data

As part of the cooperative ground-water investigations undertaken by the U.S. Geological Survey and the State of Georgia, a statewide water-level measurement program to monitor long-term trends was begun in 1938. This program initially consisted of an observation well network to provide long-term data on the amounts of ground water in storage in the coastal area. Other wells were added in areas where changes in water levels might forewarn of potential water-quality problems.

The addition of networks became necessary to obtain detailed water-level data for a generalized appraisal of the State's ground-water resources. Two of these networks have been established to provide data for water-level maps of the principal artesian aquifer and

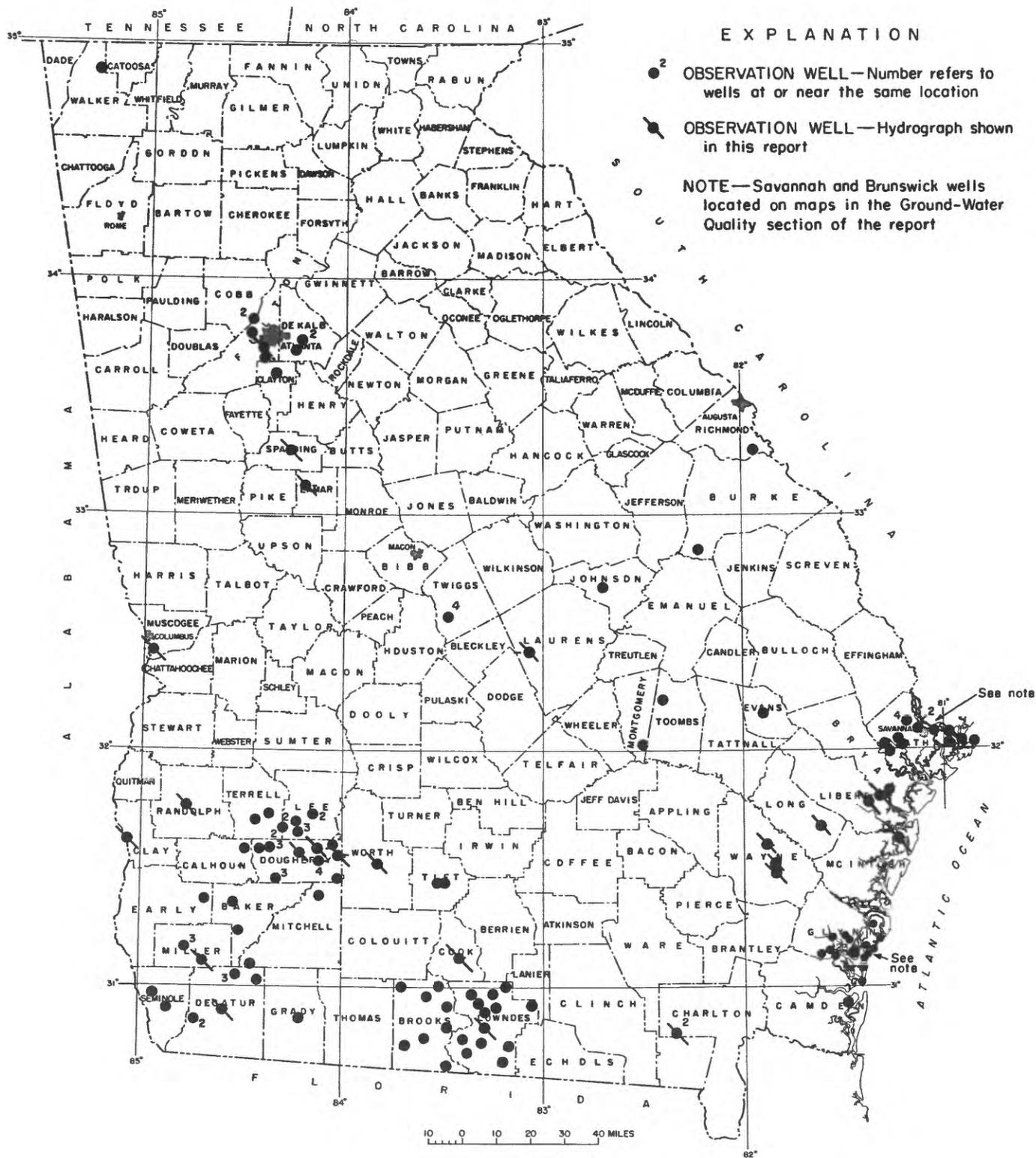


FIGURE 2.1-1.—LOCATION OF OBSERVATION WELLS THAT SHOW LONG-TERM TRENDS IN WATER LEVELS

the Cretaceous aquifer system. Water-level data are collected for each of these systems on an alternate-year basis so that a map for each system will be available every 2 years.

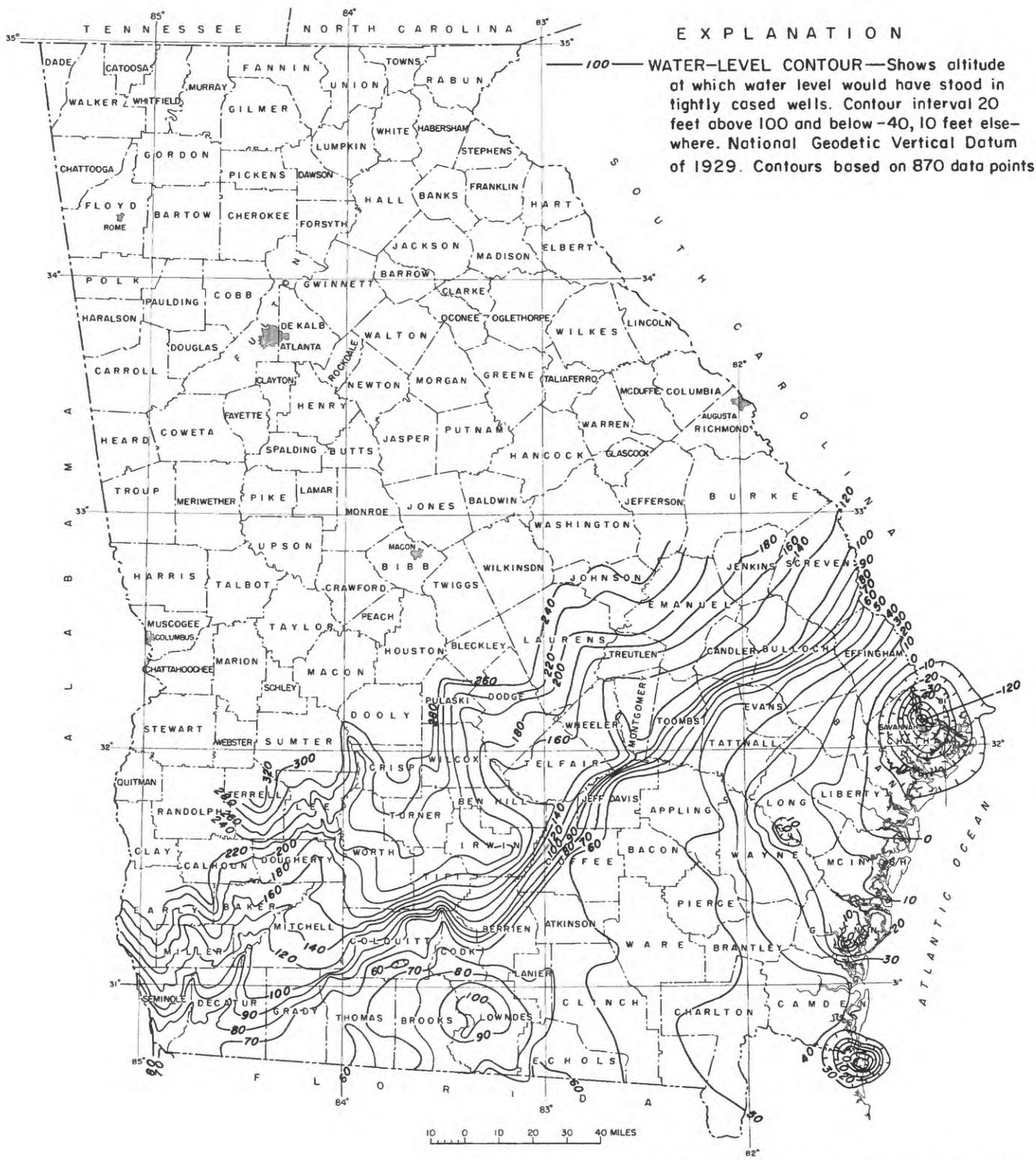
3.0 CHANGES IN WATER LEVELS, 1981

Mean annual water levels across Georgia were from 3.42 feet higher to 12.68 feet lower in 1981 than in 1980 and in some areas were the lowest of record. Precipitation in the winter of 1981 recharged the ground-water reservoirs enabling water levels to recover; however, in some areas they remained below the level at the end of 1980.

3.1 Regional Principal Artesian Aquifer

The principal artesian aquifer is one of the most productive ground-water reservoirs in the United States. About 600 million gallons of water per day is pumped from the aquifer in Georgia, mostly for industrial use and for irrigation (Pierce and Barber, 1981).

The aquifer underlies most of the Coastal Plain below the Fall Line and water is under artesian pressure except where the aquifer crops out at the surface. In some areas the artesian pressure is sufficient to produce flowing wells.



Hydrology modified from Johnston and others (1981)

FIGURE 3.1-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), GEORGIA, MAY 1980

In areas of outcrop, water levels in wells tapping the principal artesian aquifer fluctuate seasonally in response to recharge from streamflow, and hence to precipitation and evapotranspiration. Where the aquifer is deeply buried, ground-water levels are controlled by withdrawal, and seasonal fluctuations relating to recharge are less pronounced.

Record water-level low established in July

The water level in U.S. Geological Survey test well OK 8 reached a record low of 71.17 feet below land surface in July 1981 or 2.4 feet below the previous low of 68.77 feet of December 1980. The mean for 1981 was 69.6 feet as compared to the mean of 61.1 feet for 1966--a decline of 8.5 feet in the water level for the 15-year period. The long-term hydrograph shows that the water level has declined, corresponding to an increase in regional pumpage. The smaller scale fluctuations on the water-level curve generally coincide with corresponding changes in the cumulative departure curve for precipitation, illustrating how rainfall recharges the aquifer. This well experiences seasonal water-level fluctuations that correspond to changes in precipitation and evapotranspiration. This is probably due to the effects of vertical leakage from the Okefenokee Swamp into the aquifer (Callahan, 1964).

[Note: The 1-year hydrographs in this report are plotted from daily mean values and the 10-year hydrographs from monthly mean values. Therefore, the record low or high water level occurring on a day will be lower or higher than that shown on the hydrograph, which is the mean for that day.]

CHARLTON COUNTY

304943082213701 Local number, 27E002.

LOCATION.—Lat 30°49'43", long 82°21'37", Hydrologic Unit 03110201, end of Georgia Highway 177 east of Stephen C. Foster State Park.

Owner: U. S. Geological Survey, Test well OK 8.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4 in., depth 647 ft, cased to 465 ft, open hole.

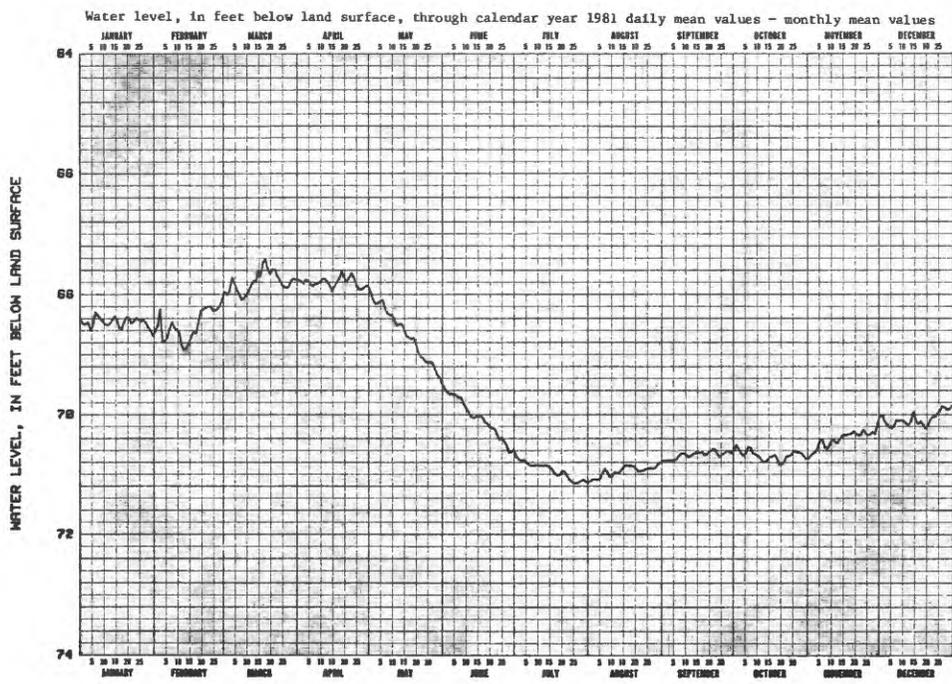
DATUM.—Altitude of land-surface datum is 116 ft.

Measuring point: Floor of recorder shelter, 4.2 ft above land-surface datum.

REMARKS.—Well pumped Aug. 1, 1978, sounded to obstruction at 484 ft. Well open below obstruction.

PERIOD OF RECORD.—May 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 58.65 ft below land-surface datum, June 27, 1966; lowest, 71.17 ft below land surface datum, July 27, 1981.



Well: 27E002
US GEOL SURVEY, TN OK 8

MONTHLY DEPARTURES AND WATER LEVELS

Station 898186

WYACROSS 4 NE GA

Period Of Record: 1966 - 1981

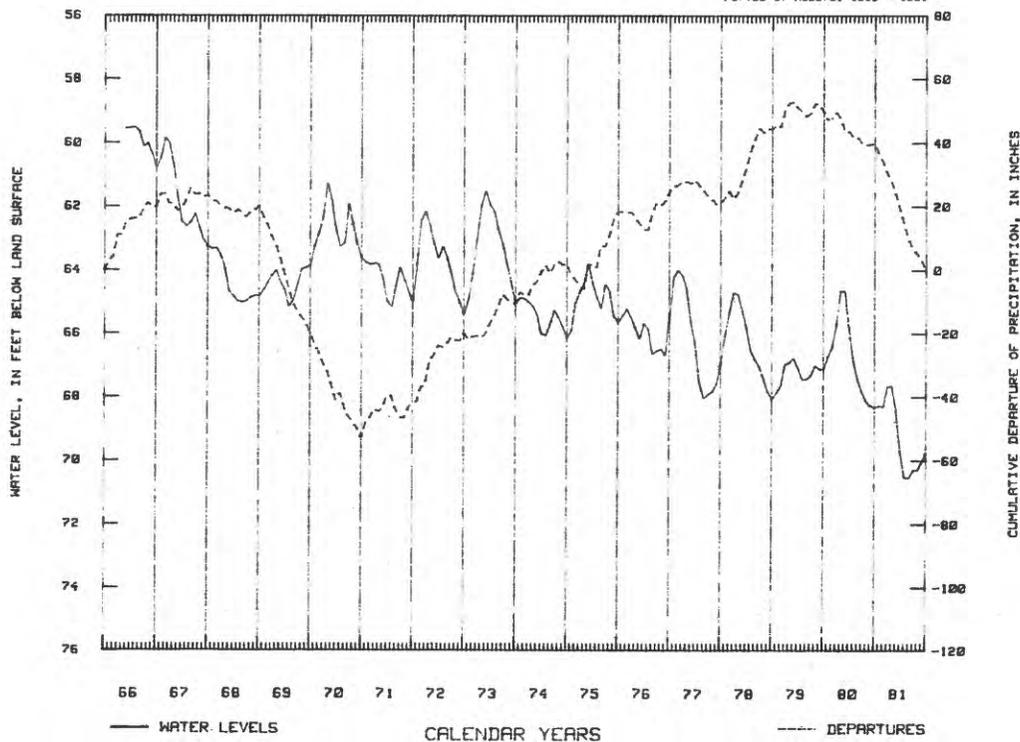


FIGURE 3.1-2.—WATER-LEVEL FLUCTUATIONS IN TEST WELL OK 8

Precipitation affects water level

The 1981 mean annual water level in the Laurens County well was 1.69 feet lower than the 1980 value. The well is very near the area where the aquifer crops out and the water level responds chiefly to precipitation. The water level rises in early spring in response to rainfall, but begins to decline early in the summer due to irrigation pumpage. When the long-term hydrograph is correlated with the cumulative departure curve for precipitation, it becomes apparent how rainfall affects this well.

LAURENS COUNTY

322652083033001 Local number, 21T001.

LOCATION.—Lat 32°26'52", long 83°03'30", Hydrologic Unit 03070102, approximately 1.8 mi northeast of Dexter, Ga.

Owner: Danny Hogan.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused domestic well, diameter 4 in., depth 123 ft, cased to 89 ft, open hole.

DATUM.—Altitude of land-surface datum is 252 ft.

Measuring point: Floor of recorder shelter, 2.57 ft above land-surface datum.

REMARKS.—Borehole geophysical survey conducted November 1973. Interpolated values, April 7-14, 1980.

PERIOD OF RECORD.—March 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 24.11 ft below land-surface datum, February 14, 1972; lowest, 39.58 ft below land-surface datum, November 12, 1968.

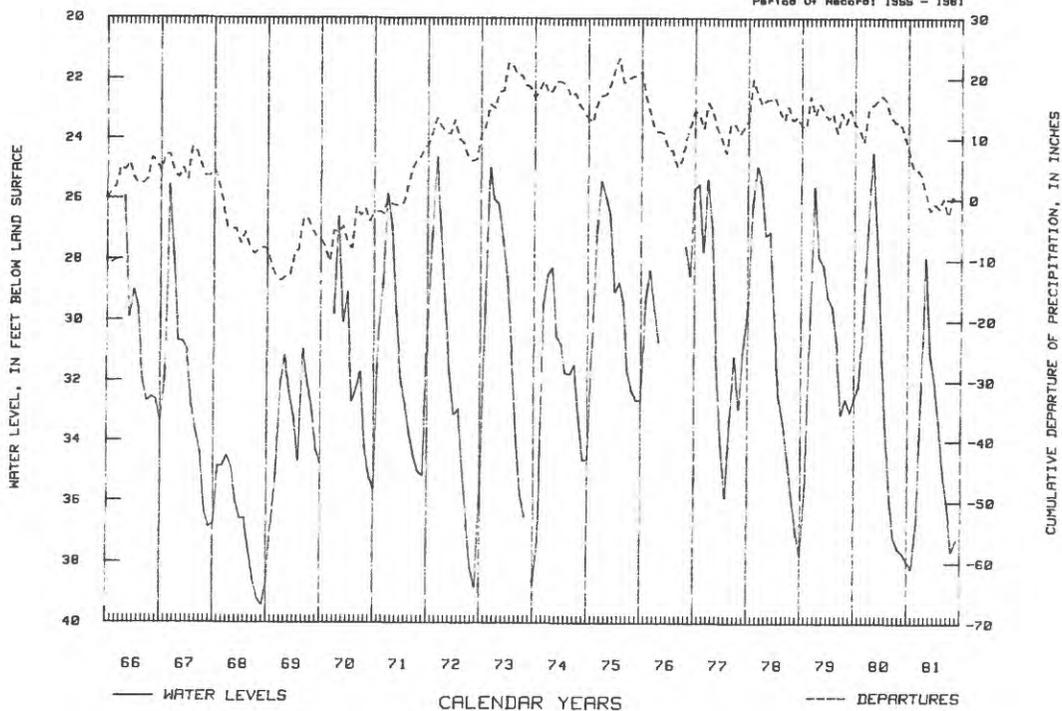
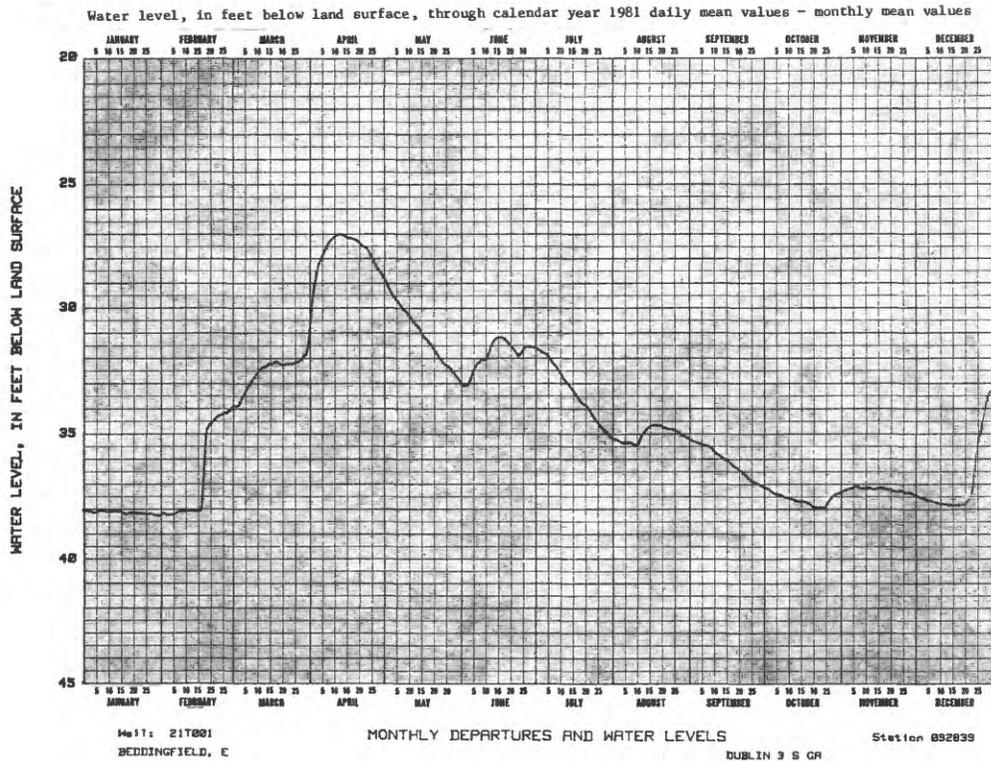


FIGURE 3.1-3.—WATER-LEVEL FLUCTUATIONS IN THE LAURENS COUNTY WELL

Water level reaches new low in July

The water level in the Sylvester well reached a new record low in July: 4.11 feet lower than the previous record low of 197.48 feet set in August 1980. The mean water level for 1981 was 199 feet, or 3.74 feet below the mean for 1980, and 6.42 feet lower than in 1972 when water-level measurements were first taken in this well. Increased pumpage for irrigation is the probable cause for the noticeable decline in the water level beginning in 1977 and continuing through 1981.

WORTH COUNTY

313146083491601 Local number, 15L020.
 LOCATION.—Lat 31°31'46", long 83°49'16", Hydrologic Unit 03110204, near water tank, behind VFW on U.S. Highway 82 east, Sylvester, Ga.
 Owner: City of Sylvester.
 AQUIFER.—Principal artesian aquifer.
 WELL CHARACTERISTICS.—Drilled unused municipal well, diameter 18 in., depth 450 ft, cased to 212 ft, open hole.
 DATUM.—Altitude of land-surface datum is 433 ft.
 Measuring point: Floor of recorder shelter, 2.90 ft above land-surface datum.
 REMARKS.—Well pumped and sounded July 19, 1978. Borehole geophysical survey conducted June 5, 1975. Interpolated values, August 20-28, October 9-November 17, 1980.
 PERIOD OF RECORD.—May 1972 to current year.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 191.50 ft below land-surface datum, May 17, 1973; lowest, 201.59 ft below land surface datum, July 31, 1981.

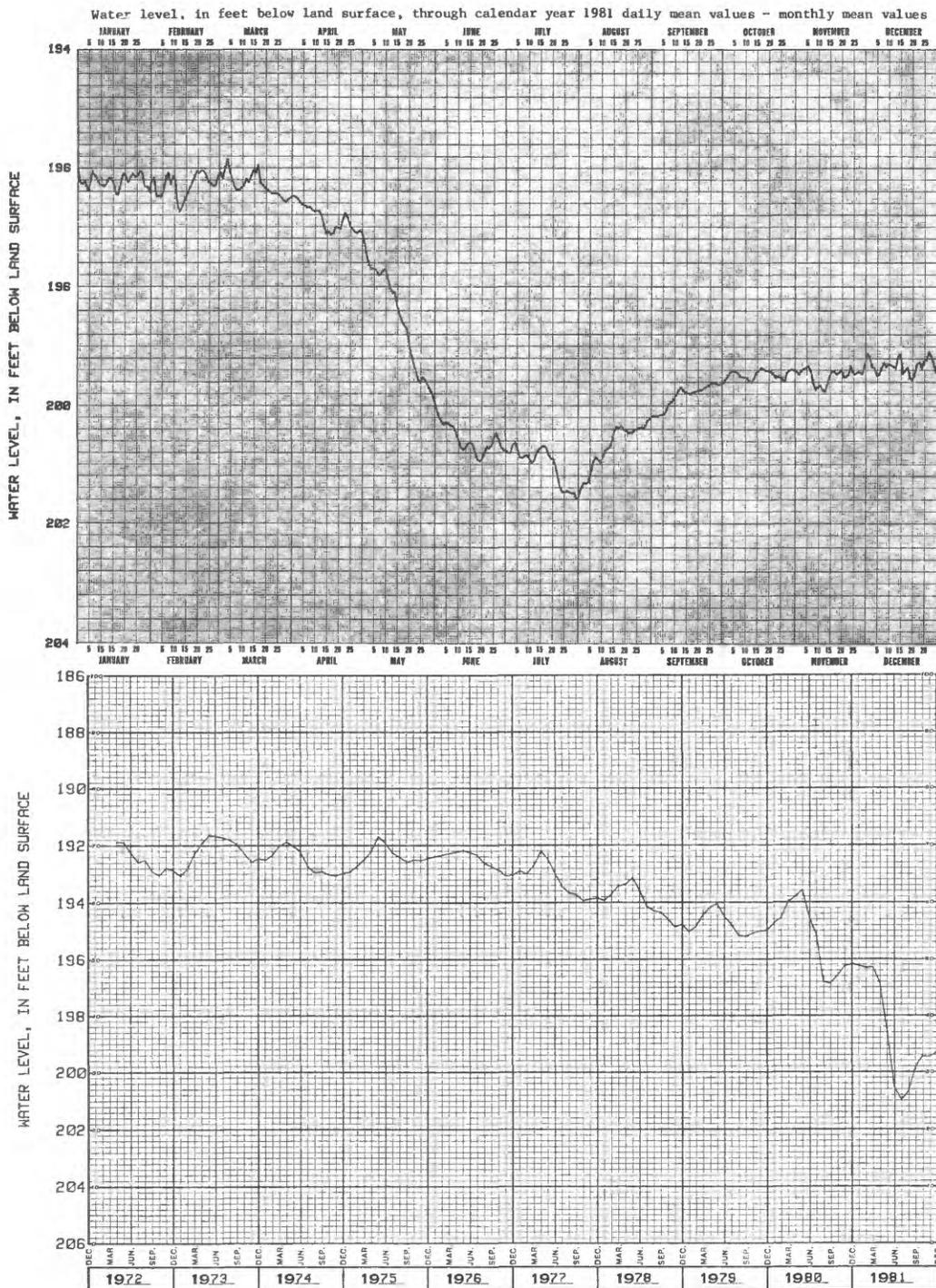


FIGURE 3.1-4.—WATER-LEVEL FLUCTUATIONS IN THE SYLVESTER OBSERVATION WELL

Record water level low established in July

The water level in the Vidalia well 2 responds to pumpage in the Toombs County area. The low water level for 1981 of 163.75 feet was 1.46 feet lower than the previous record low of July 1980 and the long-term decline was about 8.2 feet for the period of record (1974-81).

The long-term hydrograph depicts how an increase in pumpage for irrigation has caused a significant decline in the water level.

TOOMBS COUNTY

321302082243601 Local number, 26R001.

LOCATION.--Lat 32°13'02", long 82°24'36", Hydrologic Unit 03070107, 15 ft south of the Vidalia Water and Street Department and Fire Station.

Owner: City of Vidalia, well 2.

AQUIFER.--Principal artesian aquifer.

WELL CHARACTERISTICS.--Drilled municipal well, diameter 12 in., depth 1,000 ft, cased to 720 ft, open hole.

DATUM.--Altitude of land-surface datum is 285 ft.

Measuring point: Top of 12-inch casing.

REMARKS.--None.

PERIOD OF RECORD.--April 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 151.64 ft below land-surface datum, April 15, 1974; lowest, 163.75 ft below land-surface datum, July 17, 1981.

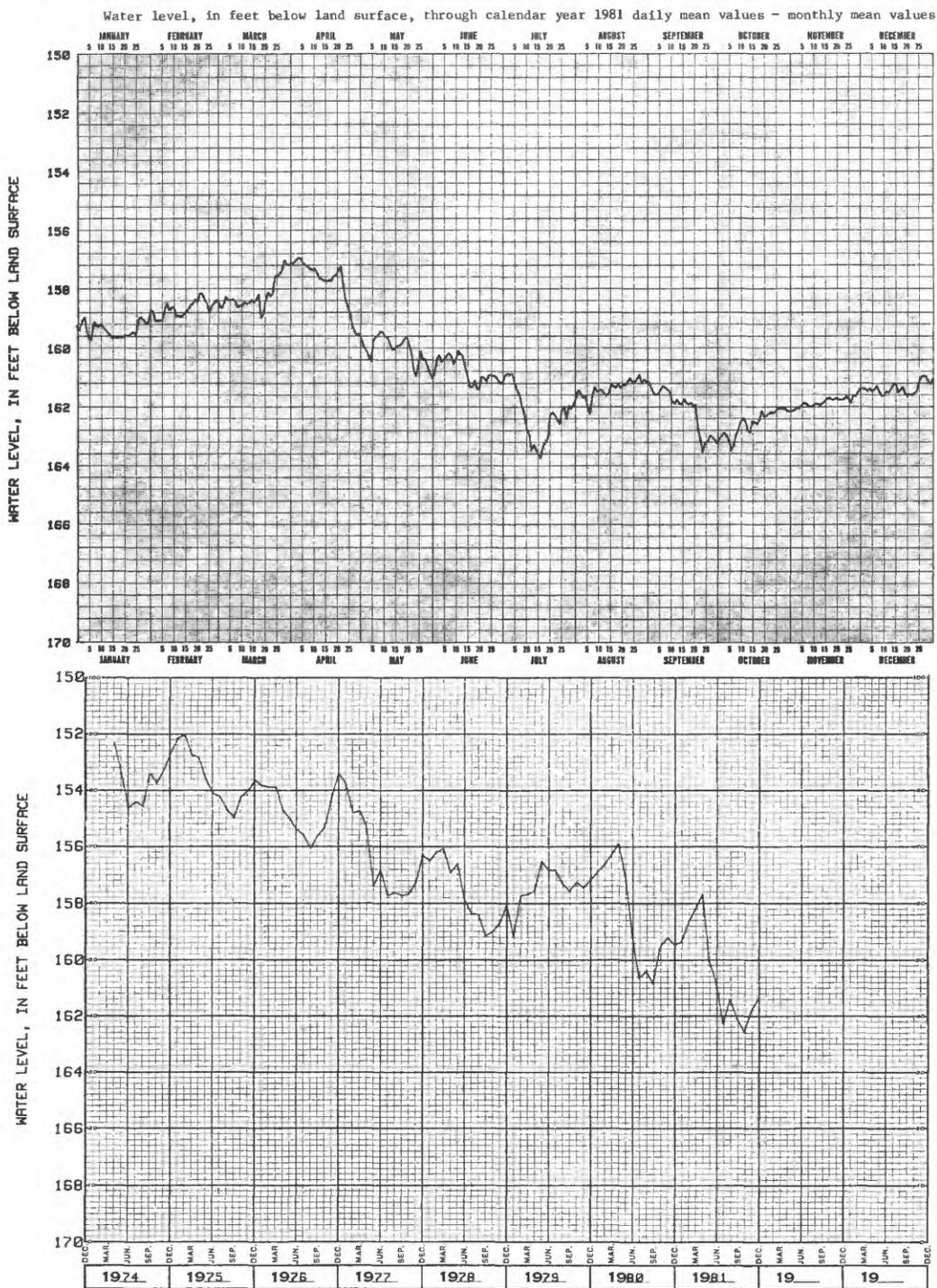


FIGURE 3.1-5.—WATER-LEVEL FLUCTUATIONS IN VIDALIA WELL 2

New water level low in July

A record low water level of 141.86 feet below land surface was established in the Seaboard Coast Line Railroad well in Tifton in July 1981, 9.86 feet below the previous low recorded in November 1980. The water level in the SCL Railroad well is affected mainly by precipitation and to a lesser extent, by pumping.

The long-term hydrograph for the period of record (1972-81) indicates a downward trend in the water level. When the water-level curve is correlated with the cumulative departure curve for precipitation, it becomes apparent how rainfall affects this well. A decrease in precipitation results in a decline of the water level because of a lack of recharge to the aquifer. Because this well is so influenced by rainfall, it is difficult to determine how much of the water-level decline can be attributed to ground-water withdrawal by pumping.

TIFT COUNTY

312716083304801 Local number, 17K001.

LOCATION.—Lat 31°27'16", long 83°30'48", Hydrologic Unit 03110204, along the Atlantic Coast Line Railroad, approximately 50 yards north of intersection of Seaboard Coast Line and the Southern Railroads.

Owner: Seaboard Coast Line Railroad.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused municipal well, diameter 12 in., depth 312, cased to 110 ft, open hole.

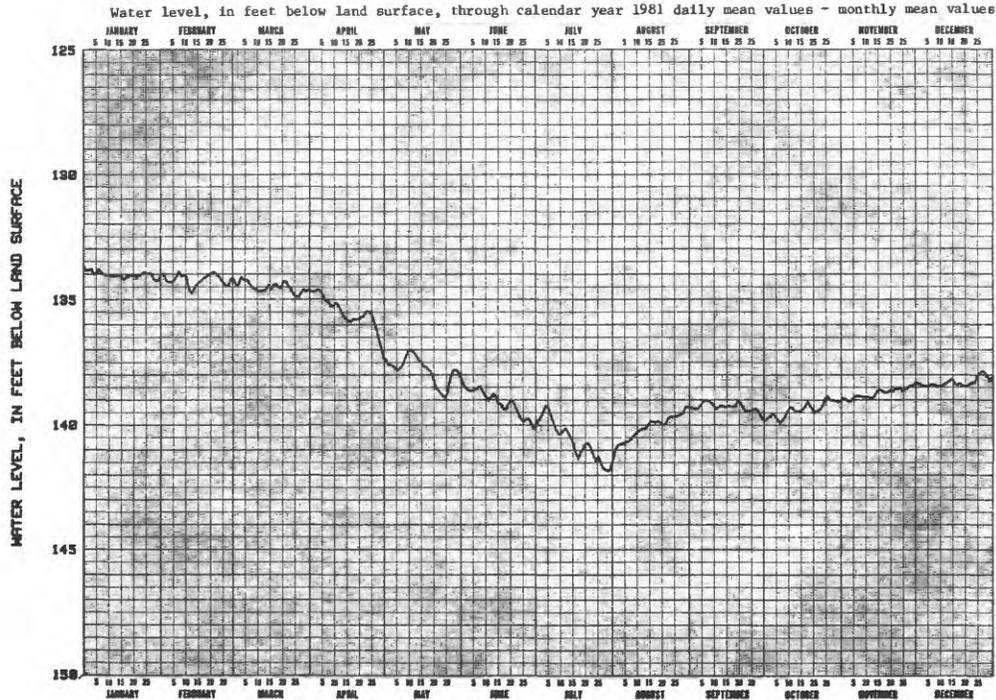
DATUM.—Altitude of land-surface datum is 345 ft.

Measuring point: Floor of recorder shelter, 2.70 ft above land-surface datum.

REMARKS.—Well sounded April 15, 1977; obstruction at 120 ft.

PERIOD OF RECORD.—February 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 120.02 ft below land-surface datum, April 5, 1966; lowest, 141.86 ft below land-surface datum, July 30, 1981.



Well: 17K001
SCL RR, TIFTON

MONTHLY DEPARTURES AND WATER LEVELS

Station 058148

ALBANY 3 SE GA

Period Of Record: 1972 - 1981

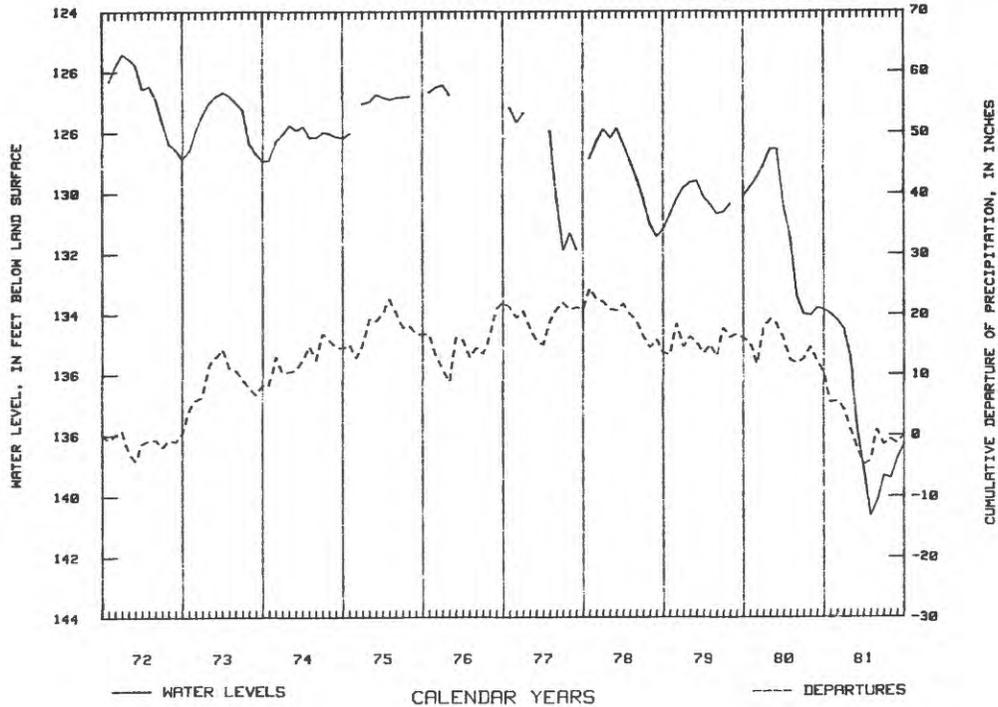


FIGURE 3.1-6.—WATER-LEVEL FLUCTUATIONS IN THE TIFT COUNTY SEABOARD COAST LINE RAILROAD WELL

New water level low in October

A record low of 78.9 feet was established in October in the Uvalda School well, 3.0 feet below the previous record low set in September 1980. The 1981 mean water level was 2.73 feet lower than in 1980. Precipitation is the main factor affecting the water level. Below normal precipitation in this area for the last few years, combined with a slight increase in ground-water withdrawal for irrigation, has caused a decline in the mean water level of about 8 feet for the period 1972-81.

MONTGOMERY COUNTY

320226082301101 Local number, 25Q1.

LOCATION.—Lat 32°02'26", long 82°30'11", Hydrologic Unit 03070106, well is located behind the Uvalda School in the city of Uvalda.

Owner: Uvalda School.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused municipal well, diameter 6 in., depth 536 ft., cased to 421, open hole.

DATUM.—Altitude of land-surface datum is 190 ft.

Measuring point: Top of 6-inch casing at land surface.

REMARKS.—Borehole geophysical survey conducted April 22, 1966.

PERIOD OF RECORD.—June 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 64.13 ft below land-surface datum, June 10, 1966; lowest, 78.9 ft below land-surface datum, October 9, 1981.

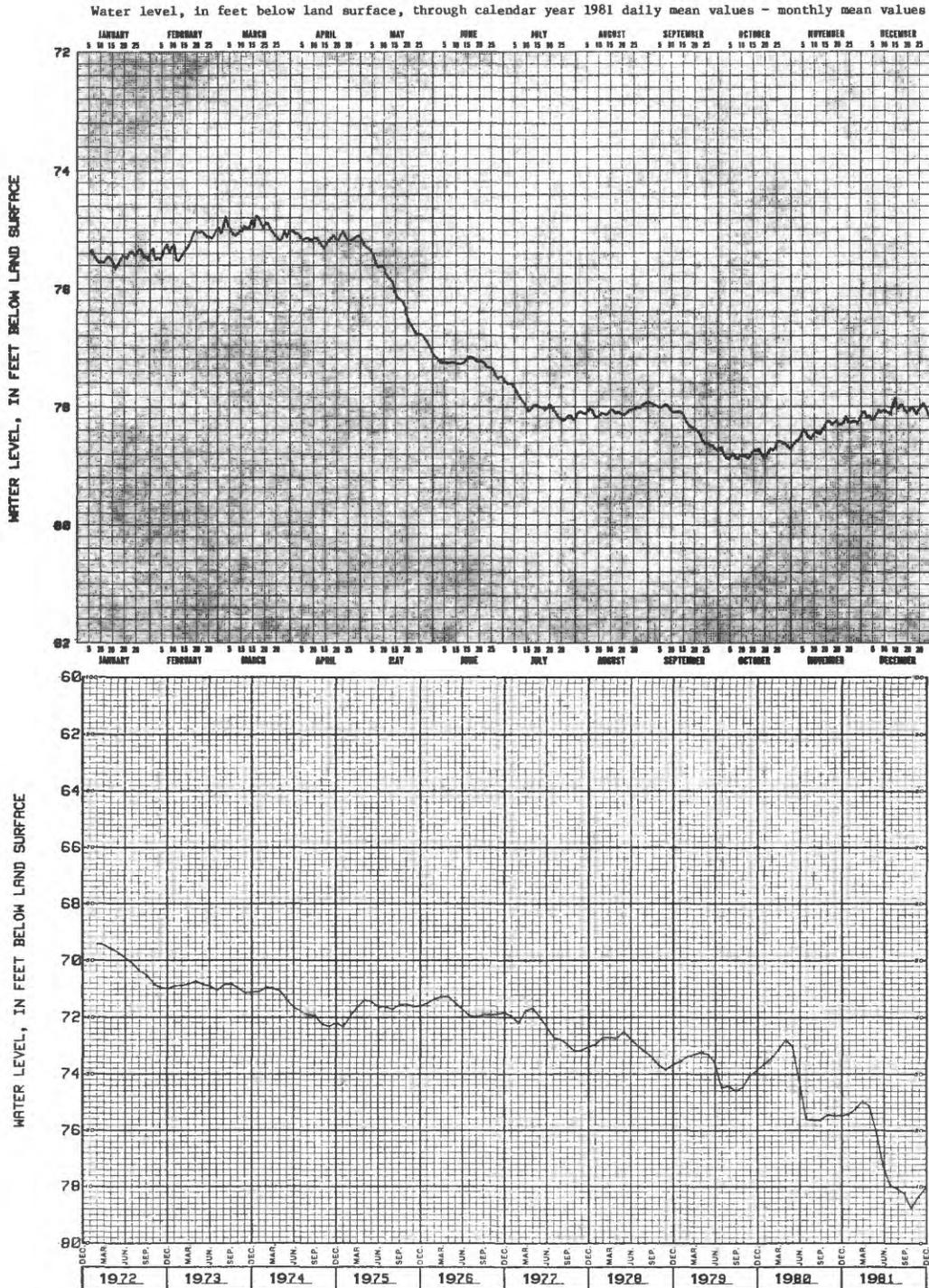


FIGURE 3.1-7.—WATER-LEVEL FLUCTUATIONS IN THE UVALDA SCHOOL WELL

3.1.1 Coastal Area

The ground-water resources of coastal Georgia constitute one of the most valuable mineral resources in the area. Growth of the pulp and paper industry, as well as the chemical industry, has occurred mainly because of the presence of large supplies of ground water available at moderate depths and at small cost. Large pulp mills are located at Savannah, Brunswick, Jesup, and St. Marys. The combined pumpage in these four areas is about 280 Mgal/d, almost 90 percent of which is used for industrial purposes. All of the ground water is pumped from the principal artesian aquifer (Wait and Gregg, 1973, p. 9).

The principal artesian aquifer is one of the most productive aquifers in the United States. The amount of water available from the aquifer is exceedingly large.

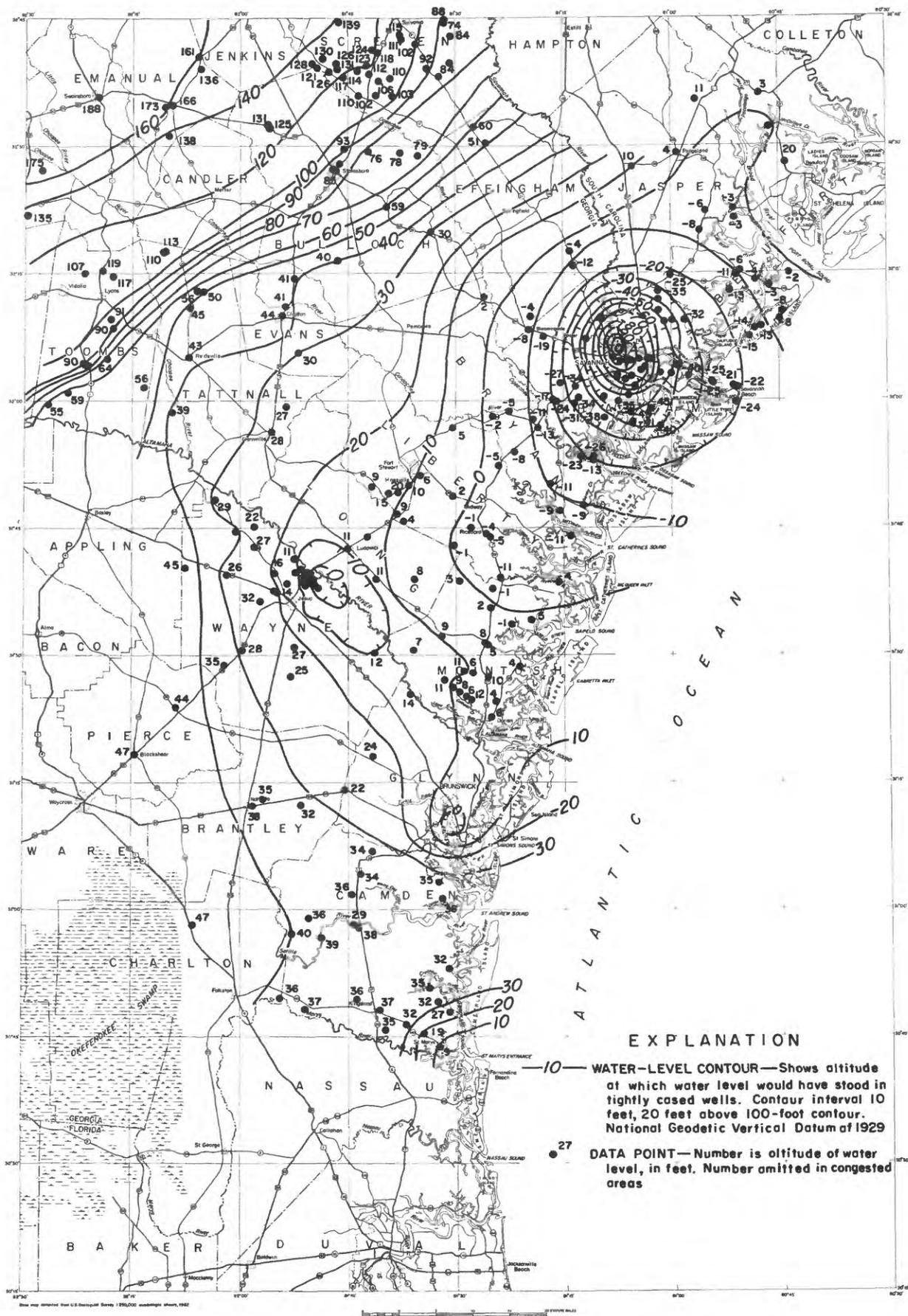


FIGURE 3.1.1-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), COASTAL AREA, NOVEMBER 1981

3.1.2 Savannah Area

Water levels in the Savannah area were slightly lower in 1981 than in 1980. Mean water levels ranged from 0.56 to 1.28 feet lower in 1981 than in 1980. Largest declines were experienced in wells near the center of pumpage in the Savannah area. Water levels in these wells also fluctuated more, responding to periodic changes in pumpage. The long-term decline in water levels can be attributed to the ever-increasing withdrawal of ground water for municipal and industrial use.

The present rate of ground-water withdrawal in the Savannah area exceeds the rate of recharge, causing a long-term decline in water levels (Counts and Donsky, 1963).

Yearly water-level fluctuations in the Savannah area reflect seasonal variations in precipitation and evapotranspiration as they affect the ground-water reservoir. Marked deviations from normal fluctuations indicate effects of ground-water withdrawal, with greater deviations occurring in water levels nearer the point of withdrawal.

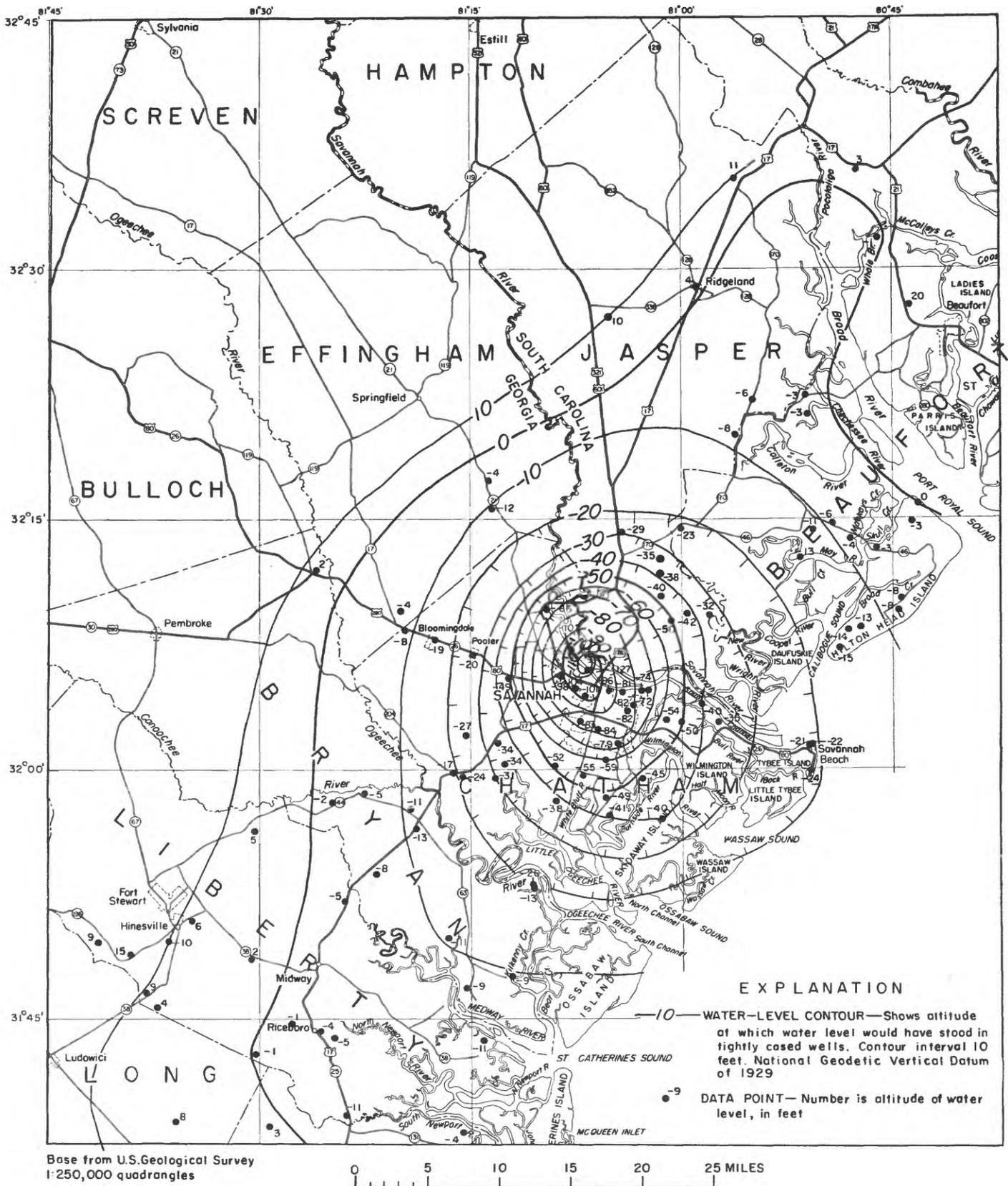


FIGURE 3.1.2-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), SAVANNAH AREA, NOVEMBER 1981

Water-level decline continues

The 1981 mean water level in the National Park Service well was 35.10 feet below land surface--only 0.50 foot above the record low established in September 1980. The mean water level was 0.56 foot lower for 1981 than for 1980. The long-term hydrograph for the entire period of record (1956-81) indicates a downward trend in the water level, corresponding to an increase in ground-water withdrawal in the Savannah area. The small-scale fluctuations on the water-level curve correlate with the cumulative departure curve for precipitation, and correspond to changes in pumpage related to climatic factors.

CHATHAM COUNTY

320202080541201 Local number, 38Q002.

LOCATION.—Lat 32°02'02", long 80°54'12", Hydrologic Unit 03060204, Cockspur Island, near pilot house.

Owner: U.S. Department of the Interior, National Park Service.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 8 in., depth 348 ft, cased to 110 ft, open hole.

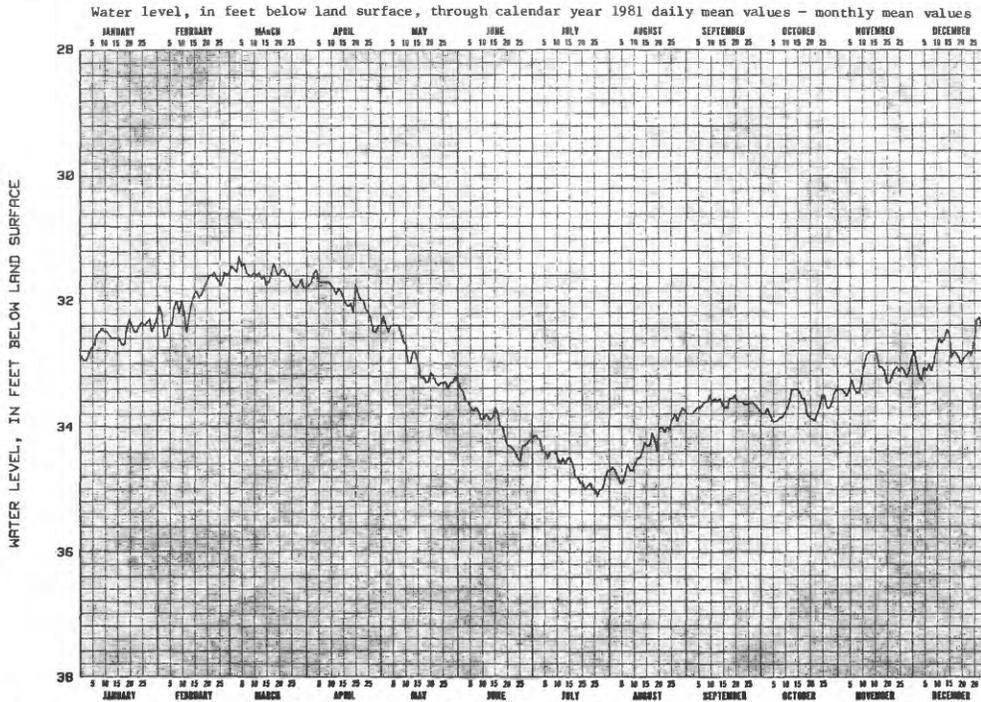
DATUM.—Altitude of land-surface datum is 8.0 ft.

Measuring point: Floor of recorder shelter, 3.62 ft above land-surface datum.

REMARKS.—Borehole geophysical survey conducted June 16, 1961.

PERIOD OF RECORD.—February 1956 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 16.0 ft below land-surface datum, March 5, 1956; lowest, 35.60 ft below land-surface datum, September 2-6, 1980.



Well: 38Q002
USNPS, FT PULASKI PILOT

MONTHLY DEPARTURES AND WATER LEVELS

Station HQ3822
NORP, EDS AT SAVANNAH AIRPORT, GA.
Period of Record: 1956 - 1981

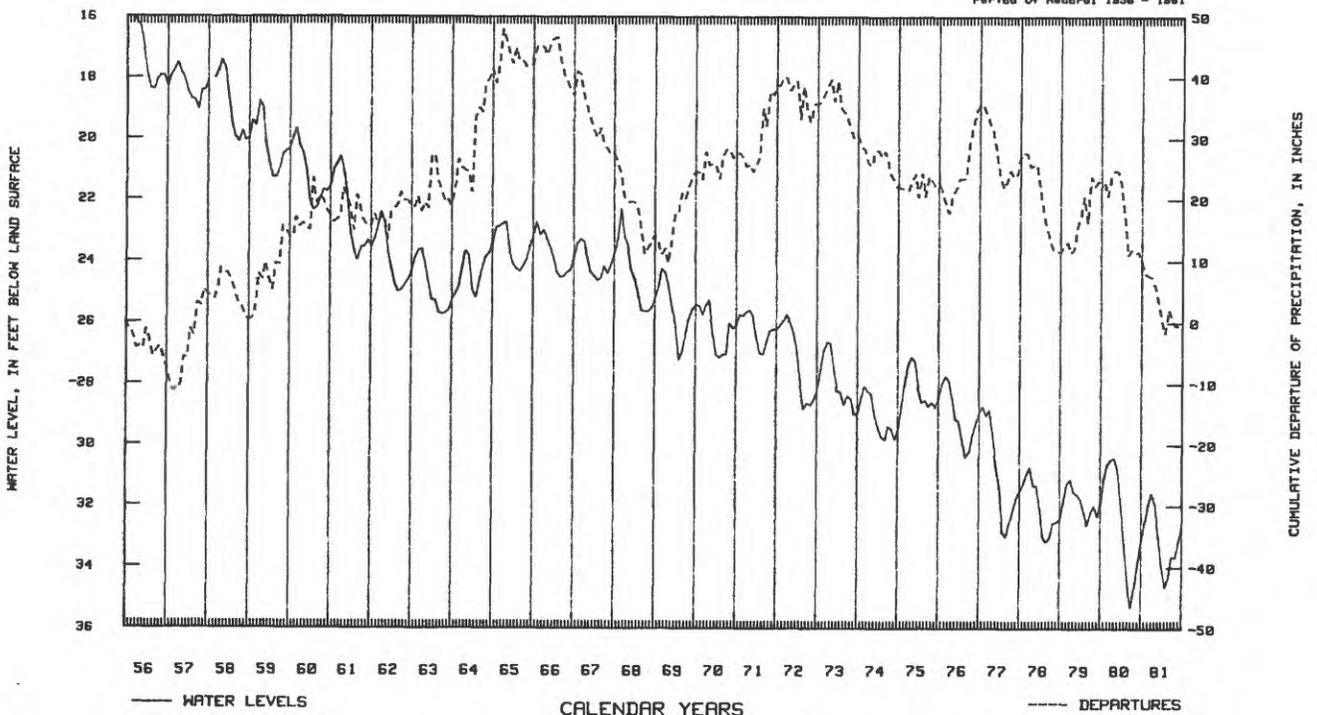


FIGURE 3.1.2-2.—WATER-LEVEL FLUCTUATIONS IN THE NATIONAL PARK SERVICE WELL

Long-term decline continues

In the Morrison well, the 1981 low water level was 49.00 feet below land surface--only 0.15 foot above the record low of 49.15 feet in September 1980.

The decline in the mean water level for the entire period of record (1958-81) was 24.9 feet, and for 1976-81 was 7.03 feet. The marked decline in the water level that began in 1976 was related to increased pumpage in the Savannah area. This causal relationship is discussed in Counts and Donsky (1963).

CHATHAM COUNTY

320021081124801 Local number, 36Q020.

LOCATION.—Lat 32°00'21", long 81°12'48", Hydrologic Unit 03060204, 2.7 mi south of intersection of U.S. Highway 17 with Dean Forest Road.

Owner: H. J. Morrison.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused domestic well, diameter 3 in., depth 365 ft, cased to 330 ft, open hole.

DATUM.—Altitude of land-surface datum is 13 ft.

Measuring point: Floor of recorder shelter, 3.88 ft above land-surface datum.

REMARKS.—None.

PERIOD OF RECORD.—March 1958 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 17.66 ft below land-surface datum, June 28, 1958; lowest, 49.15 ft below land-surface datum, September 6 and 7, 1980.

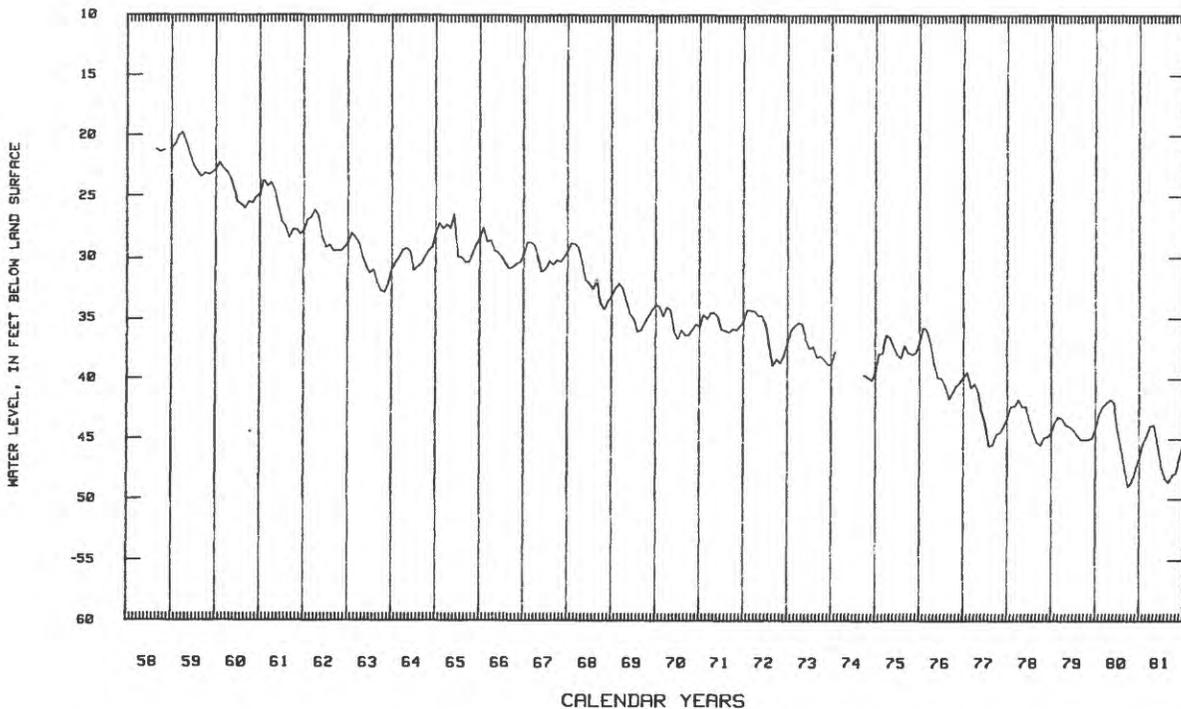
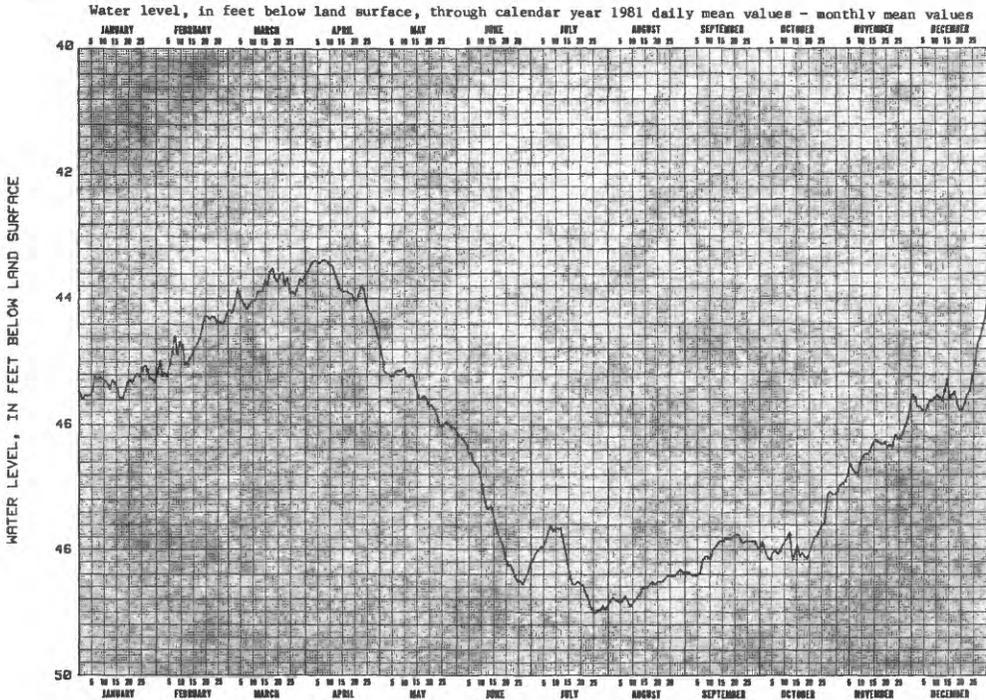


FIGURE 3.1.2-3.—WATER-LEVEL FLUCTUATIONS IN THE MORRISON OBSERVATION WELL

Water level affected by pumpage

The low water level in the Layne-Atlantic well was 115.65 feet below land surface as compared with the record low of 124.40 feet in August 1980. As seen in the long-term hydrograph, this well has shown a decline in the water level since measurements were first taken in 1954. The water level recovered somewhat in 1975, but increased ground-water withdrawal started a decline that has continued to the present. The long-term mean water level declined 47 feet during the period 1954-81.

This well experiences marked water-level fluctuations with changes in nearby pumpage. Cessation of pumpage in a nearby well field caused a temporary water-level rise of 30.8 feet in December before normal pumpage was resumed.

CHATHAM COUNTY

320530081085001 Local number, 36Q008.

LOCATION.—Lat 32°05'30", long 81°08'50", Hydrologic Unit 03060204, 0.19 mi southeast of intersection of Alfred Street and U.S. Highway 80.

Owner: Layne-Atlantic Co.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused industrial well, diameter 4 in., depth 406 ft, cased to 250 ft, open hole.

DATUM.—Altitude of land-surface datum is 9.91 ft.

Measuring point: Top of 3 in. casing, 1.0 ft above land-surface datum.

REMARKS.—None.

PERIOD OF RECORD.—February 1954 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 49.17 ft below land-surface datum, July 11, 1954; lowest, 124.40 ft below land-surface datum, August 30, 1980.

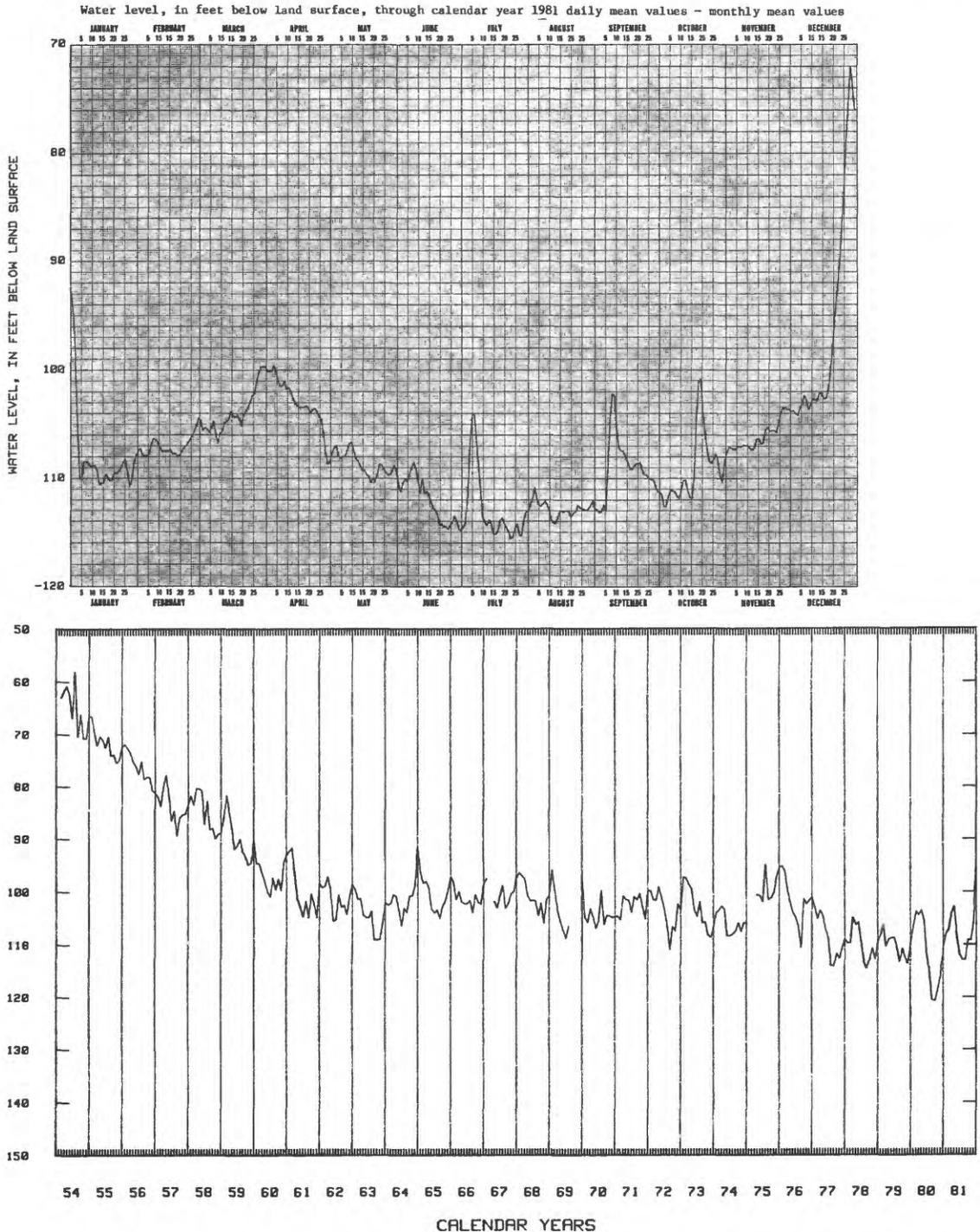


FIGURE 3.1.2-4.—WATER-LEVEL FLUCTUATIONS IN THE LAYNE-ATLANTIC OBSERVATION WELL

Record water-level low in July

A record low was established in U.S. Geological Survey test well 7 in Chatham County as the water level dropped to 29.65 feet in July, 0.15 foot below the previous low of September 1980. The mean water level was 0.65 foot lower in 1981 than in 1980. The long-term trend in the water level was a decline of 8.6 feet during the period 1965-81, as shown on the long-term hydrograph. Ground-water withdrawal that exceeds recharge is responsible for this decline. This causal relationship is documented in Counts and Donsky (1963).

CHATHAM COUNTY

320122080510202 Local number, 39Q003.

LOCATION.—Lat 32°01'22", long 80°51'02", Hydrologic Unit 03060204, Tybee Island near Fort Screven.

Owner: U.S. Geological Survey, test well 7.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 10 in., depth 600 ft, cased to 129 ft, open hole.

DATUM.—Altitude of land-surface datum is 7.0 ft.

Measuring point: Top of 10 in. casing, 2.0 ft above land-surface datum.

REMARKS.—Borehole geophysical survey conducted January 24, 1962.

PERIOD OF RECORD.—May 1952 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 17.8 ft below land-surface datum, April 11, 1963; lowest, 29.65 ft below land-surface datum, July 27, 1981.

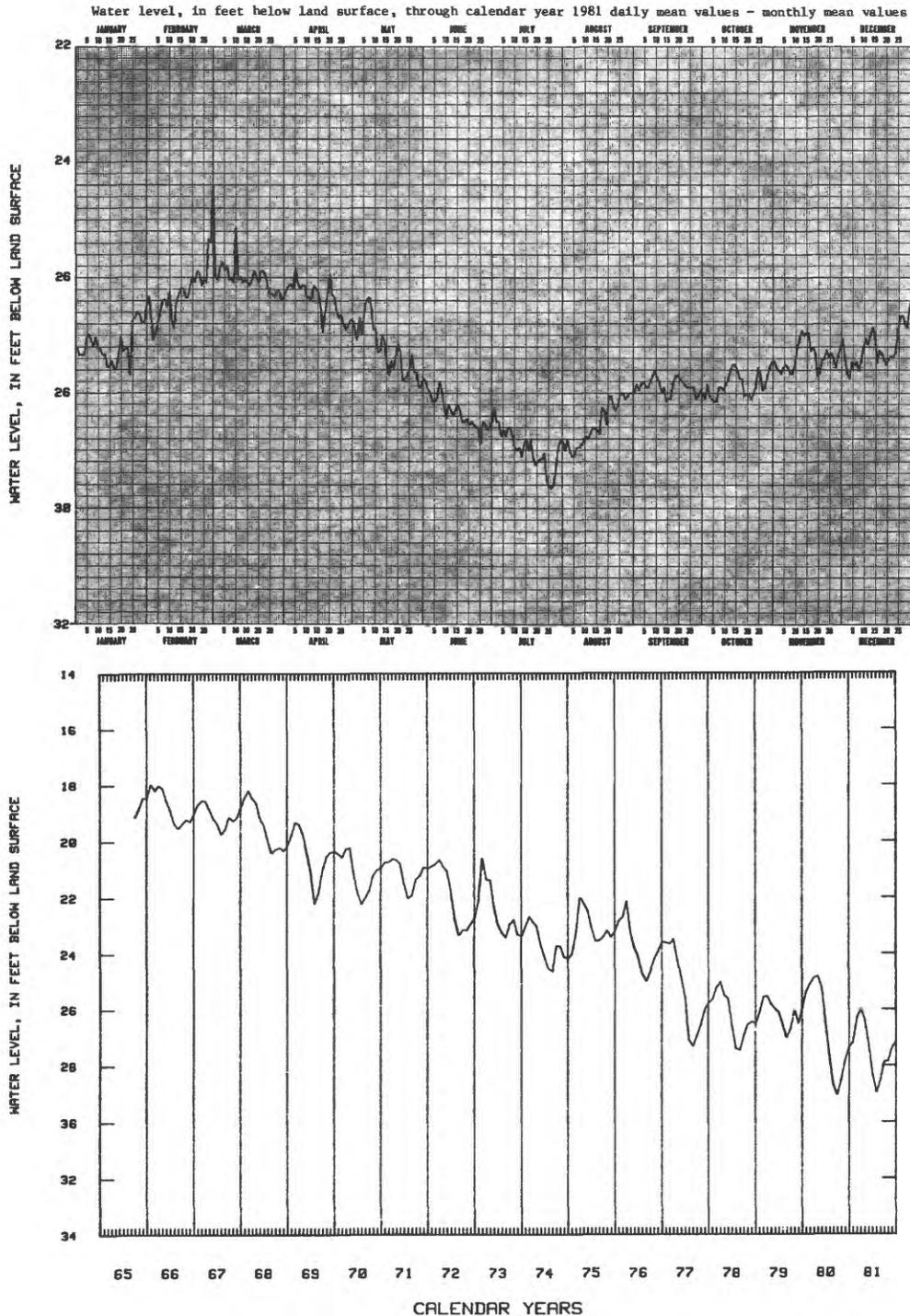


FIGURE 3.1.2-5.—WATER-LEVEL FLUCTUATIONS IN CHATHAM COUNTY TEST WELL 7

3.1.3 Brunswick Area

Mean water levels in the Brunswick area during 1981 were from 1.75 to 1.94 feet lower than in 1980. Ground-water pumpage of more than 100 million gallons per day in the Brunswick area is the overriding cause of the water-level declines. Long-term declines ranged from about 1 to 5 feet for the period 1972-81. A significant reduction in industrial pumpage during 1975 caused water levels to recover, but resumption of pumpage by the end of 1975 has caused the decline in water levels since that time.

The water level in wells near centers of pumpage responds sooner to partial shutdowns and rises more rapidly than that in wells farther away.

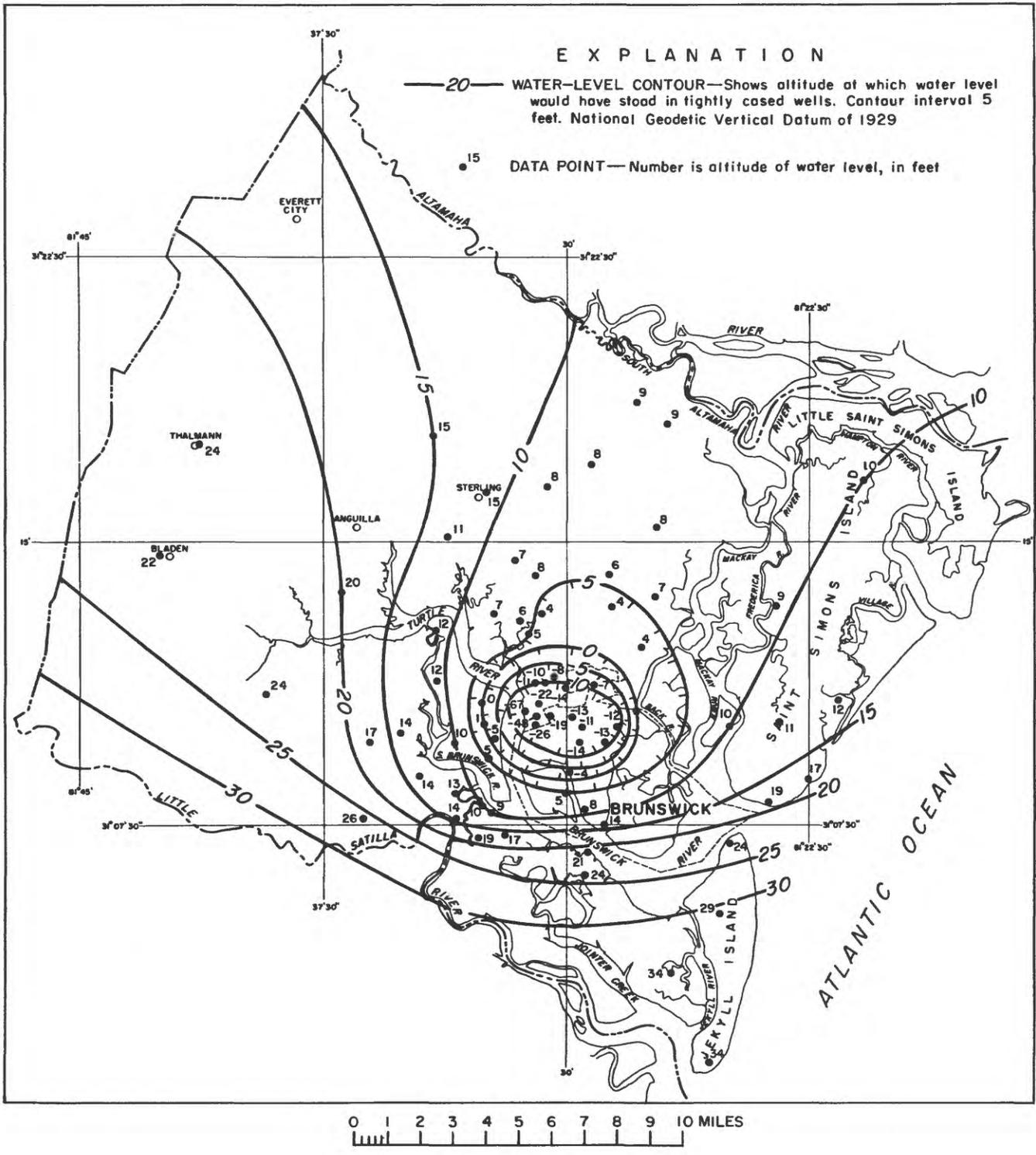


FIGURE 3.1.3-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), BRUNSWICK AREA, NOVEMBER 1981

New water-level low established in June

A record low was established in the Babcock and Wilcox well in Glynn County as the water level dropped to 3.40 feet above land surface in June 1981, 0.07 foot below the previous low of July 1977. Notable rises in the water level in April-May, July, and December 1981 corresponded to partial shutdowns of industrial pumpage. The long-term hydrograph for the entire period of record (1963-81) indicates a downward trend in the water level, caused by an increase in ground-water withdrawal. The small-scale fluctuations on the water-level curve correlate with the cumulative departure curve for precipitation. Superimposed on the downward trend are other significant fluctuations, such as the marked rise in the water level in 1975 caused by a decrease in pumpage in the Brunswick area. This causal relationship is documented in Wait and Gregg (1973).

GLYNN COUNTY

310726081285801 Local number, 34G001.
 LOCATION.—Lat 31°07'26", long 81°28'58", Hydrologic Unit 03070203, Babcock and Wilcox yards near Newcastle Street and King Shrimp Co. in Brunswick.
 Owner: Babcock and Wilcox Co.
 AQUIFER.—Principal artesian aquifer.
 WELL CHARACTERISTICS.—Drilled unused industrial well, diameter 18 in., depth 1,006 ft, cased to 589 ft, open hole.
 DATUM.—Altitude of land-surface datum is 9 ft.
 Measuring point: Center of recorder, 2.0 ft above land-surface datum.
 REMARKS.—Borehole geophysical survey conducted May 28, 1964. Interpolated values, January 18-24, February 1-7, February 18-21, March 3-6, April 5-6, 1980.
 PERIOD OF RECORD.—December 1962 to current year.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 24.93 ft above land-surface datum, December 12, 1960; lowest, 3.40 ft above land-surface datum, June 19, 1981.

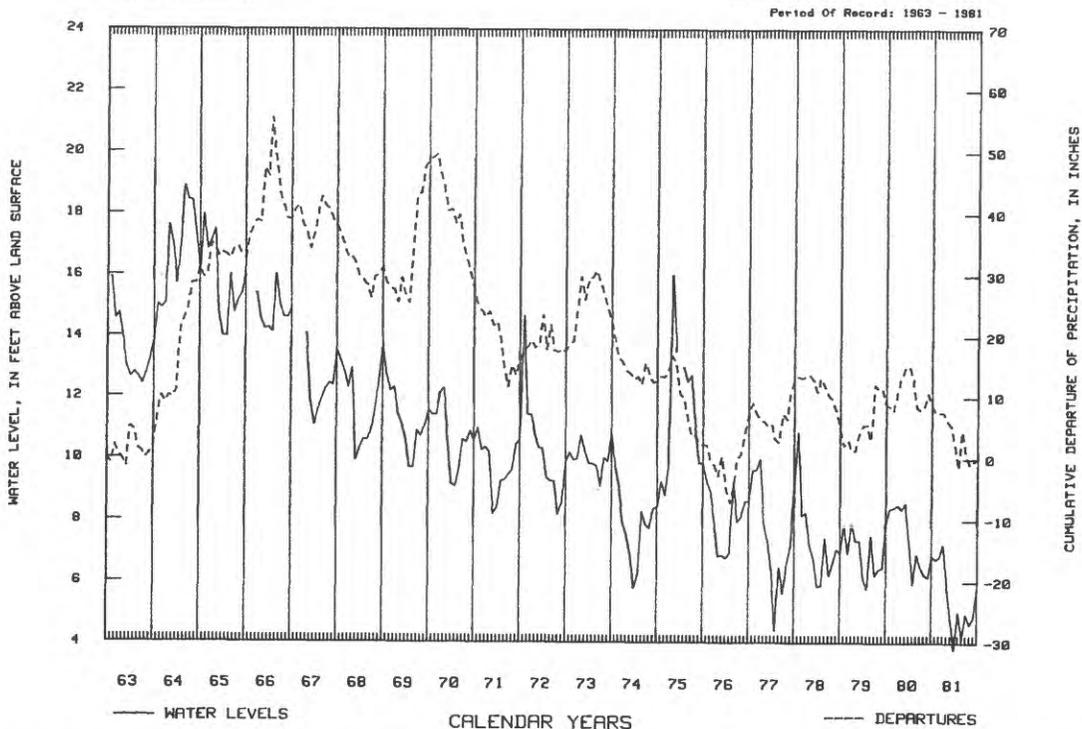
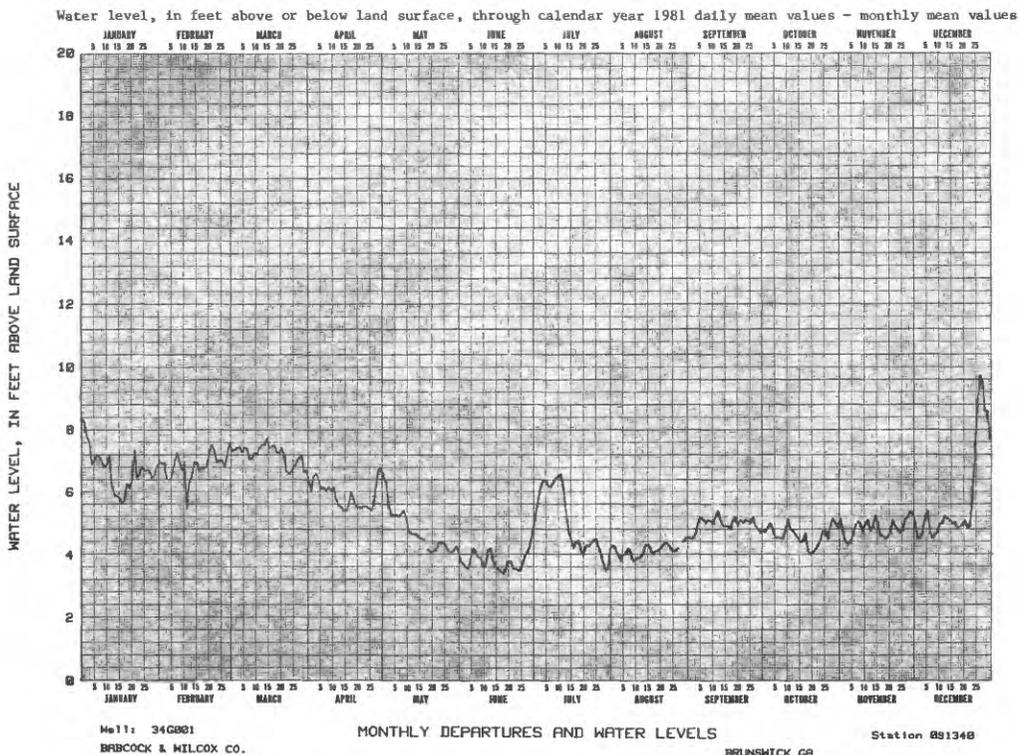


FIGURE 3.1.3-2.—WATER-LEVEL FLUCTUATIONS IN THE BABCOCK AND WILCOX CO. WELL

Long-term decline continues

The 1981 low water level in U.S. Geological Survey test well 6 in Glynn County was only 0.10 foot higher than that of 1980, and 0.24 foot higher than the record low of July 1977. Rises in the water level in April, July, August, September, and December 1981 corresponded to partial and total shutdowns of industrial pumpage.

The mean water-level decline for the entire period of record (1963-81) was about 9 feet, most of which occurred during 1975-77. The water-level rise in 1975 was due to decreased industrial pumpage, and the subsequent decline was due to an increase in industrial pumpage. This causal relationship is documented in Wait and Gregg (1973).

GLYNN COUNTY

311007081301702 Local number, 33H133.

LOCATION.—Lat 31°10'07", long 81°30'17", Hydrologic Unit 03070203, near the intersection of Newcastle and Oak Streets to the south of the cemetery in Brunswick.

Owner: U.S. Geological Survey, test well 6.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4 in., depth 790 ft, cased to 520 ft, open hole.

DATUM.—Altitude of land-surface datum is 7 ft.

Measuring point: Floor of recorder shelter, 3.0 ft above land-surface datum.

REMARKS.—Well pumped monthly; water-quality samples collected at conclusion of pumping. Borehole geophysical survey conducted September 26, 1977. Interpolated values, December 25-29, 1980.

PERIOD OF RECORD.—January 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 9.07 ft above land-surface datum, December 26, 1965; lowest, 21.87 ft below land-surface datum, July 22, 1977.

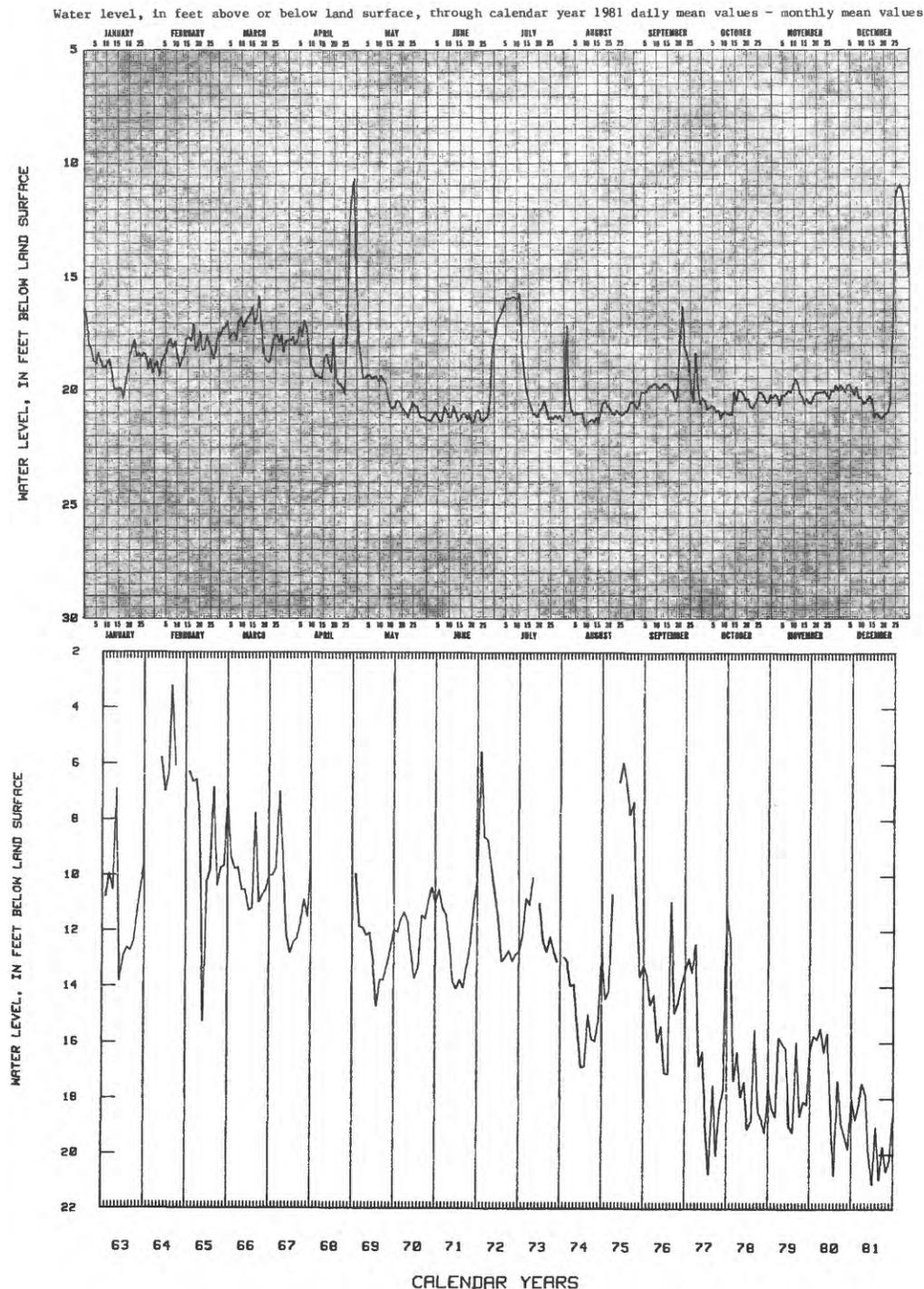
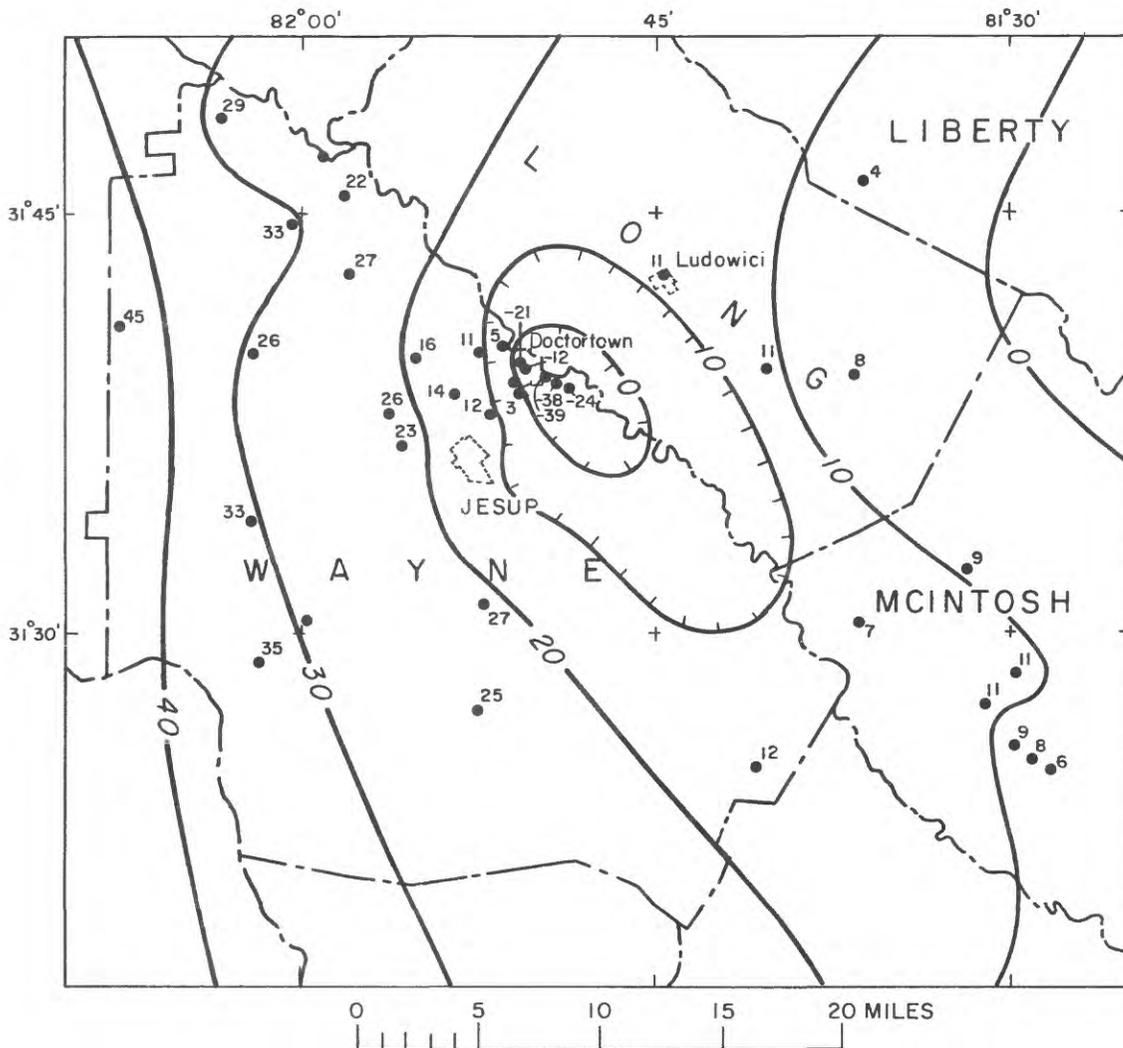


FIGURE 3.1.3-3.—WATER-LEVEL FLUCTUATIONS IN GLYNN COUNTY TEST WELL 6

3.1.4 Jesup Area

Ground-water levels in the Jesup area are chiefly affected by the ground-water withdrawal of about 75 million gallons per day for industrial use in Doctortown, near Jesup. Water levels in the Jesup area are also affected by industrial pumpage in Brunswick and Riceboro, but to a lesser extent.



EXPLANATION

- 20 — WATER-LEVEL CONTOUR— Shows altitude at which water level would have stood in tightly cased wells. Contour interval 10 feet. National Geodetic Vertical Datum of 1929
- 25 DATA POINT—Number is altitude of water level, in feet

FIGURE 3.1.4-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), JESUP AREA, NOVEMBER 1981

Record low water level established in July

U.S. Geological Survey test well 3 in Long County, about 13 miles east of Doctortown and about 13 miles southwest of Riceboro, responds to pumpage at those two locations (Krause and Gregg, 1972). Industrial pumpage at Doctortown increased in 1972 by about 30 million gallons per day, causing a major decline in the water level. The water level recovered somewhat in 1975 as pumpage decreased throughout the coastal area. Pre-1975 pumpage rates resumed in 1976 and the water level continued to decline. However, in 1977 almost all industrial pumpage in the Jesup area was temporarily stopped and levels rose sharply. Pumping resumed in the Jesup area during 1978 and the water levels continued their decline. A record low of 53.22 feet was reached in July, 1.67 feet lower than the previous record low set in December 1980. The mean water level in test well 3 dropped 15.2 feet during 1968-81, the entire period of record for measurements in this well.

Rises in April and September 1981 corresponded with partial industrial shutdowns. This causal relationship is documented in Krause and Counts (1975).

LONG COUNTY

313844081361401 Local number, 33M004.

LOCATION.—Lat 31°38'44", long 81°36'14", Hydrologic Unit 03070106, 9 mi southeast of Ludowici, at Hope Cemetery.

Owner: U.S. Geological Survey, test well 3.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4-3 in, depth 872 ft, cased to 538 ft, open hole.

DATUM.—Altitude of land-surface datum is 61.2 ft.

Measuring point: Top of recorder shelter, 3.5 ft above land-surface datum.

REMARKS.—Well pumped and sounded June 17, 1976, to depth of 861 ft; water-quality sample collected. Borehole geophysical survey conducted July 28, 1976. Interpolated values, February 3-25, February 27-March 23, March 26-30, 1980.

PERIOD OF RECORD.—January 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 34.04 ft below land-surface datum, January 14, 1968; lowest, 53.22 ft below land-surface datum, July 27, 1981.

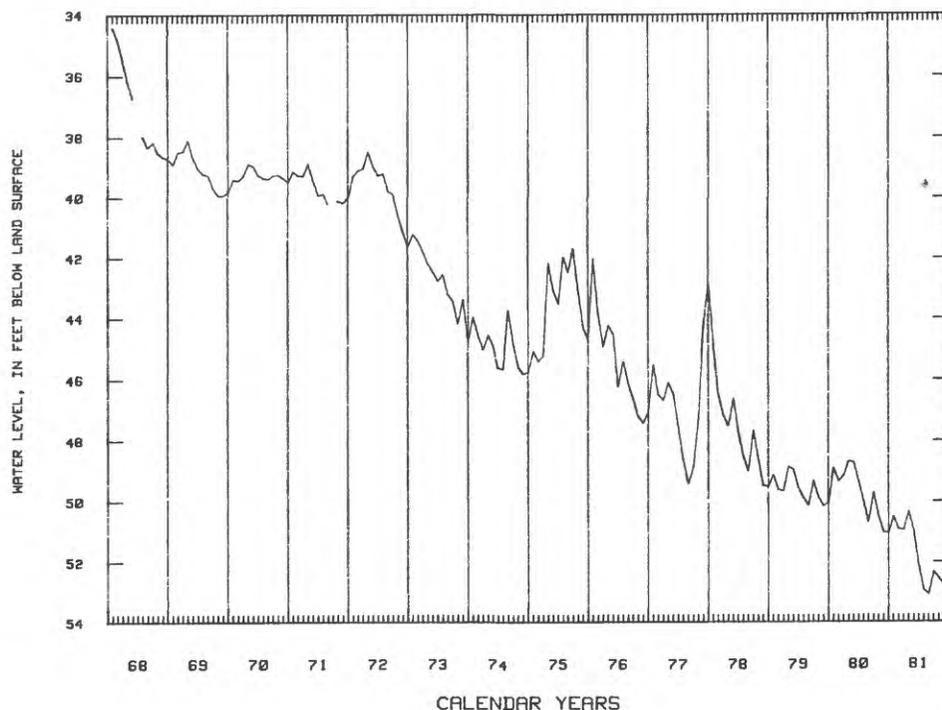
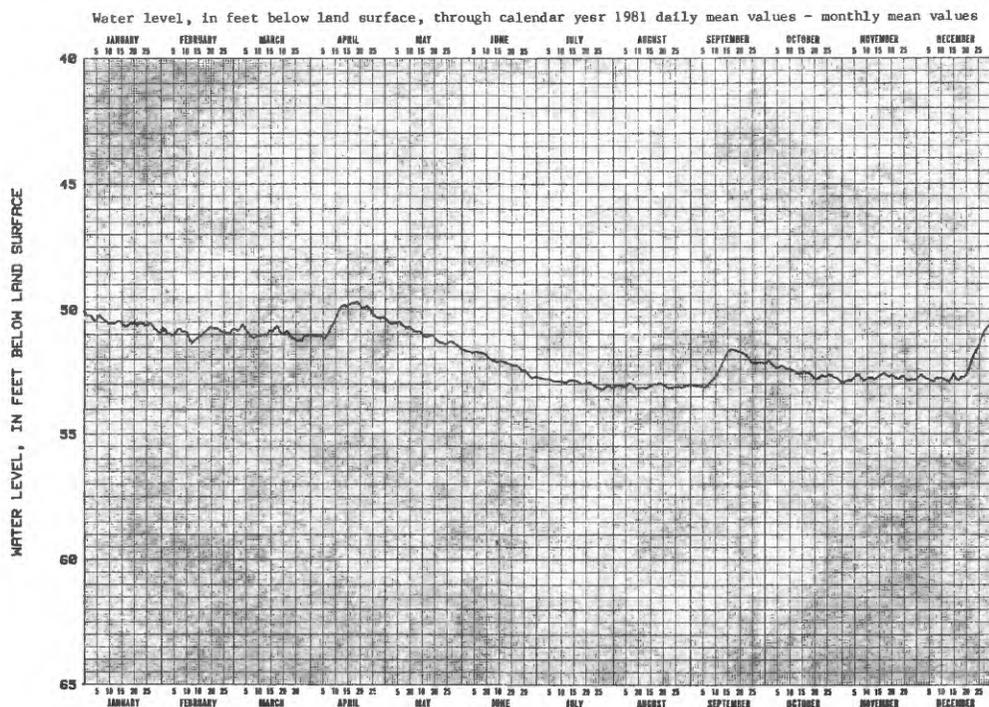


FIGURE 3.1.4-2.—WATER-LEVEL FLUCTUATIONS IN LONG COUNTY TEST WELL 3

Record low water level established in June

Ground-water levels in wells near Jesup dramatically reflect changes in industrial pumpage at Doctortown. The Johnson well, located 5 miles from the center of pumpage, exhibited rises in the water level in April, September, and December 1981 due to partial industrial shutdowns.

A record low was established in the Johnson well as the water level dropped to 85.27 feet in June, or 2.37 feet below the previous low of December 1980. The 1981 mean water level was 4.33 feet below the mean for 1976, when measurements were first made in this well. In the long-term hydrograph, the sharp rise in water level from August to December 1977 resulted from an almost total shutdown of industrial pumpage.

WAYNE COUNTY

313701081543501 Local number, 30L003.

LOCATION.—Lat 31°37'01", long 81°54'35", Hydrologic Unit 03070106, about 0.5 mi west of Jesup city limits near intersection of Highway 341 and Sunset Drive.

Owner: Homer Johnson.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused domestic well, diameter 4 in., depth 584 ft, cased to 472 ft, open hole.

DATUM.—Altitude of land-surface datum is 107 ft.

Measuring point: Floor of recorder shelter, 2.88 ft above land-surface datum.

REMARKS.—Borehole geophysical survey conducted August 19, 1963.

PERIOD OF RECORD.—January 1964 to March 1967. February 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 59.98 ft below land-surface datum, April 19, 1964; lowest 85.27 ft below land-surface datum, June 29, 1981.

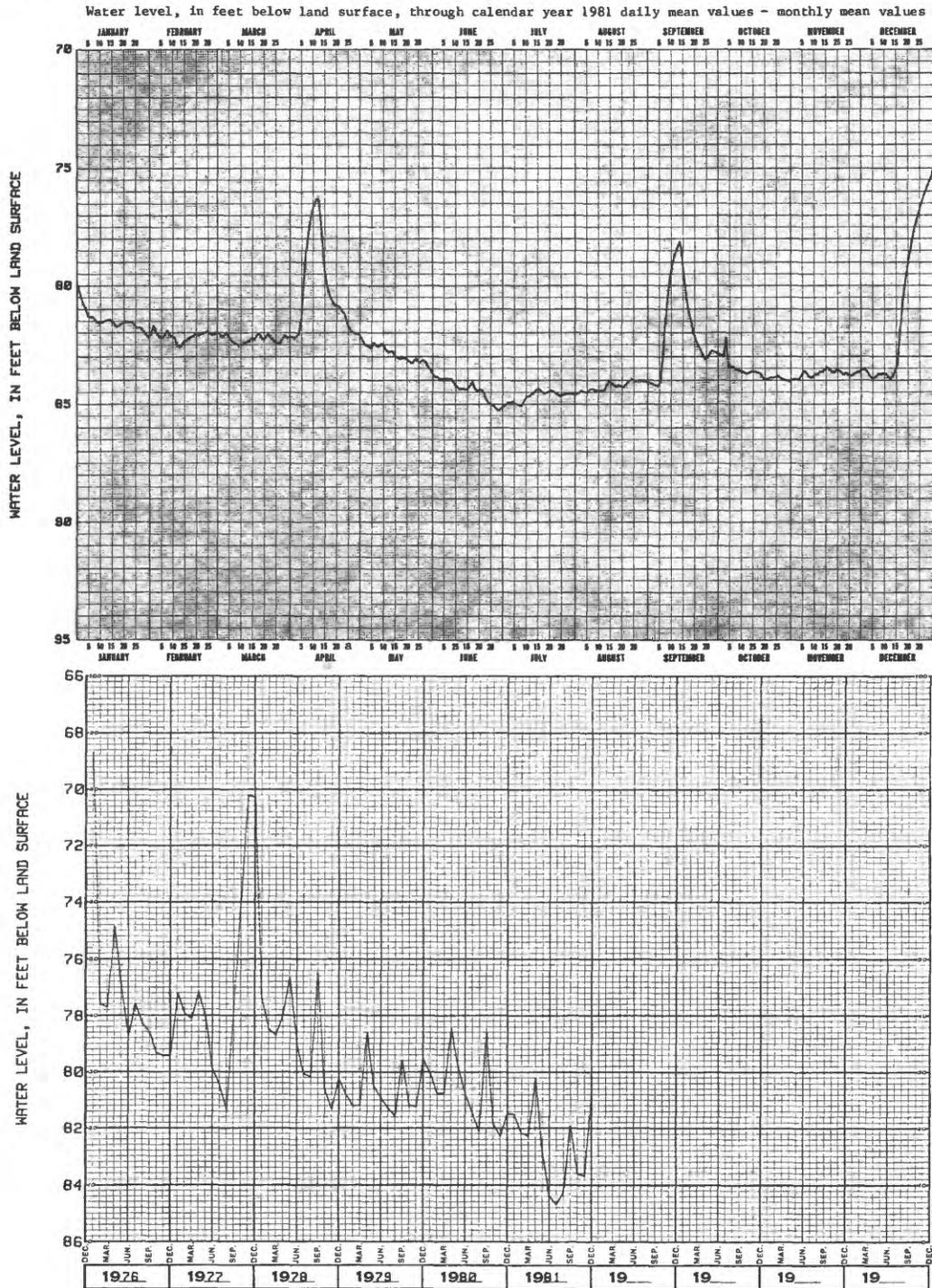


FIGURE 3.1.4-3.—WATER-LEVEL FLUCTUATIONS IN THE JOHNSON OBSERVATION WELL

New record low water level

The Mears 2 well, about 10 miles from the center of pumpage in Doctortown, is similar to the Johnson well in response to pumpage. The Mears well, like the Johnson well, showed rises in water level in April, September, and December that correlate with periods of partial shutdown of industrial pumpage at Doctortown. However, the rises in water level in the Mears well were not as pronounced as those in the Johnson well because the the Mears well is about 8 miles farther from the center of pumpage at Doctortown.

The new record low of June 1981 was 2.13 feet lower than the previous low of December 1980. The 1981 mean water level was 2.24 feet below the 1980 mean of 24.96 feet. Over the period 1976-81, the water level showed a decline of 4.88 feet.

On the long-term hydrograph, the sharp rise in water level from August to December 1977 resulted from an almost total shutdown of industrial pumpage. The causal relationship is documented in Krause and Counts (1975).

WAYNE COUNTY

313055081521901 Local number, 31L001.

LOCATION.—Lat 31°30'55", long 81°52'19", Hydrologic Unit 03070106, about 6 mi south of Jesup near Penholoway Creek on Walker Creek.

Owner: Brunswick Pulp and Paper, Justice Mears 2.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused oil test well, diameter 6 in., depth 691 ft, cased to 587 ft, open hole.

DATUM.—Altitude of land-surface datum is 55 ft.

Measuring point: Top of 6 in. casing at land-surface datum.

REMARKS.—Well pumped and water quality sampled, August 2, 1978.

PERIOD OF RECORD.—February 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 15.30 ft below land-surface datum, December 16, 1977; lowest, 29.23 ft below land-surface datum, June 29, 1981.

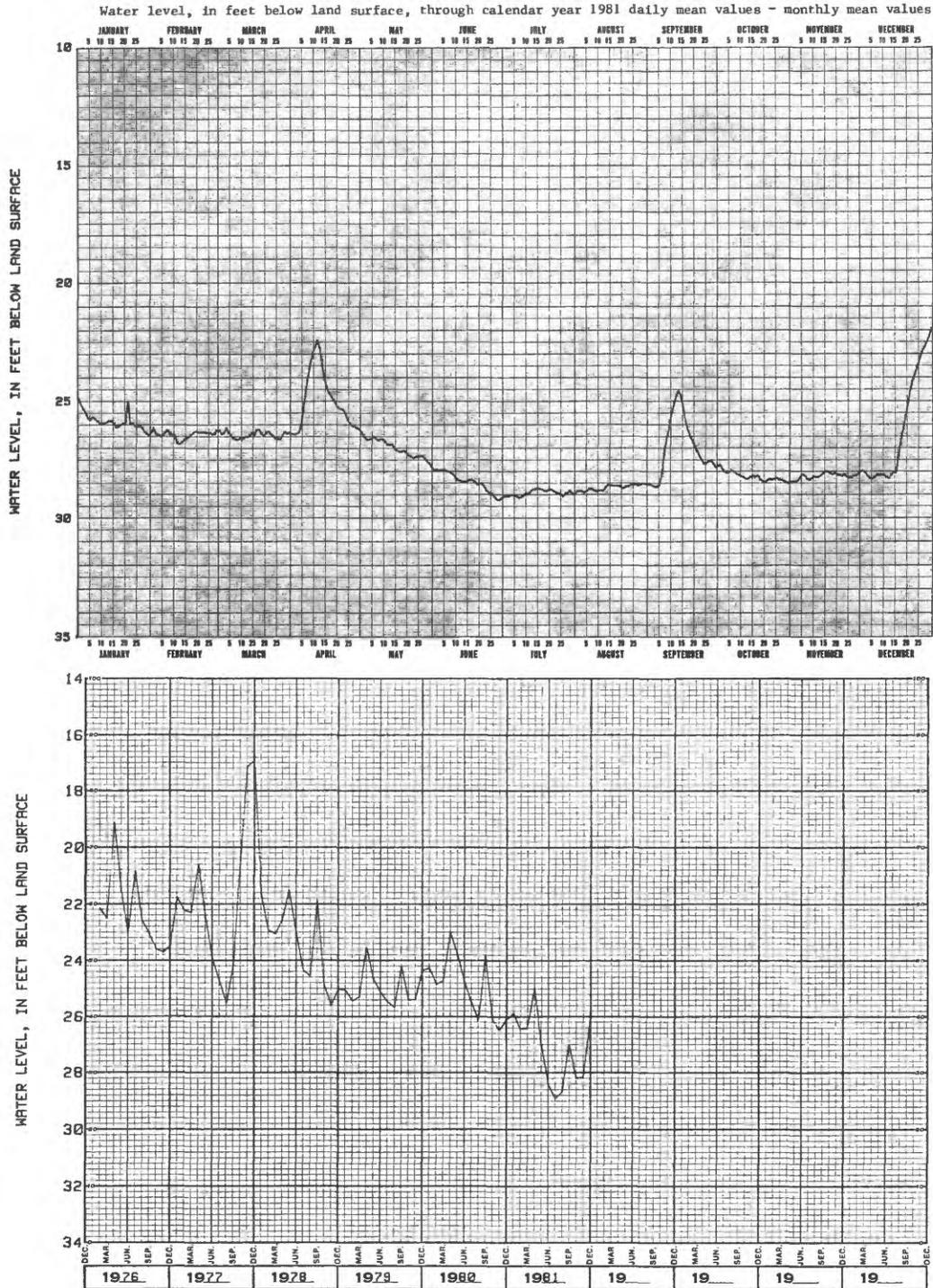


FIGURE 3.1.4-4.—WATER-LEVEL FLUCTUATIONS IN THE JUSTICE MEARS 2 OBSERVATION WELL

3.1.5 Riceboro Area

Ground-water levels in the Riceboro area are affected mainly by industrial pumpage of about 10 million gallons per day. Pumpage throughout the coastal area has caused water levels to decline, but the addition of a 10-million gallon per day withdrawal near Riceboro in 1968 noticeably affected water levels. Water levels in observation wells in the Riceboro area also reflect changes in pumpage at Doctortown, about 25 miles to the west. A 30-million gallon per day increase in pumpage at Doctortown in 1972 caused water levels to decline in observation wells in the Riceboro area.

New water-level low in December

The water level in U.S. Geological Survey test well 2 in Liberty County responds to pumpage at Riceboro. Rises in water level in April, July, August, September, and December corresponded to partial shutdowns of industrial pumpage.

A record low was established in December 1981 when the water level declined to 24.30 feet, 2.0 feet lower than the previous record of December 1980. The rate of decline became greater in 1972 as a result of the 30-million gallon per day increase in pumpage at Doctortown. The coastal-wide reduction in pumpage during 1975 allowed the water level to partially recover before pumpage resumed. In October 1977, almost all pumpage at Doctortown ceased and the water level rose about 5 feet during the remainder of 1977. Pumpage resumed in early 1978 and the water level has continued to decline.

LIBERTY COUNTY

314343081251901 Local number, 34M054.

LOCATION.—Lat 31°43'43", long 81°25'19", Hydrologic Unit 03060204, Riceboro, Ga., near entrance to Interstate Paper Co.

Owner: U.S. Geological Survey, test well 2.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4 in., depth 802 ft, cased to 467 ft, open hole.

DATUM.—Altitude of land-surface datum is 19 ft.

Measuring point: Floor of recorder shelter, 3.4 ft above land-surface datum.

REMARKS.—Well pumped July 11, 1979; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 15, 1976. Interpolated values, April 26-May 1, May 5-11, 1980.

PERIOD OF RECORD.—February 1967 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 0.85 ft below land-surface datum, February 5, 1967; lowest, 24.30 ft below land-surface datum, December 20, 1981.

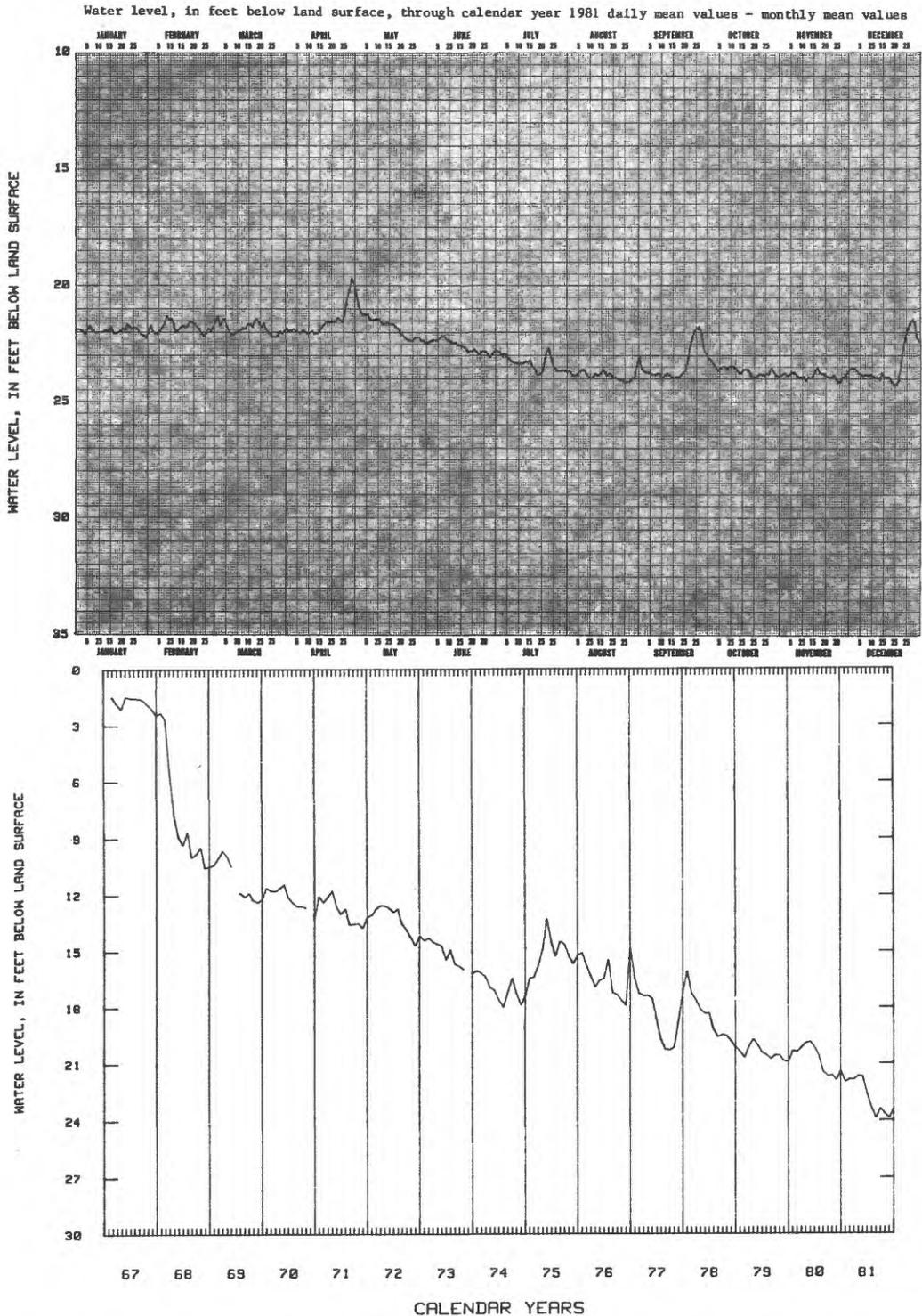


FIGURE 3.1.5-1.—WATER-LEVEL FLUCTUATIONS IN LIBERTY COUNTY TEST WELL 2

August water level sets new low

A record low water level of 22.28 feet below land surface was established in test well 1 in August 1981, 1.93 feet below the previous low recorded in November 1980. U.S. Geological Survey test well 1 in Liberty County, about 8 miles north of Riceboro, responds to pumpage at Riceboro and Doctortown in the same manner as test well 2, but to a lesser extent.

The mean water level during 1981 was 20.8 feet, 2.08 feet below that for 1980. The long-term hydrograph for the entire period of record (1967-81), combined with the cumulative departure curve for precipitation, illustrates how the water level in this well is affected by pumpage and rainfall. The industrial pumpage in the area has caused an overall decline in the water level, but the small-scale fluctuations result from changes in pumpage patterns in response to changes in precipitation.

LIBERTY COUNTY

315214081235301 Local number, 34N089.

LOCATION.—Lat 31°52'14", long 81°23'53", Hydrologic Unit 03060204, north of Midway, Ga., near intersection of Georgia Highway 196 and U.S. Highway 17.

Owner: U.S. Geological Survey, test well 1.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4 in., depth 789 ft., cased to 410 ft., open hole.

DATUM.—Altitude of land-surface datum is 17 ft.

Measuring point: Top of 4 in. casing, 1.33 ft above land-surface datum.

REMARKS.—Well pumped July 11, 1979; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 15, 1976.

PERIOD OF RECORD.—February 1967 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 2.34 ft below land-surface datum, March 6, 1967; lowest, 22.28 ft below land-surface datum, August 10-11, 1981.

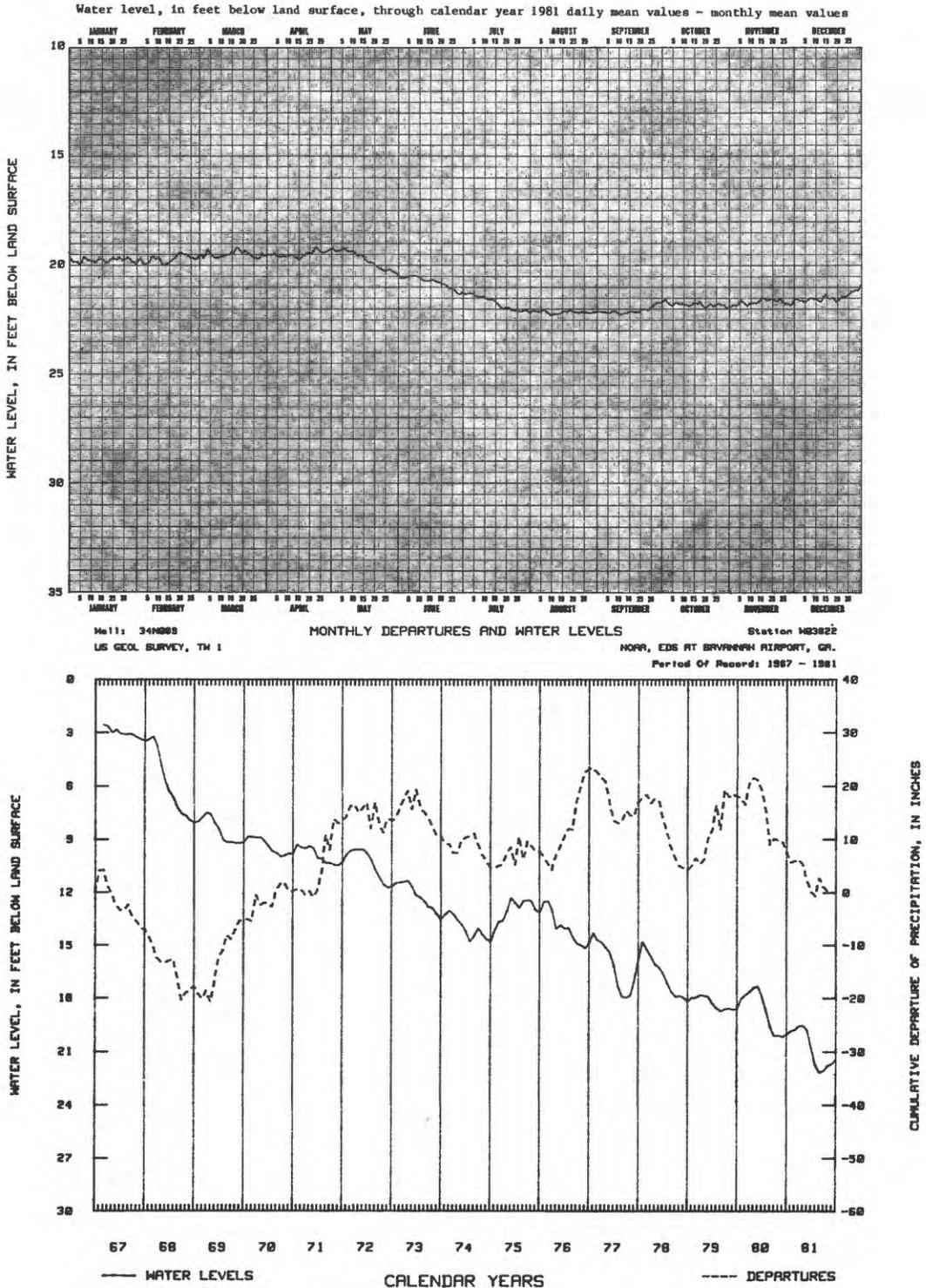


FIGURE 3.1.5-2.—WATER-LEVEL FLUCTUATIONS IN LIBERTY COUNTY TEST WELL 1

Record water-level low established in December

The water level in the McIntosh County well responds to pumpage in the same manner as test wells 1 and 2 in Liberty County. The low water level for 1981 of 20.45 feet was 1.42 feet lower than the previous record low of November 1980. The 1981 mean water level was 1.67 feet lower than in 1980 and the long-term decline was 14.4 feet for the entire period of record (1966-81).

MCINTOSH COUNTY

313826081152601 Local number, 35M013.

LOCATION.—Lat 31°38'26", long 81°15'26", Hydrologic Unit 03060204, 8.5 mi east of U.S. Highway 17 at Harris Neck Wildlife Refuge.

Owner: U.S. Department of the Interior, Fish and Wildlife Service.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused supply well, diameter 10 in., depth 553 ft, cased to 376 ft, open hole.

DATUM.—Altitude of land-surface datum is 16.3 ft.

Measuring point: Floor of recorder shelter, 3.2 ft above land-surface datum.

REMARKS.—Well pumped August 3, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 16, 1976. Interpolated values, March 10-17, March 26-30, April 1, April 6-17, 1980.

PERIOD OF RECORD.—September 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 4.35 ft below land-surface datum, October 4, 1966; lowest, 20.45 ft below land-surface datum, December 19, 1981.

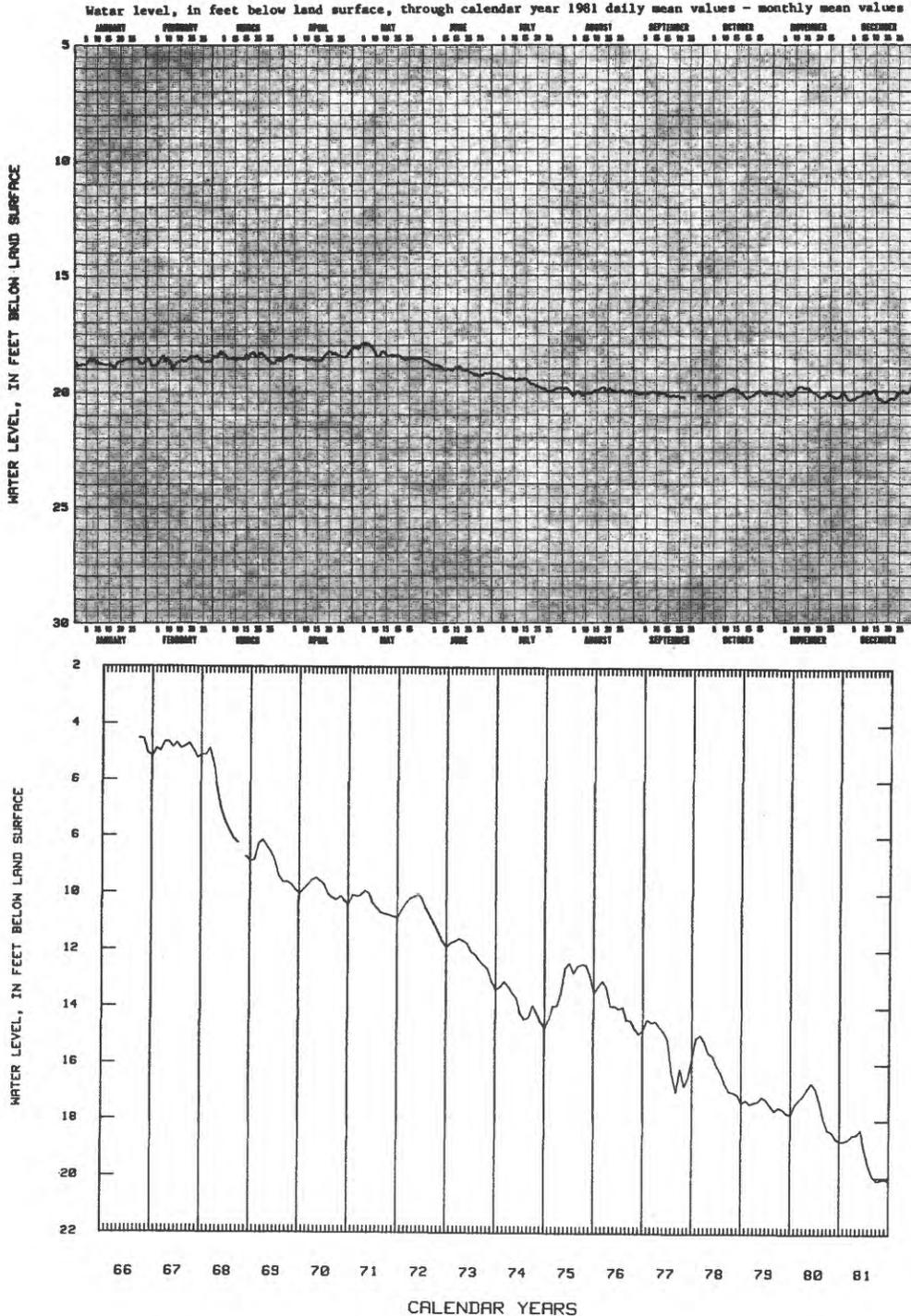
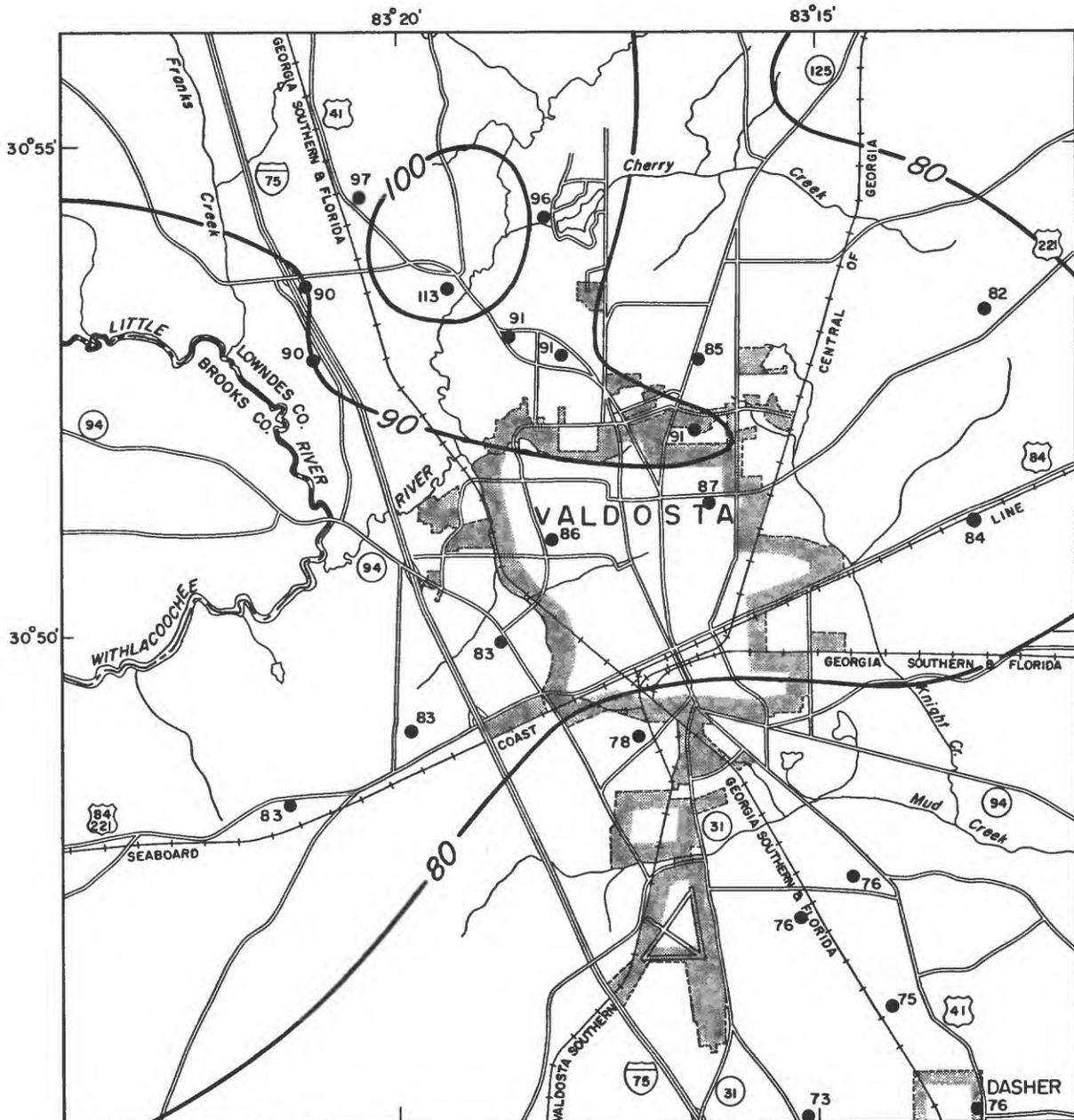


FIGURE 3.1.5-3.—WATER-LEVEL FLUCTUATIONS IN THE MCINTOSH COUNTY OBSERVATION WELL

3.1.6 Valdosta Area

Ground-water levels in the immediate Valdosta area are mainly controlled by local recharge. The highest water levels are north of town, where the principal artesian aquifer receives recharge from the Withlacoochee River. The river flows into sinkholes and solution openings in the aquifer and water levels respond to this streamflow, which in turn responds to precipitation and evapotranspiration. Large amounts of precipitation and streamflow in winter and early spring cause high ground-water levels. Decreased precipitation and increased evapotranspiration in summer and autumn result in low streamflow and correspondingly low ground-water levels.

Pumpage of about 22 million gallons per day in the area has not appreciably lowered the water level in the principal artesian aquifer because of the local recharge.



Base from Georgia Department Transportation county highway maps I:63,360



- 85 — WATER-LEVEL CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Contour interval 10 feet. National Geodetic Vertical Datum of 1929
- 75 DATA POINT—Number is altitude of water level, in feet

FIGURE 3.1.6-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), VALDOSTA AREA, NOVEMBER 1981

Water level reaches new low in October

The water level in the Valdosta observation well reached a new record low in October: 2.0 feet lower than the previous record low of 143.50 feet set in October 1968. The mean water level was 5.6 feet lower in 1981 than in 1980.

The water level in the Valdosta observation well is affected by precipitation and pumpage. The long-term hydrograph for the entire period of record (1957-81) indicates a downward trend in the water level caused by an increase in ground-water withdrawal. The small-scale fluctuations on the water-level curve correlate with the cumulative departure curve for precipitation illustrating how rainfall also affects this well.

LOWNDES COUNTY

304949083165301 Local number, 19E009.

LOCATION.—Lat 30°49'49", long 83°16'53", Hydrologic Unit 03110202, N. Oak Street, one block north of intersection with U.S. Highway 84, Valdosta, Ga.

Owner: City of Valdosta.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused municipal supply well, diameter 20 in., depth 342 ft, cased to 200 ft open hole.

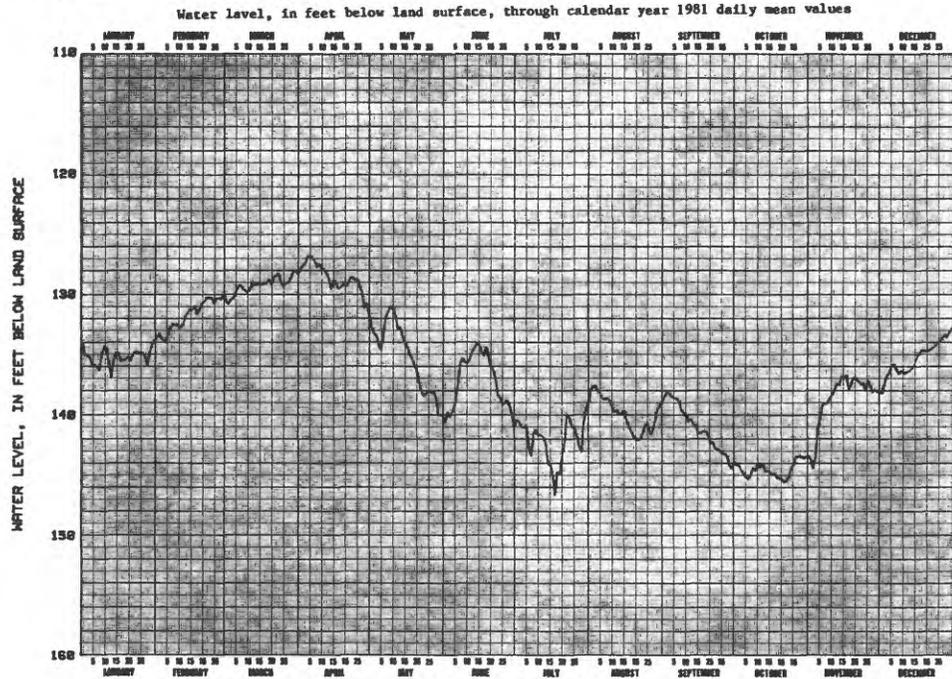
DATUM.—Altitude of land-surface datum is 217 ft.

Measuring point: Top of casing, 1.7 ft above land-surface datum.

REMARKS.—Well pumped July 18, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted April 11, 1963. Interpolated values, January 27-February 12, December 12-28, 1980.

PERIOD OF RECORD.—February 1957 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 112.69 ft below land-surface datum, March 9, 1964; lowest, 145.50 ft below land-surface datum, October 22, 1981.



Well: 18C009
VALDOSTA OBS WELL

MONTHLY DEPARTURES AND WATER LEVELS

Station 087276
GUTHRIE 2 1/4 CR
Period of Record: 1957 - 1981

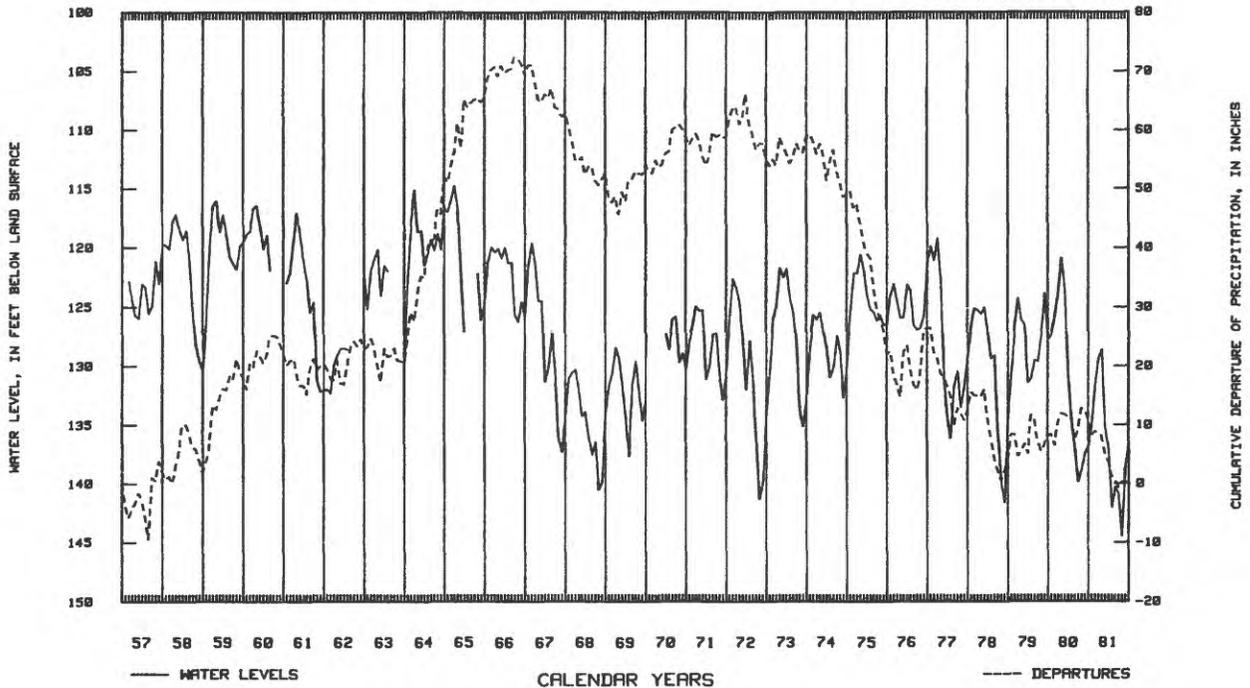


FIGURE 3.1.6-2.—WATER-LEVEL FLUCTUATIONS IN THE VALDOSTA OBSERVATION WELL

Water level reaches new low in June

The 1981 water-level low in the U.S. Geological Survey test well in Adel was 1.37 feet lower than the previous record low of 172.50 feet established in January 1979. The mean water level was 1.91 feet lower in 1981 than in 1980 and the long-term trend was a decline of 7.2 feet for the period of record (1964-81). The water level in the Adel well is affected by precipitation. The rises and declines in the water level are caused by variations in rainfall. Small-scale water-level fluctuations in this well are caused by a nearby pumping well.

COOK COUNTY

310813083260301 Local number, 18H016.

LOCATION.—Lat 31°08'13", long 83°26'03", Hydrologic Unit 03110203, on West Second Street near intersection of Georgia Highways 76 and 37.

Owner: U.S. Geological Survey, Adel test well.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled observation well, diameter 8 in., depth 865 ft, cased to 207 ft, open hole.

DATUM.—Altitude of land-surface datum is 241 ft.

Measuring point: Floor of recorder shelter, 2.66 ft above land-surface datum.

REMARKS.—Well pumped July 19, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted October 24, 1974. Interpolated values, January 5 and 6, March 18-April 13, July 19-24, 1980.

PERIOD OF RECORD.—December 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 163.34 ft below land-surface datum, July 5, 1966; lowest, 173.87 ft below land-surface datum, June 30, 1981.

Water level, in feet below land surface, through calendar year 1981 daily mean values - monthly mean values

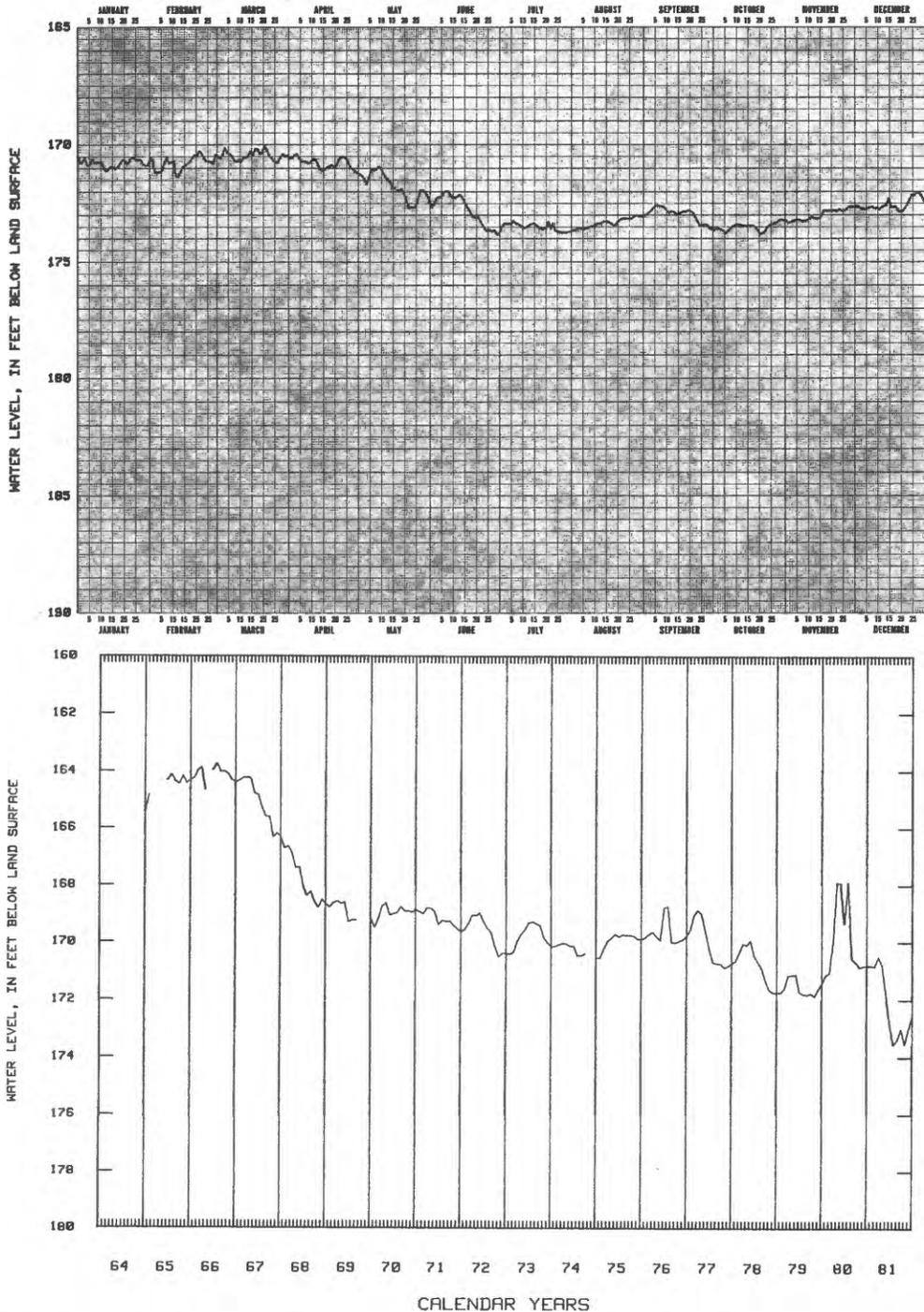


FIGURE 3.1.6-3.—WATER-LEVEL FLUCTUATIONS IN THE ADEL TEST WELL

3.1.7 Dougherty Plain Area

Ground-water levels in the Dougherty Plain respond to variations in pumpage, streamflow, precipitation, and evapotranspiration. Water levels in some wells began declining in the late seventies, probably due to increased pumpage in southwest Georgia and to a significant lack of precipitation for the last few years.

During the 1981 growing season, over 90 percent of all ground water used for irrigation in the Dougherty Plain came from the principal artesian aquifer. Most of the irrigated acreage in the Dougherty Plain is in Baker, Decatur, Miller, Mitchell, and Seminole Counties. The quantity of ground water used for irrigation in these counties during the 1981 growing season was over 70 billion gallons, an increase of 62 percent from the 1977 growing season (H. E. Gill, U.S. Geological Survey, written commun., 1981).

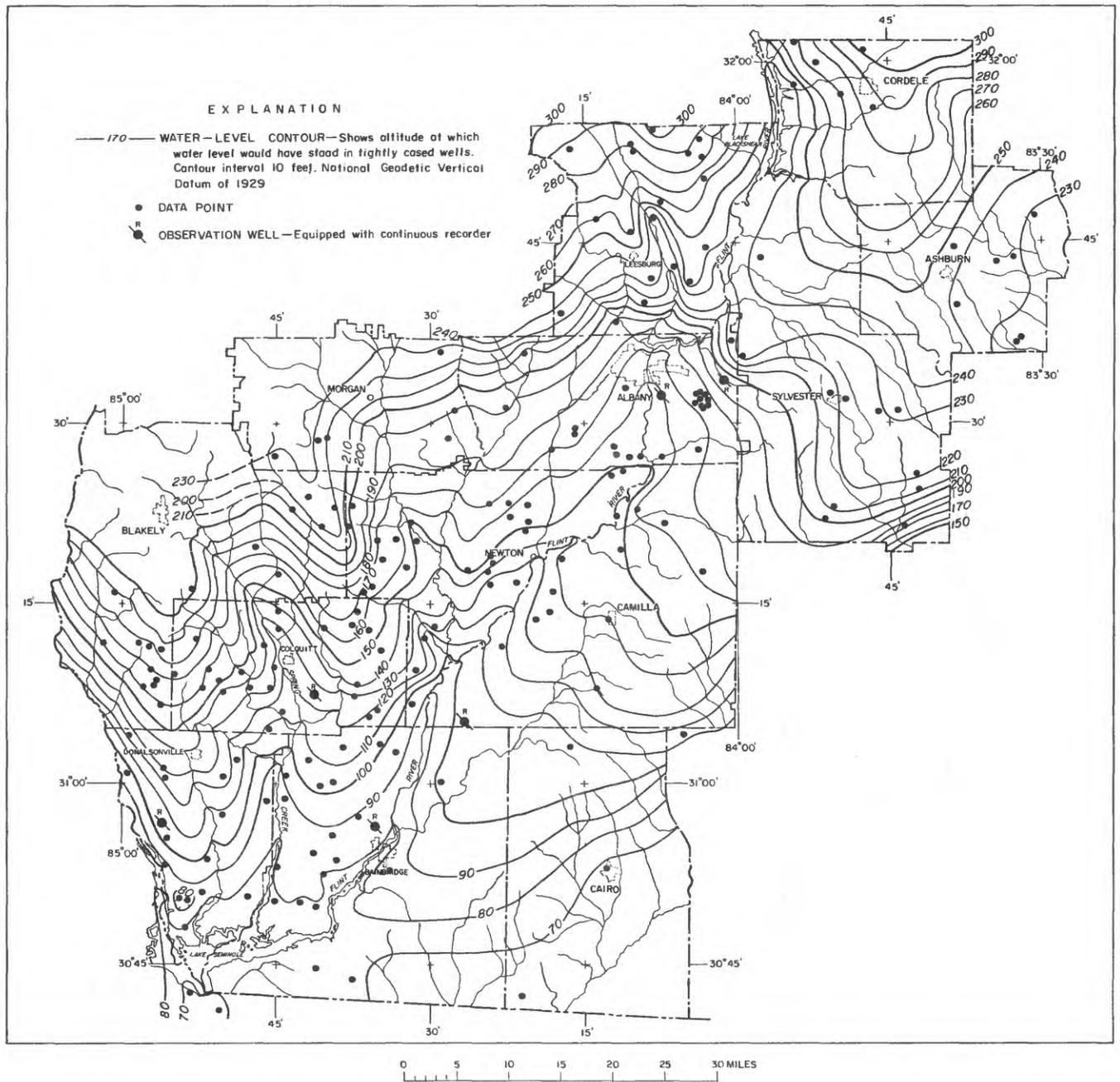


FIGURE 3.1.7-1.—WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), DOUGHERTY PLAIN AREA, MAY 1980 (FROM KRAUSE AND HAYES, 1981)

Water level responds to seasonal rainfall and pumpage

The Bolton well is an example of how outside influences affect the water level in a well. The water level in this well responds to seasonal variations in rainfall and pumpage. The slight rise in the water level in the spring of 1981 corresponded to periods of increased precipitation. The subsequent decline in May through August 1981 correlated with the growing season and was, in part, due to irrigation pumpage and decreased precipitation. Sharp declines and recoveries were caused by the turning on and off of a nearby irrigation system. This causal relationship is discussed in Pollard and others (1978). Increased precipitation and decreased irrigation pumpage accounted for the recovery of the water level for the rest of 1981.

The water level in the Bolton well established a new record low of 54.78 feet in August--3.36 feet lower than the previous low of June 1977. The mean water level for 1981 was 49.8 feet, 4.40 feet lower than the mean for 1980.

DECATUR COUNTY

305736084355801 Local number, 09F520.

LOCATION.—Lat 30°57'36", long 84°35'58", Hydrologic Unit 03130008, U.S. 27 north of Bainbridge, right on dirt road near John Deere tractor dealership.

Owner: Graham Bolton.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Unused private irrigation well, diameter 12 in., depth 251 ft, cased to 130 ft, open hole.

DATUM.—Altitude of land-surface datum is 128 ft.

Measuring point: Floor of recorder shelter, 3,50 ft above land-surface datum.

REMARKS.—This well is about 15 ft from pumped well.

PERIOD OF RECORD.—June 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 36.75 ft below land-surface datum, April 24, 1975; lowest, 54.78 ft below land-surface datum, August 20, 1981.

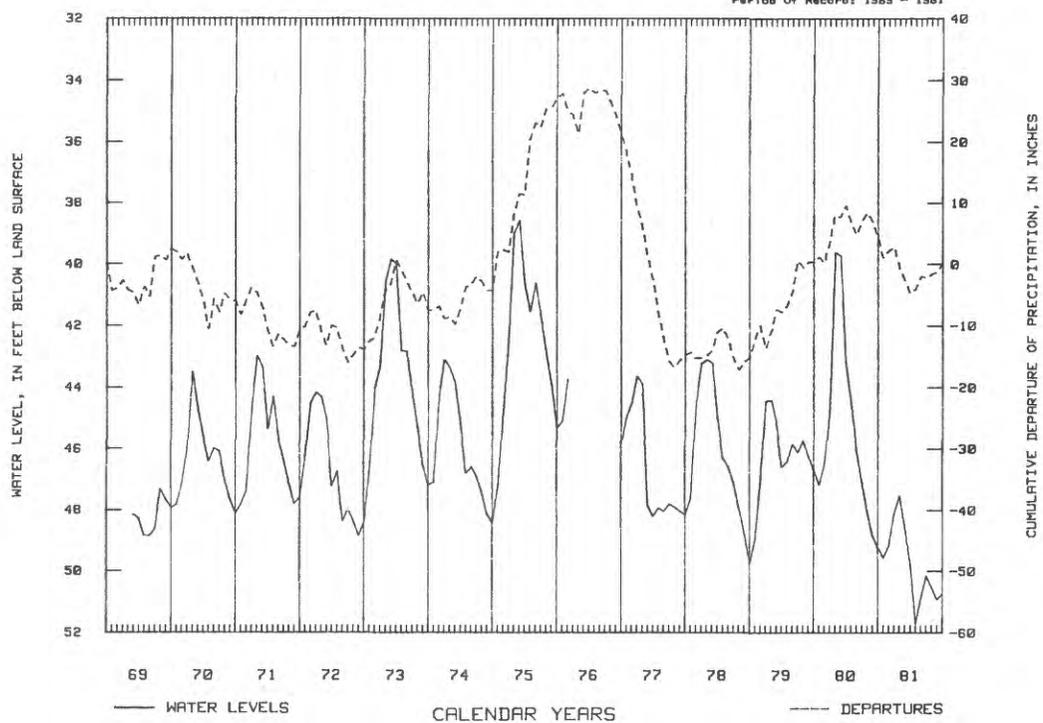
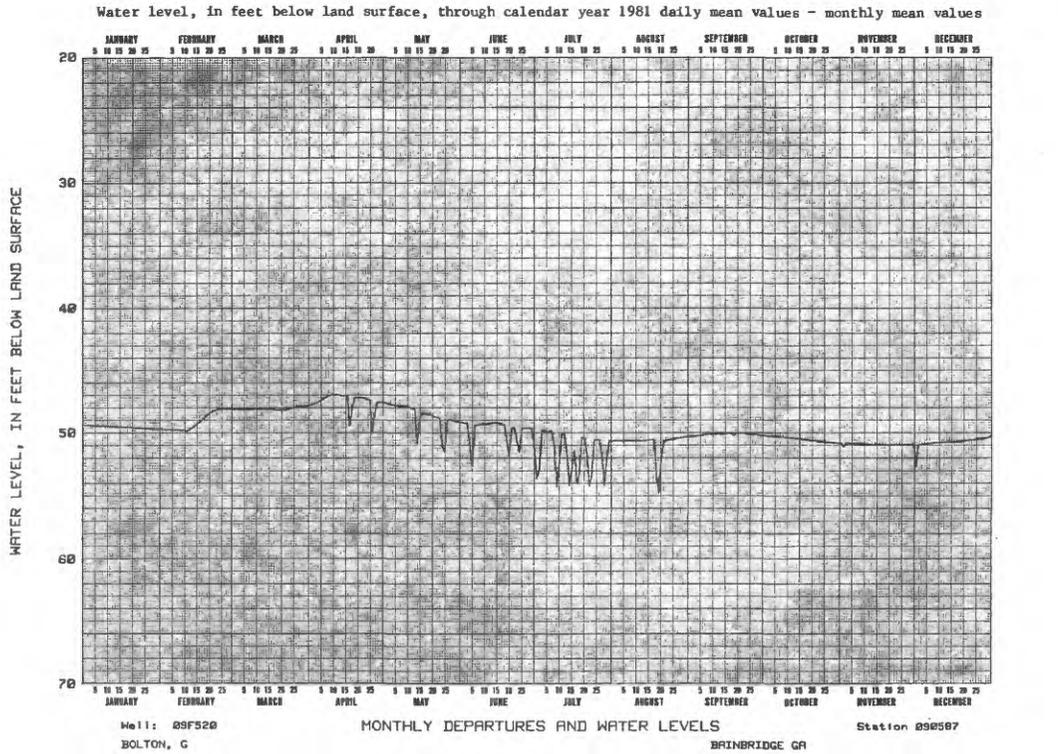


FIGURE 3.1.7-2.—WATER-LEVEL FLUCTUATIONS IN THE BOLTON OBSERVATION WELL

New water level low established

The water level in the Fleet well, like the Bolton well, responds to seasonal variations in rainfall and pumpage. An excellent example of this is the peak in the hydrograph for the first few days of August 1981. A severe thunderstorm caused the water level in the Fleet well to rise from 41.72 feet on July 31 to 28.23 feet on August 3--a difference of 13.49 feet. Below normal precipitation and heavy irrigation pumpage contributed to the overall water-level decline for 1981. The water level stabilized at the end of the year, probably because pumping and natural spring discharge lowered the ground-water level to that of nearby Spring Creek and, thus, reduced or eliminated any flow gradient (Pollard and others, 1978).

The 1981 low water level set a new record at 43.88 feet, 3.25 feet below the previous record low set in December 1980. The 1981 mean water level was 40.4 feet and in 1978 it was 8.60 feet, a difference of 31.80 feet for the 4-year period.

The long-term hydrograph illustrates how responsive the Fleet well is to rainfall and pumpage. Early spring rains cause the water level to rise. During the growing season, decreased precipitation creates a demand for irrigation, resulting in a decline in the water level. With the advent of winter, precipitation increases, pumpage for irrigation decreases, and the water level begins to recover. As spring approaches, the cycle repeats.

KILLER COUNTY

31095108404501. Local number, 0845001.
 Location: N 85° 31' E, long 84° 40' 45" W, hydrologic Unit 03130010, 1 mi northeast of Boykin, Ga.
 Owner: Jack Place.
 AQUIFER—Principal: artesian aquifer, unconsolidated sandstone.
 MEASURING POINT: Top front edge of recorder shelter, 3.0 ft above land-surface datum.
 DATUM—Altitude of land-surface datum is 150 ft.
 MEASURING POINT: Top front edge of recorder shelter, 3.0 ft above land-surface datum.
 REPAIRS: Incorporated volume 1-18, July 30-August 26, 1980.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 14.20 ft below land-surface datum, March 17, 1978; lowest, 63.88 ft below land-surface datum, July 17, 1981.

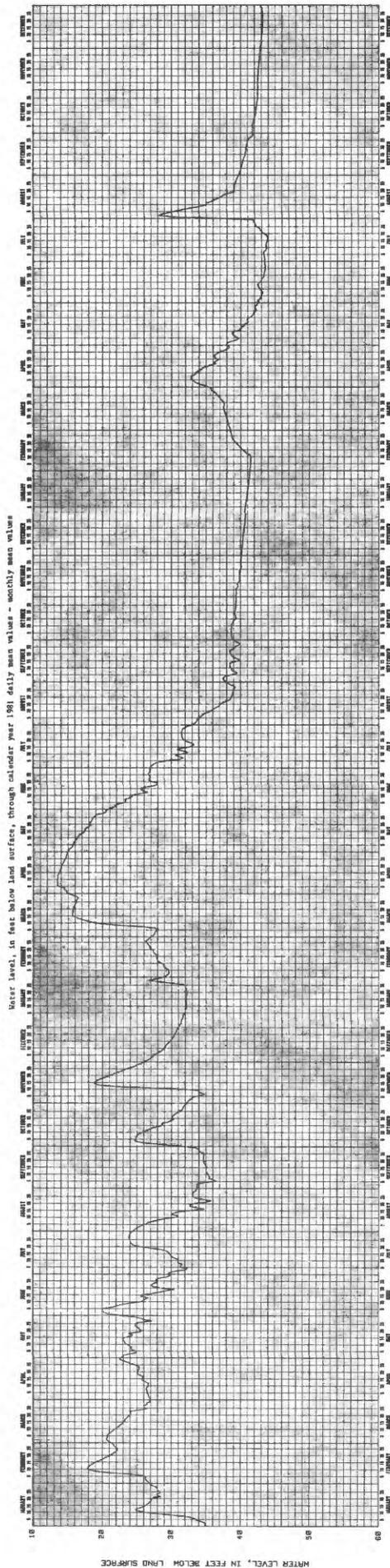


FIGURE 3.1.7-3. —WATER-LEVEL FLUCTUATIONS IN THE FLEET OBSERVATION WELL, 1979-81

New water level low established

The Albany-Dougherty County well shows a seasonal response to precipitation. The sharp peaks on the hydrograph in February and April 1981 correspond to periods of increased precipitation. The long-term hydrograph for the entire period of record (1963-81) better illustrates how this well is affected by precipitation. The cumulative departure curve for rainfall correlates very well with the water-level curve.

The 1981 mean water level was 41.8 feet, a difference of 10.6 feet from the 1980 mean of 31.2 feet. The 1981 low water level set a new record of 44.89 feet, 1 foot below the previous record low of December 1963. This decline may be due, in part, to increased pumpage in southwest Georgia.

DOUGHERTY COUNTY

313748084002901 Local number, 13L003.

LOCATION.—Lat 31°37'48", long 84°00'29", Hydrologic Unit 03130008, near northeast corner of Marine Corps Supply Center, Acree, Ga.

Owner: City of Albany and Dougherty County.

AQUIFER.—Principal artesian aquifer.

WELL CHARACTERISTICS.—Drilled unused supply well, diameter 6 in., depth 259 ft, cased to 206 ft, open hole.

DATUM.—Altitude of land-surface datum is 225 ft.

Measuring point: Floor of recorder shelter, 4.10 ft above land-surface datum.

REMARKS.—Well pumped and sounded June 21, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted March 17, 1977.

PERIOD OF RECORD.—January 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 17.41 ft below land-surface datum, April 2, 1965; lowest, 44.89 ft below land-surface datum, December 13, 1981.

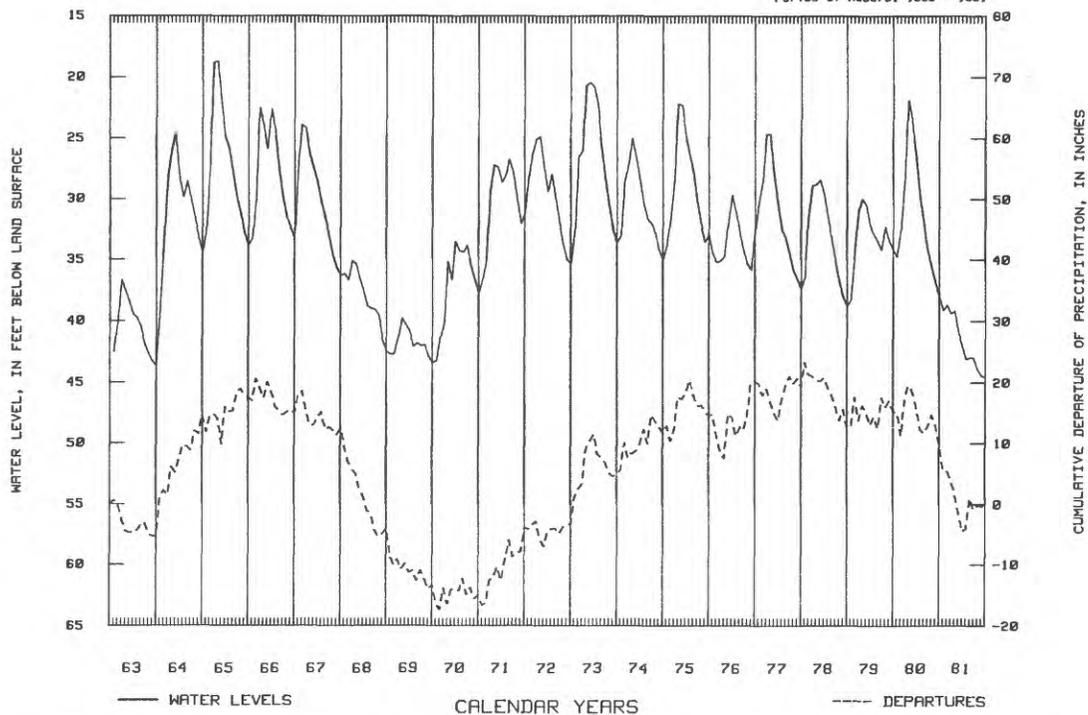
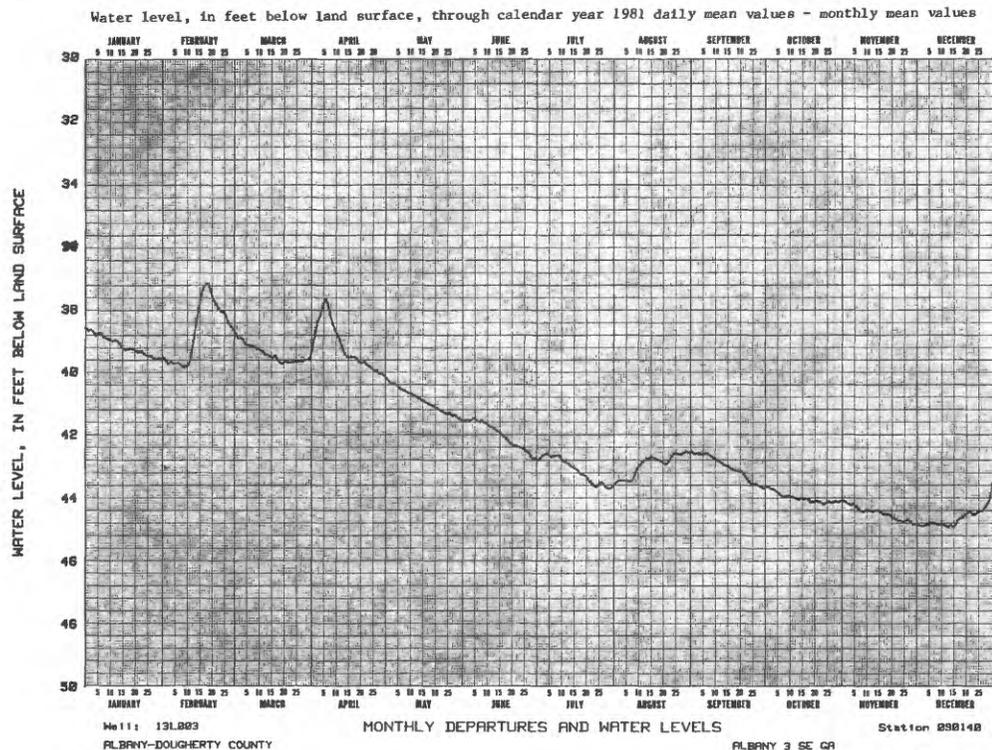


FIGURE 3.1.7-4.—WATER-LEVEL FLUCTUATIONS IN THE ALBANY-DOUGHERTY COUNTY OBSERVATION WELL

3.2 Regional Clayton Aquifer

The limestone part of the Clayton aquifer supplies water for municipalities and agriculture in the west-central part of the Coastal Plain. Recharge to this aquifer is primarily from rainfall in the outcrop area. In areas where the principal artesian aquifer cannot supply the quantities of ground water needed, the Clayton aquifer is utilized.

Water level controlled by reservoir and river stages

Annual water-level fluctuations of over 10 feet in the Clay County observation well are controlled mainly by changing stages in nearby Walter F. George Reservoir. Sharp, small-scale fluctuations occurring throughout the year reflect responses of the aquifer to changing river stages caused by operation of the dam.

The 1981 low water level was 32.9 feet, or 0.49 foot below that of 1980, and remained 2.98 feet above the record low of August 1963. Average water levels during the entire period of record indicate no long-term trend, but do show the impact of changing ground-water storage near a large surface-water reservoir.

CLAY COUNTY

313637085032601 Local number, 05L001.
 LOCATION.—Lat 31°36'37", long 85°03'26", Hydrologic Unit 03130004, between Chattahoochee River and Ft. Gaines waterplant.
 Owner: U.S. Army Corps of Engineers.
 AQUIFER.—Clayton Limestone.
 WELL CHARACTERISTICS.—Drilled observation well, diameter 3 in., depth 120 ft, cased to 44 ft, open hole.
 DATUM.—Altitude of land-surface datum is 146.7 ft.
 Measuring point: Top of floor of recorder shelter, 2.7 ft above land-surface datum.
 REMARKS.—Interpolated values, December 2-12, 1980.
 PERIOD OF RECORD.—May 23, 1957 to current year.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 18.86 ft below land-surface datum, February 17, 1966; lowest, 35.95 ft below land-surface datum, February 14, 1961.

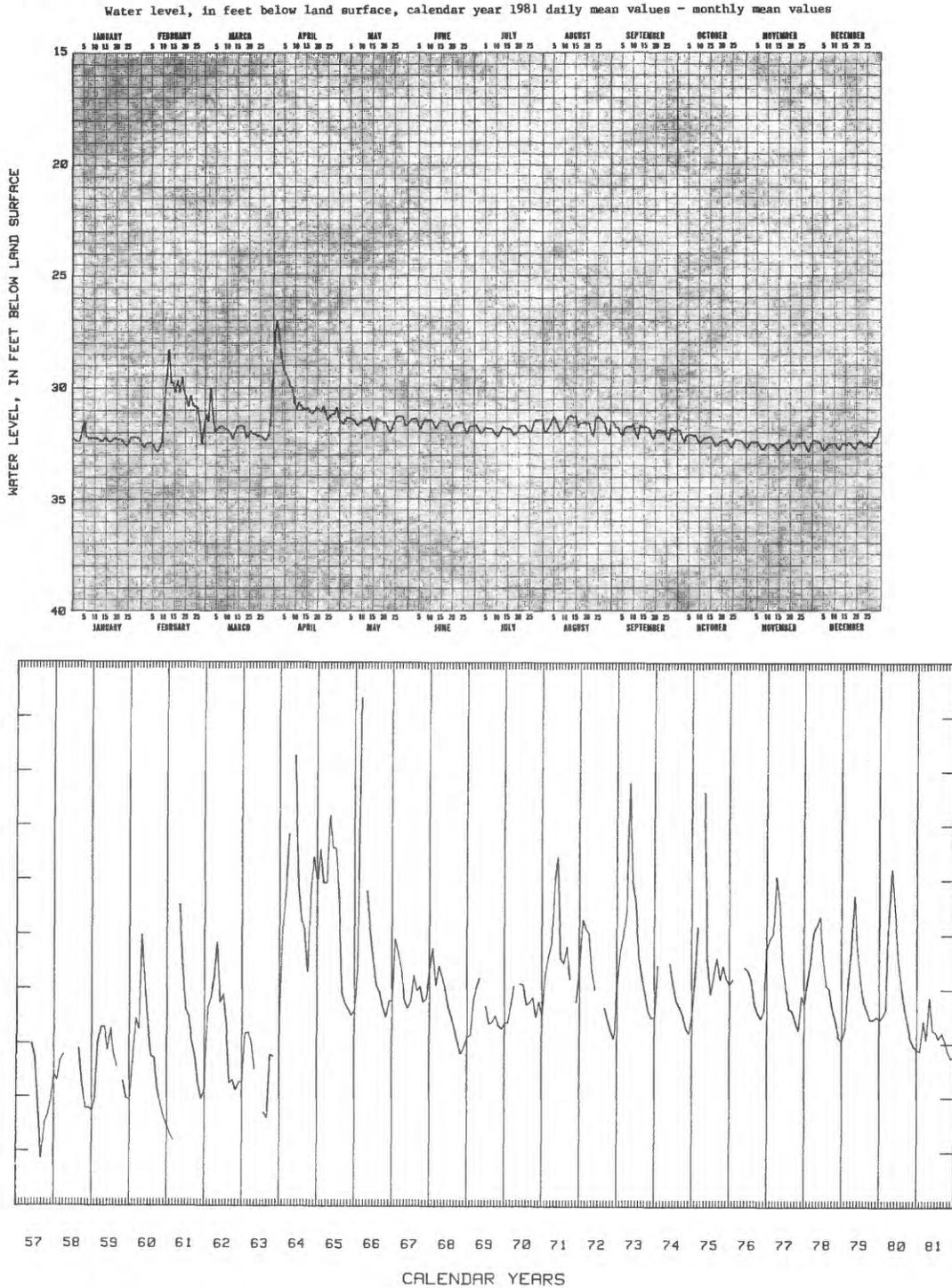


FIGURE 3.2-1.—WATER-LEVEL FLUCTUATIONS IN THE CLAY COUNTY OBSERVATION WELL

Water levels affected by precipitation and pumpage

The combination of regional pumpage and deficient rainfall reduced the water level in the Cuthbert observation well to a low of 153.87 feet--only 0.07 foot higher than the record low of September 1980.

The water level ranged from a high of 143.19 feet in March to 153.87 in September, a decline of 10.68 feet. The water level had recovered to 146.90 feet by the end of 1981. The 1981 mean water level was 2.86 feet lower than in 1980 and the long-term trend shows a steady decline--most of which occurred from 1977-81.

RANDOLPH COUNTY

314602084473701 Local number, 07N001.

LOCATION.—Lat 31°46'02", long 84°47'37", Hydrologic Unit 03110204, south of intersection of College and Andrew Streets, near electric substation.

Owner: City of Outhbert.

AQUIFER.—Clayton Limestone.

WELL CHARACTERISTICS.—Drilled unused municipal well, diameter 8 in., depth 372 ft, casing depth unknown.

DATUM.—Altitude of land-surface datum is 460 ft.

Measuring point: Floor of recorder shelter, 3.30 ft above land-surface datum.

REMARKS.—Well pumped and sounded June 22, 1978, to a depth of 372 ft; water-quality sample collected at conclusion of pumping.

Well near city wells.

PERIOD OF RECORD.—January 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 132.0 ft below land-surface datum, December 10, 1967; lowest, 153.94 ft below land-surface datum, September 8, 1980.

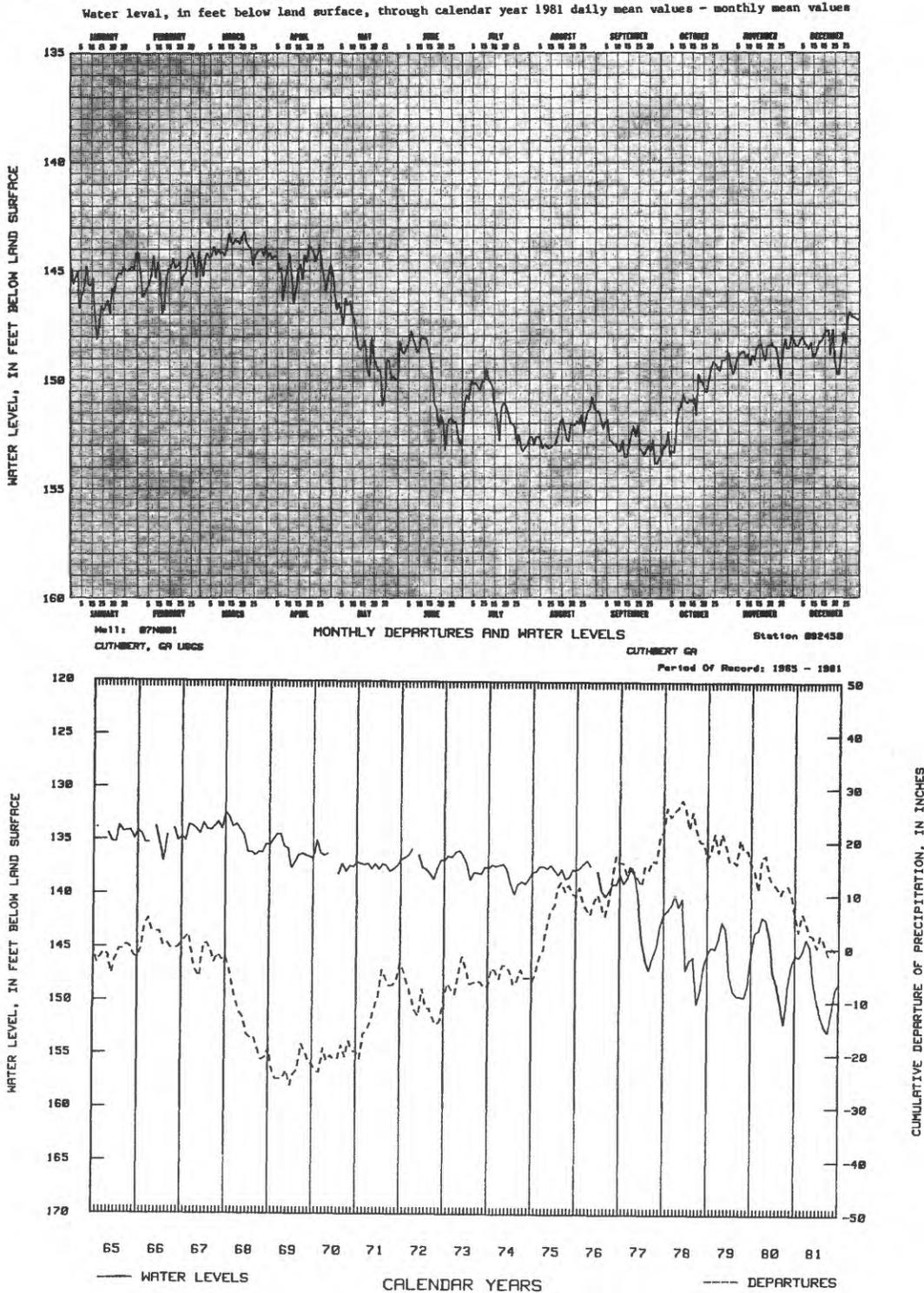


FIGURE 3.2-2.—WATER-LEVEL FLUCTUATIONS IN THE CUTHBERT OBSERVATION WELL

3.2.1 Albany Area

Rapid growth and extensive agricultural development in the Albany area has caused significant increases in ground-water use since 1977. Municipal, industrial, agricultural, and domestic water use in the Albany area fluctuates seasonally and generally peaks during June and July when ground-water withdrawals may exceed 100 million gallons per day. The city of Albany has a water system supplied by 26 multiaquifer wells that yielded from 10 to 26 million gallons per day in 1981.

Four aquifers are used for water supply in the Albany area. They are, in order of depth below land surface, the Ocala Limestone and Tallahatta Formation of Eocene age, the Clayton Limestone of Paleocene age, and the Providence Sand of Cretaceous age (Hicks and others, 1981, p. 1).

A water-level monitoring network consisting of 15 test wells was established in the Albany area during 1977-79. Each of the network wells was drilled to tap 1 of the 4 aquifers. Measurements made during 1981 indicate that in the Albany area, water levels remain lower in the Clayton aquifer than in the other aquifers utilized.

Water levels in the Clayton aquifer in the Albany area underwent a long-term decline during the period 1977-81, and in some wells water levels dropped more than 46 feet.

Because of the continued agricultural drought in southwest Georgia and increased agricultural development in the Albany area, more ground water was withdrawn during 1981 than in the same period of 1980. This increased pumpage caused water levels in the Clayton aquifer to decline in some areas as much as 8 feet below the 1980 minimums, and as much as 32 feet below the 1979 minimums. Water levels in

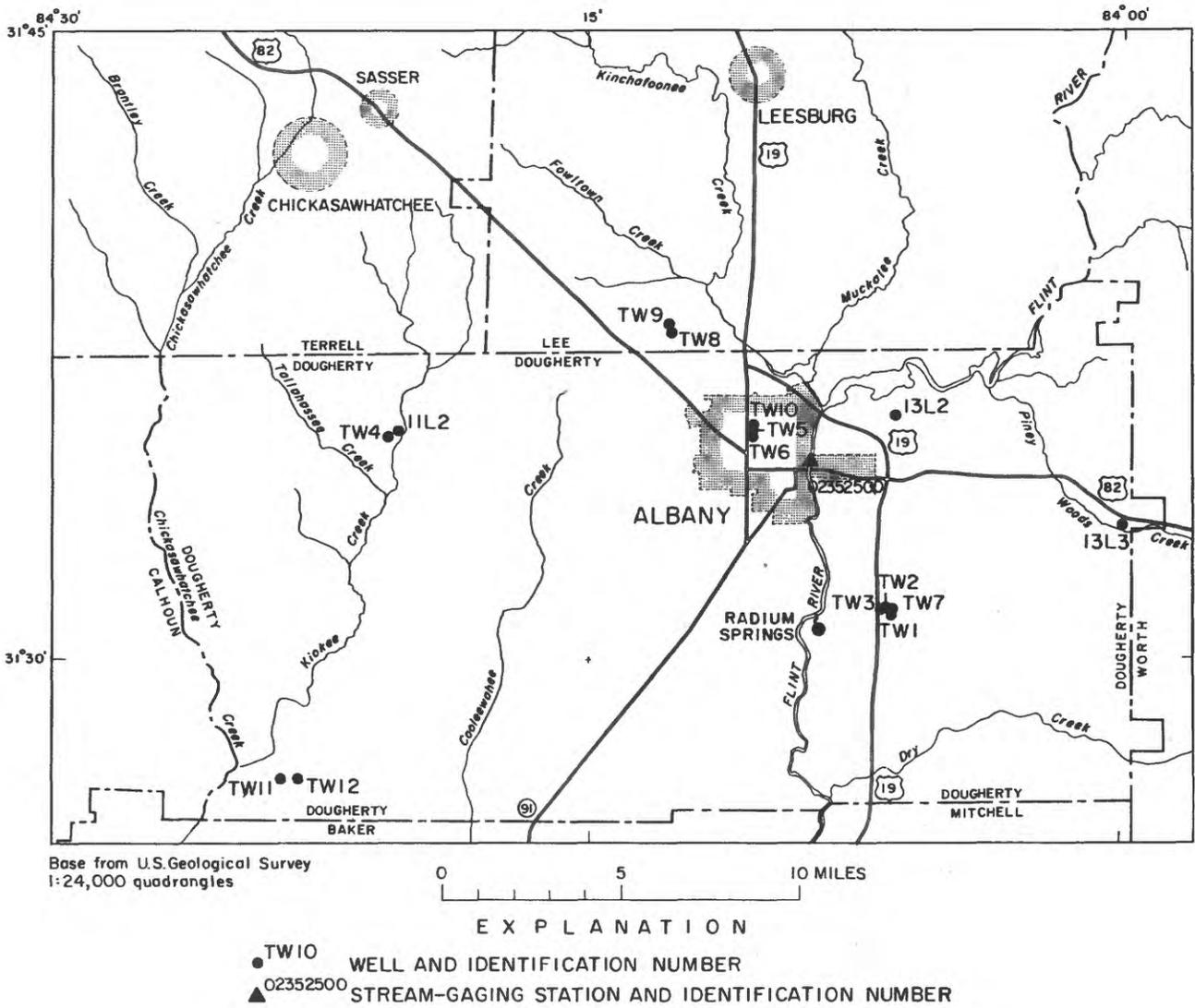


FIGURE 3.2.1-1.—LOCATION OF TEST WELLS IN THE ALBANY AREA

the surficial Ocala Limestone declined to record lows in the Albany area causing many springs to cease flowing. Radium Springs, a historic landmark which normally discharges as much as 90 million gallons per day from the Ocala aquifer, ceased to flow during the summer and fall of 1981, the first time on record.

Pumpage effect on water levels

A comparison of the hydrographs of U.S. Geological Survey test wells 2 and 5, and 6, and 7 (figs. 3.2.1-2 and 3.2.1-3) illustrate how water-level declines are affected by distance from a pumping center. Test wells 2 and 5 both tap the Tallahatta aquifer. Test well 5, near the center of pumpage, had an average water level of 89.5 feet for 1981, whereas test well 2, which is 6.5 miles to the southeast, had an average water level of 85.7 feet. Increased pumpage caused the water level in both wells to drop during the summer months. A decrease in pumpage in late fall-early winter caused water levels to rise.

In the Clayton aquifer, test well 6, near the center of pumpage, had an average water level of 146 feet. Test well 7, located 6.5 miles to the southeast, had an average of 110 feet, or 36 feet higher than the well near the center of pumpage.

Test well 3 taps the Ocala aquifer and had an average water level of 45.7 feet for 1981, 3.7 feet lower than in 1980.

Test well 10 is in the Providence aquifer and had an average water level of 134 feet, or 8 feet below the average for 1980. This difference was probably due to increased municipal pumpage necessitated by lower than normal precipitation.

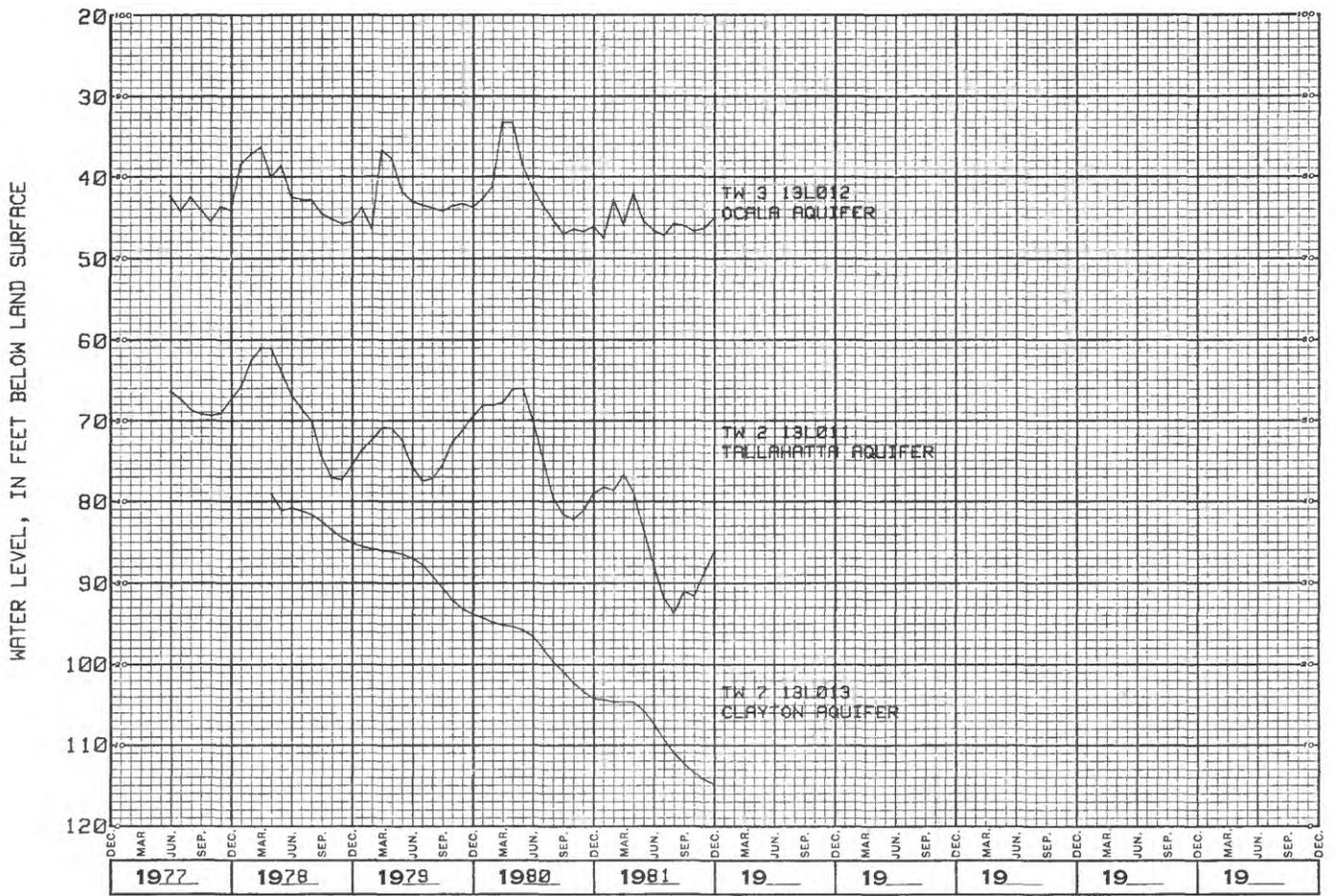


FIGURE 3.2.1-2.—WATER-LEVEL FLUCTUATIONS IN WELLS 2, 3, AND 7

The 1977-81 hydrograph for test wells 2, 3, and 7 (fig. 3.2.1-2) illustrates how the water levels in these wells have declined over the 5-year period. Ground-water levels in this area fluctuate in response to seasonal variations in precipitation, streamflow, evapotranspiration, and pumpage. Abundant winter rainfall increases the potential for recharge of the aquifers throughout the area, especially the Ocala aquifer. During the winter months, when vegetation growth and solar radiation are at a minimum, evapotranspiration is low and the aquifer receives the maximum annual recharge. Accordingly, by early spring water levels recover from the previous year's low levels. Although precipitation is generally heavy from late spring through fall, water lost to evapotranspiration is greatest during the growing season and the amount of water available for recharge is reduced. This reduced recharge and increased agricultural pumpage during the spring and summer seasons cause ground-water levels to decline to a minimum by late fall.

Because the Tallahatta and Clayton aquifers are recharged 20 to 40 miles north and northwest of the Albany area, water levels in these aquifers are affected primarily by changes in local pumpage, as is the Providence aquifer. During late fall to winter, a decrease in municipal pumpage and a substantial decrease in agricultural pumpage result in a reduction in total ground-water withdrawal. Due to this reduced pumpage, and to recharge, ground-water levels in the Tallahatta, Clayton, and Providence aquifers attain a maximum by late winter. During the spring and summer, increased municipal and agricultural pumpage causes water levels to decline to a minimum by late fall (Hicks and others, 1981, p. 28). These seasonal fluctuations are best illustrated on the 1981 hydrograph for test wells 5, 6, and 10 (fig. 3.2.1-3).

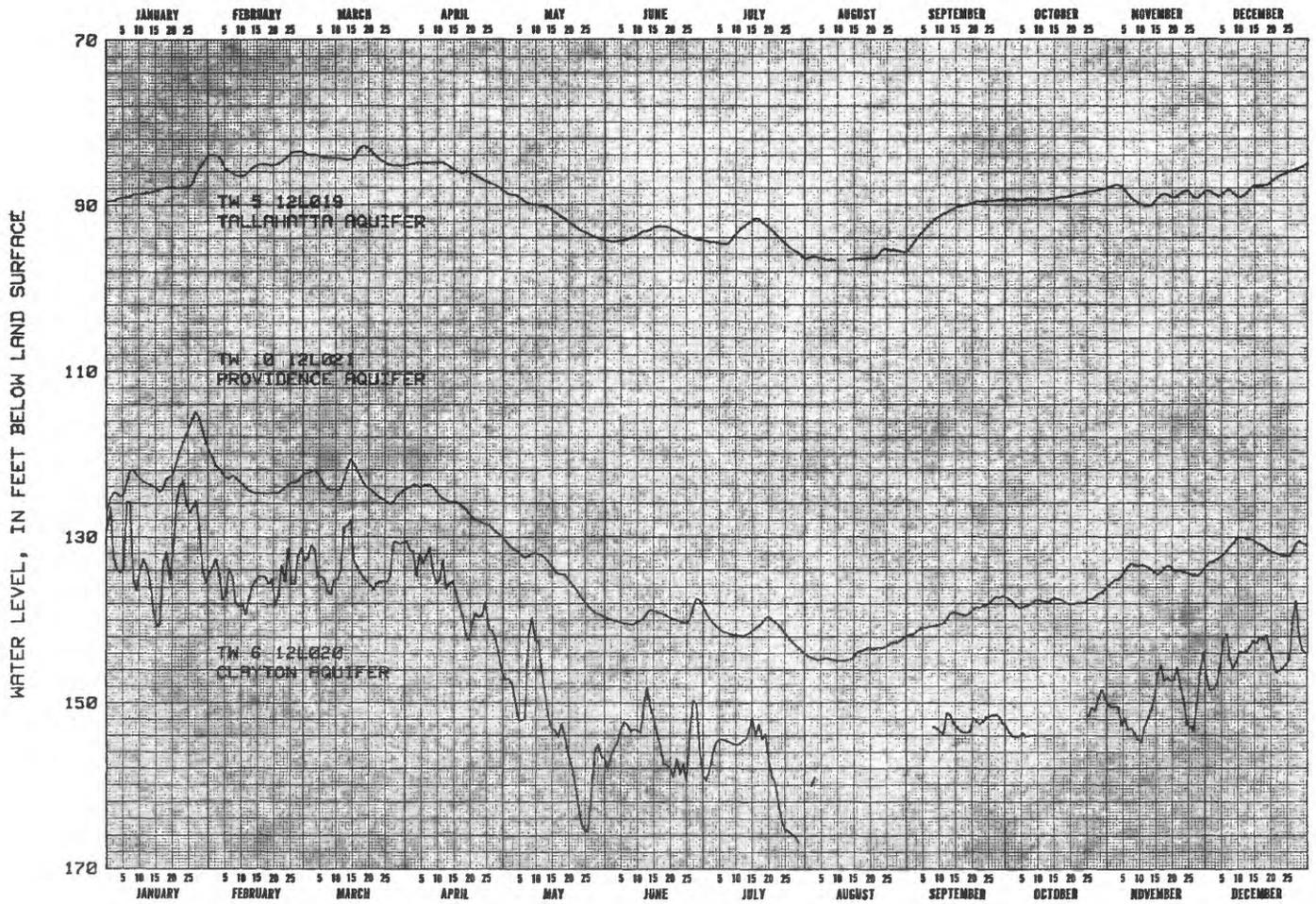
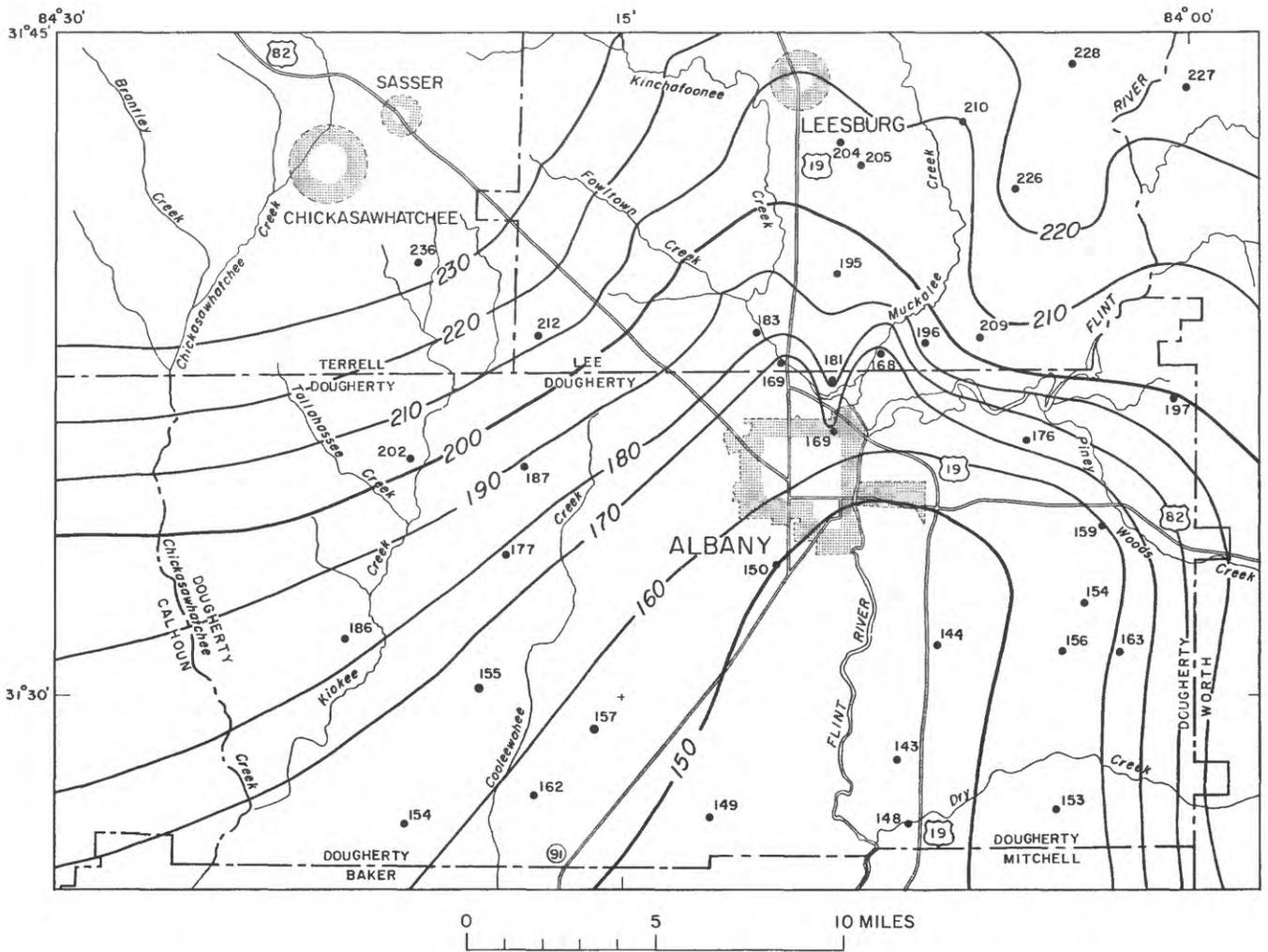


FIGURE 3.2.1-3.—WATER-LEVEL FLUCTUATIONS IN WELLS 5, 6, AND 10

Principal artesian aquifer in the Albany area

A water-level map of the principal artesian aquifer was constructed from measurements made in December 1981. The water-level contours indicate that the aquifer receives recharge throughout much of the Albany area and discharges through springs and into streams where erosion has removed the confining layer and exposed the aquifer. Abundant local recharge has prevented the development of widespread pumpage cones in the water-level surface (Hicks and others, 1981, p. 25).



EXPLANATION

—150— WATER-LEVEL CONTOUR — Shows altitude at which water level would have stood in tightly cased wells. Contour interval 10 feet. National Geodetic Vertical Datum of 1929

●157 DATA POINT — Number is altitude of water level, in feet

FIGURE 3.2.1-4. — WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), DOUGHERTY COUNTY AND SURROUNDING AREA, DECEMBER 1981

New record low in August

A record low of 153.04 feet was established in August in the Turner City well, 1.48 feet below the previous record set in September 1980. The 1981 mean water level was 8.05 feet lower than in 1980.

Ground-water withdrawal and precipitation are the main factors affecting the water level in the Turner City well. The long-term hydrograph shows how the water level declined for the period 1962-81. The mean water level decreased 0.66 foot during the period 1970-73, rose 5.8 feet in 1974, and leveled off in 1975-76. The water level began to decline in 1976, and dropped 53.61 feet during 1976-81. For the period 1962-81, the water level dropped 75.5 feet. The rise in the water level beginning in the latter part of 1974 corresponded to a decrease in pumpage by the city of Albany. The subsequent decline in 1976-81 corresponded to an increase in pumpage in the Albany area, and to increased agricultural pumpage to the west and northwest in parts of Dougherty, Calhoun, and Terrell Counties (Hicks and others, 1981, p. 2).

DOUGHERTY COUNTY

313554084062601 Local number, 13L002.

LOCATION.—Lat 31°35'54", long 84°06'25", Hydrologic Unit 03130008, Malone and Gardner Avenue near main entrance to Turner Field, Albany.

Owner: City of Albany, Turner City.

AQUIFER.—Clayton Limestone.

WELL CHARACTERISTICS.—Drilled unused supply well, diameter 12 in. and 8 in., depth 760 ft, cased to 713 ft, open hole.

DATUM.—Altitude of land-surface datum is 212.84 ft.

Measuring point: Floor of recorder shelter, 3.2 ft above land-surface datum.

REMARKS.—Well pumped and sounded to a depth of 760 ft, June 21, 1978; water-quality sample collected at conclusion of pumping.

Borehole geophysical survey conducted March 17, 1977. Interpolated values, October 2–November 14, 1980.

PERIOD OF RECORD.—December 1957 to December 1959, January 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 38.19 ft below land-surface datum, April 1, 1959; lowest, 153.04 ft below land-surface datum, August 1, 1981.

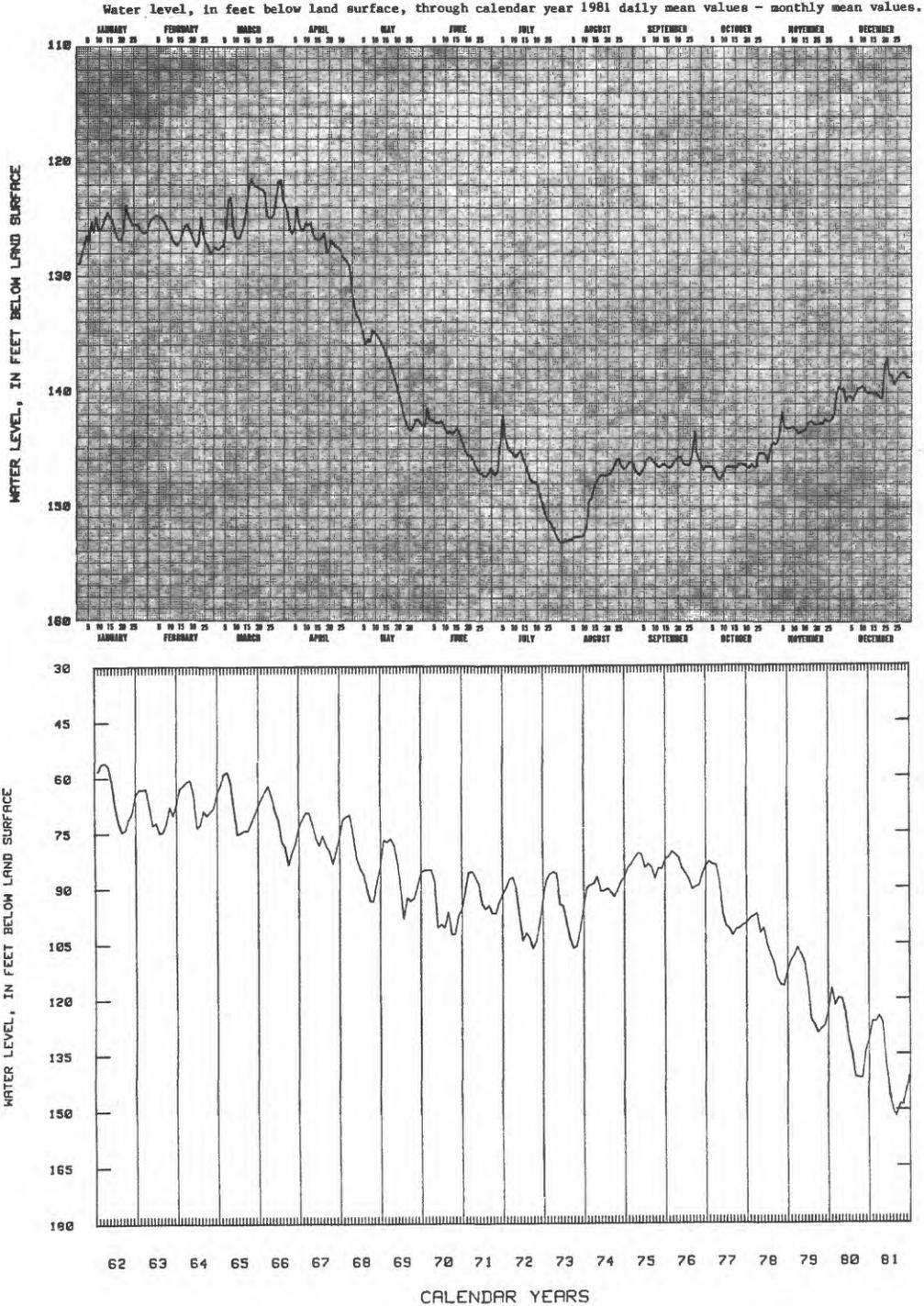


FIGURE 3.2.1-5.—WATER-LEVEL FLUCTUATIONS IN THE TURNER CITY OBSERVATION WELL

New water level low in August

Regional ground-water withdrawal, operation of nearby irrigation wells, and reduced rainfall caused the water level in the Tallahassee Plantation well to decline from the previous record low of 116.79 feet in September 1980 to a new low of 123.45 feet in August 1981. By the end of 1981, the water level had recovered 23.27 feet. The 1981 mean water level of 106.0 feet was 12.68 feet below the mean for 1980. The long-term hydrograph indicates a downward trend in the water level caused by an increase in ground-water withdrawal. Comparison of the water levels in the aquifer with the cumulative departure curve for precipitation shows the impact of decreasing rainfall for 1980-81.

DOUGHERTY COUNTY

313530084203201 Local number, 11L002.

LOCATION.—Lat 31°35'32", long 84°20'35", Hydrologic Unit 03130008, Tallahassee Plantation, 10.4 mi west of Albany.

Owner: Georgia Department of Natural Resources.

AQUIFER.—Clayton Limestone.

WELL CHARACTERISTICS.—Drilled observation well, diameter 3 in., depth 656 ft, cased to 542 ft, open hole.

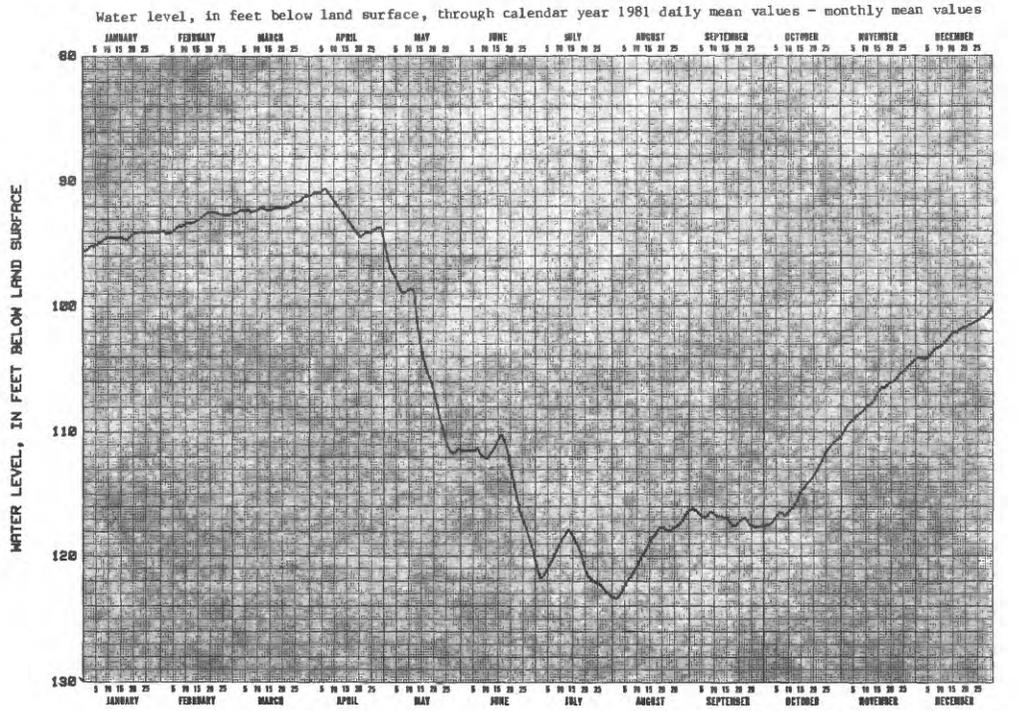
DATUM.—Altitude of land-surface datum is 222 ft.

Measuring point: Floor of recorder shelter, 3.02 ft above land-surface datum.

REMARKS.—Well pumped April 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 3, 1975. Interpolated values, February 18-25, March 11, June 15-July 14, August 13-25, August 31-September 8, October 3-21, October 24-November 16.

PERIOD OF RECORD.—September 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 58.90 ft below land-surface datum, April 29, 1975; lowest, 123.45 ft below land-surface datum, August 2, 1981.



Well: 11L002 MONTHLY DEPARTURES AND WATER LEVELS Station 098140
 GADR TALLAHASSEE PLNT ALBANY 3 SE GR
 Period Of Record: 1974 - 1981

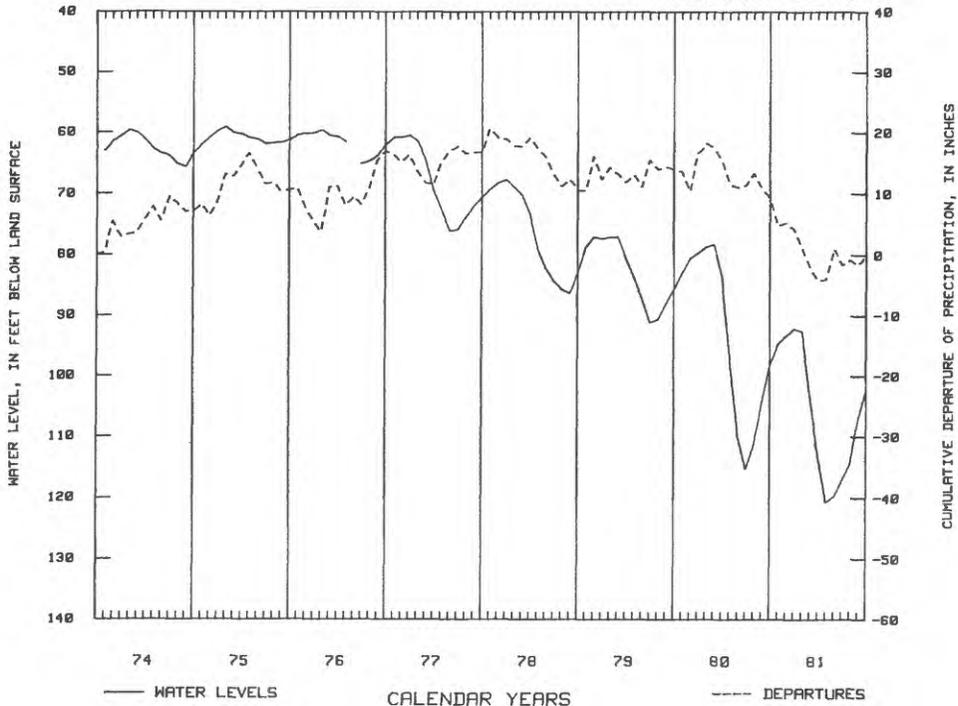


FIGURE 3.2.1-6.—WATER-LEVEL FLUCTUATIONS IN THE TALLAHASSEE PLANTATION OBSERVATION WELL

3.3 Regional Cretaceous Aquifer System

The aquifers of Cretaceous age in the Georgia Coastal Plain supply more than 107 million gallons of water per day for municipal and industrial use. The major source of recharge to the aquifer system is rainfall in areas where the individual aquifers intersect the land surface or underlie permeable surface material. Rainfall infiltrates the surface material and moves downgradient toward the southeast through the aquifer system. Most of the natural discharge from the aquifer system is into streams and rivers that cross the outcrop area.

In general, water-level declines in the Cretaceous aquifer system for the period 1972-81 were negligible. The only exceptions have been in those areas where pumpage was heavy: Houston and Twiggs Counties, northwest Wilkinson County, central Washington County, and the eastern part of Richmond County. The water-level declines in these areas vary from 10 to 50 feet (R. E. Faye, U.S. Geological Survey, oral commun., 1981).

Long-term water-level decline

The mean water level low in the Fort Benning well was 14.67 feet, a difference of 15.06 feet above the record low of 1958 that resulted from local heavy pumpage, which has been discontinued. The water level generally fluctuates about 2 feet per year, reflecting seasonal variations in precipitation and streamflow. The notable decline in water level beginning in 1977 and continuing into 1981 corresponded to increases in regional pumpage. This increase in ground-water withdrawal also accounted for the decline of about 11 feet for the period 1960-81.

CHATTahoochee COUNTY

322036084590301 Local number, 06S001

LOCATION.—Lat 32°20'36", long 84°59'03", Hydrologic Unit 03130003, in "Motor Pool" across road from Lawson Airfield main building.

Owner: U.S. Army.

AQUIFER.—Blufftown and Eutaw Formations, and Tuscaloosa Formation.

WELL CHARACTERISTICS.—Drilled unused supply well, diameter 12 in., depth 568 ft, screened interval 215-220 ft, 230-235 ft, 280-290 ft, 540-550 ft.

DATUM.—Altitude of land-surface datum is 255 ft.

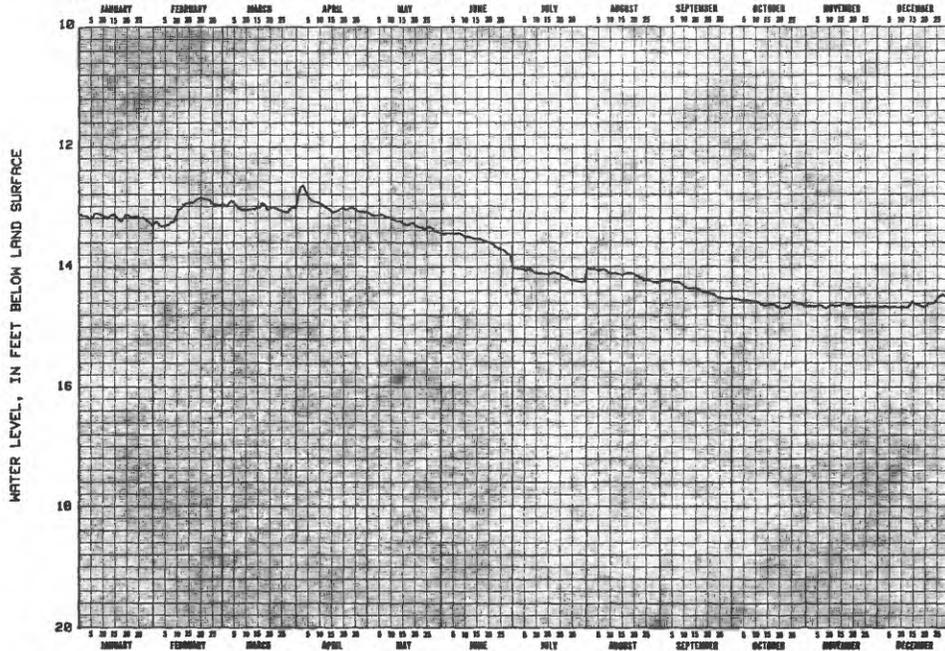
Measuring point: Floor of recorder shelter, 2.80 ft above land-surface datum.

REMARKS.—Well pumped June 1978; water-quality sample collected at conclusion of pumping.

PERIOD OF RECORD.—May 1950 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 0.37 ft below land-surface datum, April 10, 1964; lowest, 29.73 ft below land-surface datum, September 10, 1958.

Water level, in feet below land surface, monthly mean values through 1975 and 1981 - periodic measurements, 1975-79



Well: 06S001
USA FORT BENNING

MONTHLY DEPARTURES AND WATER LEVELS

Station 062166
COLUMBUS MSO RP (R) GA
Period Of Records 1950 - 1981

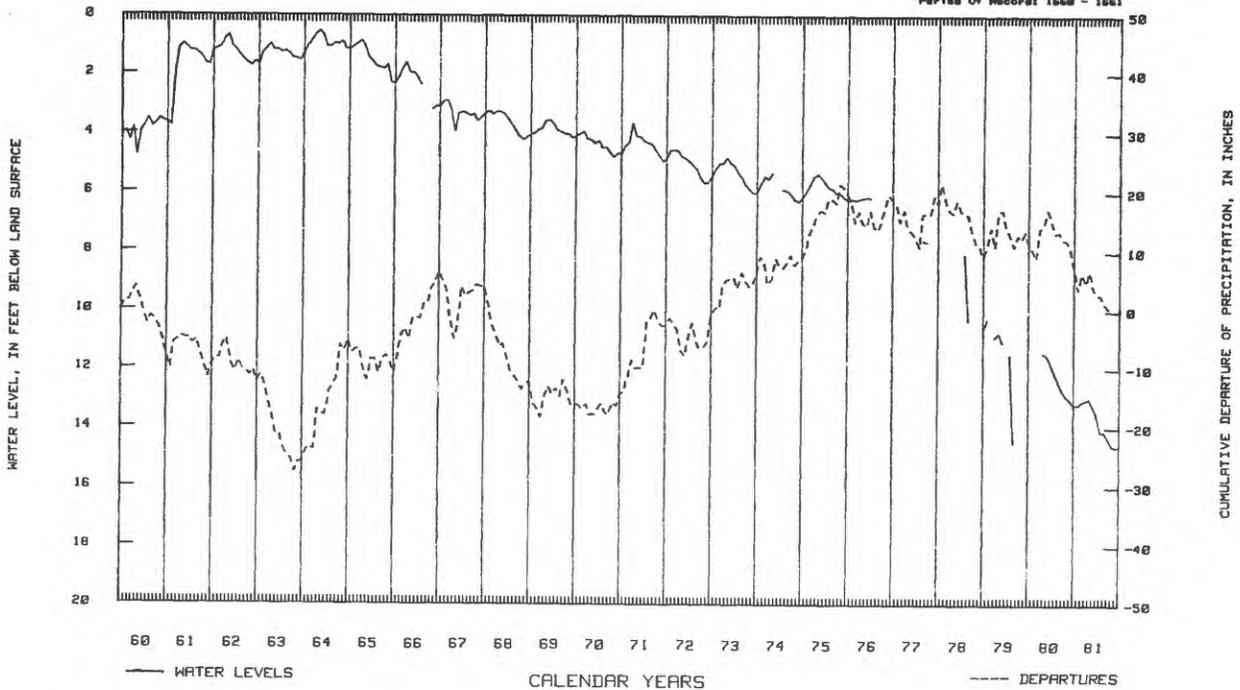


FIGURE 3.3-1.—WATER-LEVEL FLUCTUATIONS IN THE FORT BENNING OBSERVATION WELL

Record water level low established in October

The water level in the Georgia Kraft, U.S. Geological Survey test well 3 responds to industrial pumpage in the Twiggs County area. The low water level for 1981 of 165.64 feet was 0.91 foot lower than the previous record low of September 1980. The mean water-level for the entire period of record (1975-81) shows a decline of 1.35 feet.

TWIGGS COUNTY

323302083263401 Local number, 18U001.

LOCATION.—Lat 32°33'02", long 83°26'34", Hydrologic Unit 03070104, 0.6 miles north of intersection of U.S. Highways 23 and 129 and Georgia Highway 96, turn left at Woods Road West. Well is 100 ft west of highway.

Owner: Georgia Kraft, USGS TW 3.

AQUIFER.—Upper Cretaceous Series.

WELL CHARACTERISTICS.—Drilled observation well, diameter 6 in., depth 590 ft, 3 in.; depth 586-616 ft, cased to 616 ft.

DATUM.—Altitude of land-surface datum is 420 ft.

Measuring point: Top of recorder shelter, 2.6 ft above land-surface datum.

REMARKS.—Borehole geophysical survey conducted.

PERIOD OF RECORD.—July 1975 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 162.00 ft below land-surface datum, April 4, 1977; lowest, 165.64 ft below land-surface datum, October 5, 1981.

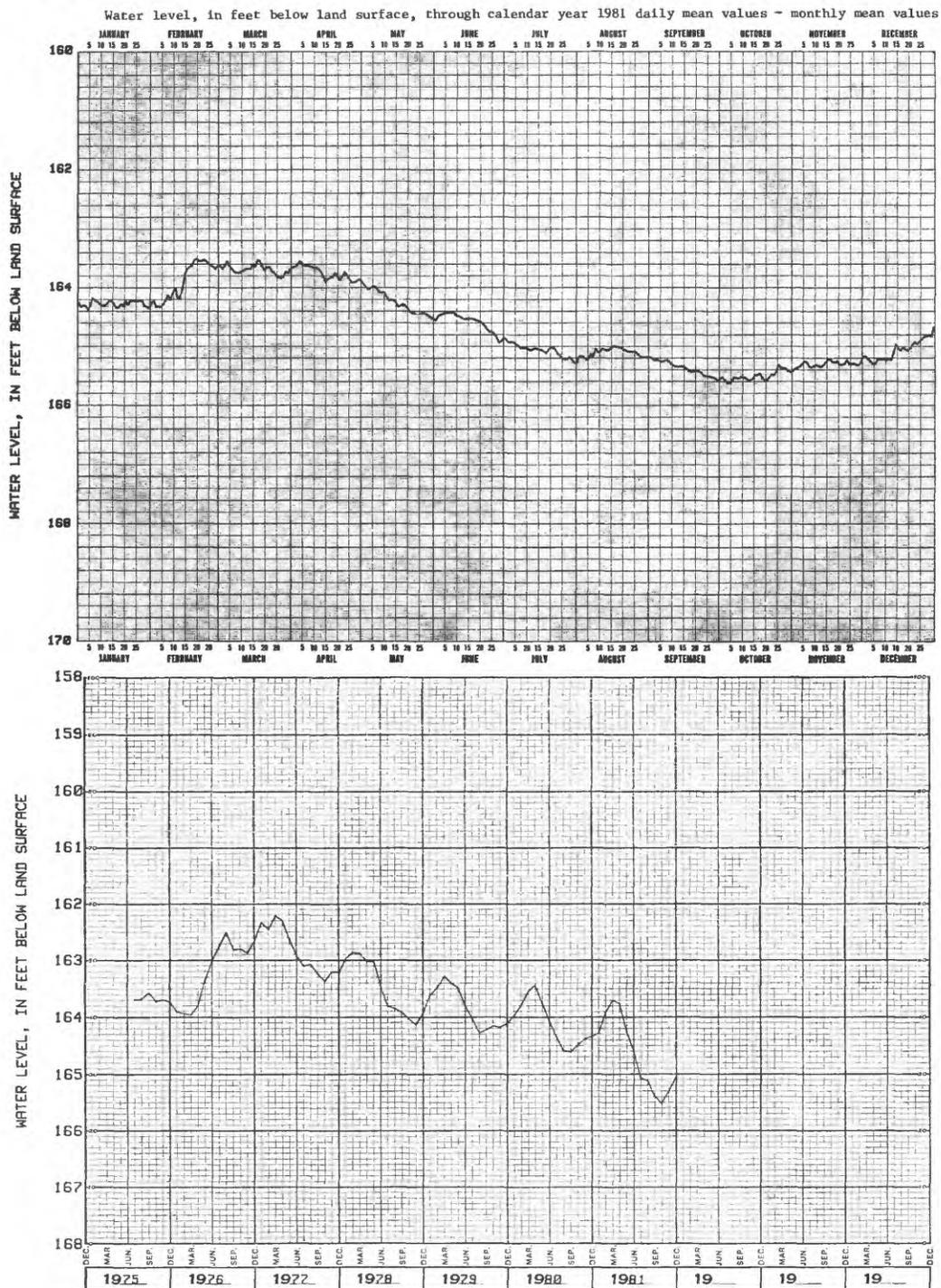


FIGURE 3.3-2.—WATER-LEVEL FLUCTUATIONS IN THE TWIGGS COUNTY U.S. GEOLOGICAL SURVEY TEST WELL 3

3.4 Coastal Plain Water-Table Aquifers

Shallow water-table aquifers in some areas of the Coastal Plain are used for domestic and stock supplies. Precipitation is the main factor affecting water levels in these aquifers. They respond rapidly to changes in precipitation and show marked seasonal fluctuations that correspond to variations in rainfall. Ground-water withdrawal from the aquifers rarely exceeds the rate of recharge except during extended dry periods, and recovery generally occurs with the onset of heavy rainfall.

Precipitation affects water levels

In this shallow water-table well, precipitation is the main factor affecting the water level. The prominent peaks on the hydrograph correspond to heavy rainfall in the Chatham County area. At the end of 1981, the mean water level in the U.S. Department of Agriculture observation well was 10.04 feet, 2.59 feet below the mean for 1980. The long-term hydrograph covering the entire period of record (1942-81) indicates no long-term trend in the water level.

CHATHAM COUNTY

315950081161201 Local number, 35P094.

LOCATION.—Lat 31°59'50", long 81°16'12", Hydrologic Unit 03060204, Barbour Lathrop Plant Introduction Station, 10 miles south of Savannah, north of the intersection of U. S. Highway 17 and Argyle Rd.

Owner: U.S. Department of Agriculture.

AQUIFER.—Sands of Holocene and Pleistocene age.

WELL CHARACTERISTICS.—Bored observation well, diameter 30 in., depth 15 ft, cased to 15 ft, open end.

DATUM.—Altitude of land-surface datum is 18.67 ft.

Measuring point: Iron bracket on recorder shelter, 3.3 ft above land-surface datum.

REMARKS.—Responds quickly to precipitation.

PERIOD OF RECORD.—August 1942 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 0.05 ft below land-surface datum, Sept. 26, 1953; lowest, 12.28 ft below land-surface datum, November 30, 1972.

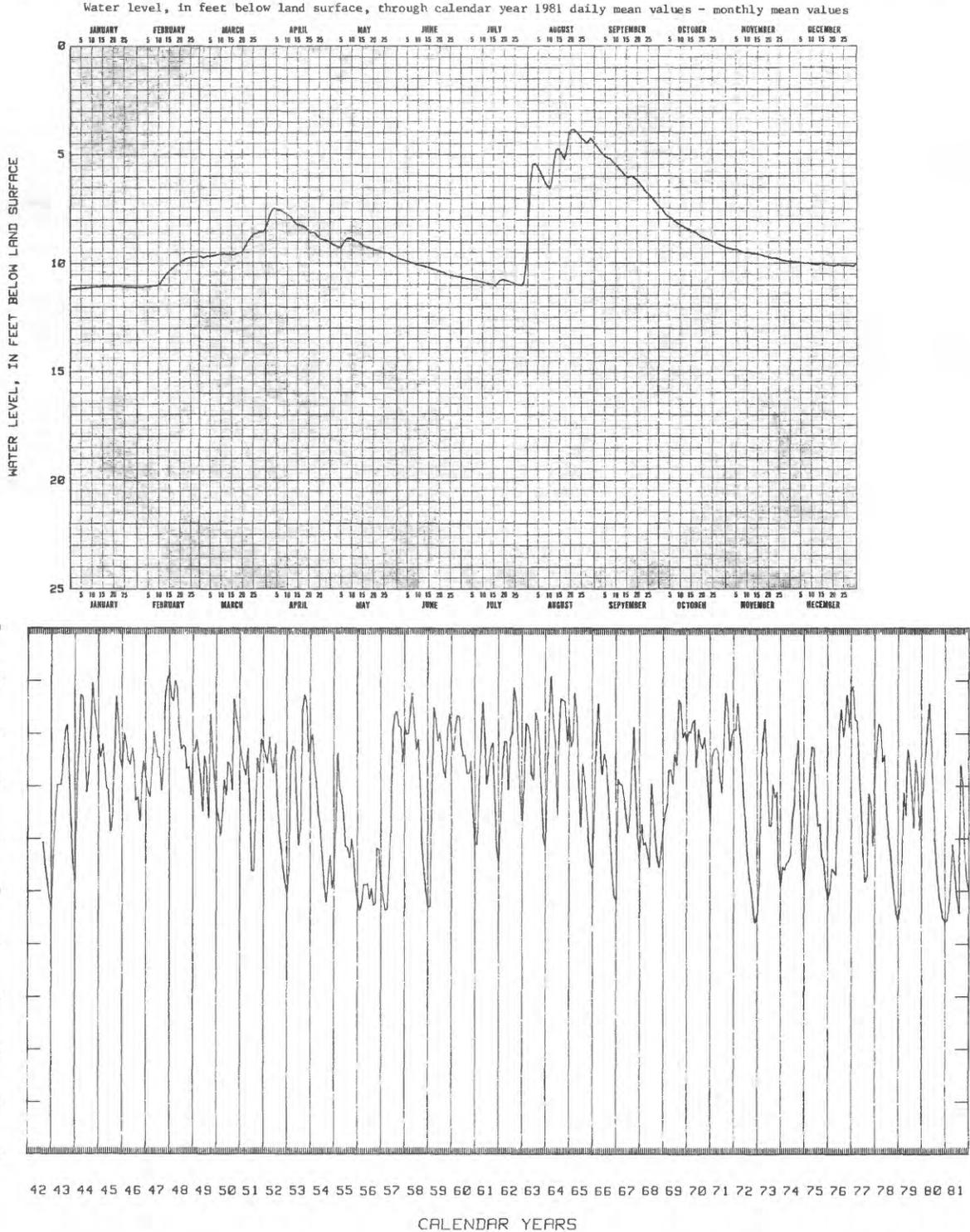


FIGURE 3.4-1.—WATER-LEVEL FLUCTUATIONS IN THE U.S. DEPARTMENT OF AGRICULTURE OBSERVATION WELL

3.5 Piedmont Area

Water levels in four observation wells were from 1.35 to 3.8 feet lower during 1981 than in 1980. Annual water-level fluctuations in the wells range from 4 to 8 feet.

Seasonal changes in precipitation and evapotranspiration produce corresponding changes in ground-water levels. Rainfall in the area is heavy in winter and midsummer and relatively light in spring and autumn. Autumn is the driest season of the year. Ground-water levels rise rapidly with the onset of late winter rains and reduced evapotranspiration, and generally reach their highest levels for the year in March or April. Increases in evapotranspiration and decreases in rainfall during the spring and early summer cause ground-water levels to decline. Heavy precipitation in midsummer may cause small rises in ground-water levels, but the lack of recharge from light rainfall in the autumn results in water levels declining to the annual lows, generally in October or November.

Water-level fluctuations indicate no long-term trend

The mean water level in the O'Neill Bros. well was 1.82 feet lower in 1981 than in 1980. The 1981 low water level was about 5.36 feet above the record low of February 1944 of 25.06 feet. When the water-level curve is compared to the cumulative departure curve for precipitation, it becomes apparent how rapid recharge from precipitation accounts for the small-scale fluctuations on the water-level curve. The average water level for the period 1946-81 has fluctuated 3 to 4 feet and indicates no long-term trend.

FULTON COUNTY

334038084262001 Local number, 10DD01.
 LOCATION.—Lat 33°40'38", long 84°26'20", Hydrologic Unit 03130001, Cleveland Avenue, East Point, O'Neill Brothers Warehouse.
 Owner: O'Neill Brothers.
 AQUIFER.—Biotite gneiss.
 WELL CHARACTERISTICS.—Drilled unused industrial water-table well, diameter 10 in., depth 350 ft.
 DATUM.—Altitude of land-surface datum is 1,038 ft.
 Measuring point: At land-surface datum.
 REMARKS.—None.
 PERIOD OF RECORD.—1944 to current year.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 12.10 ft below land-surface datum, May 3, 1964; lowest, 25.06 ft below land-surface datum, February 10, 1944.

Water level, in feet below land surface, monthly mean values through 1973 - periodic measurements, 1973-present

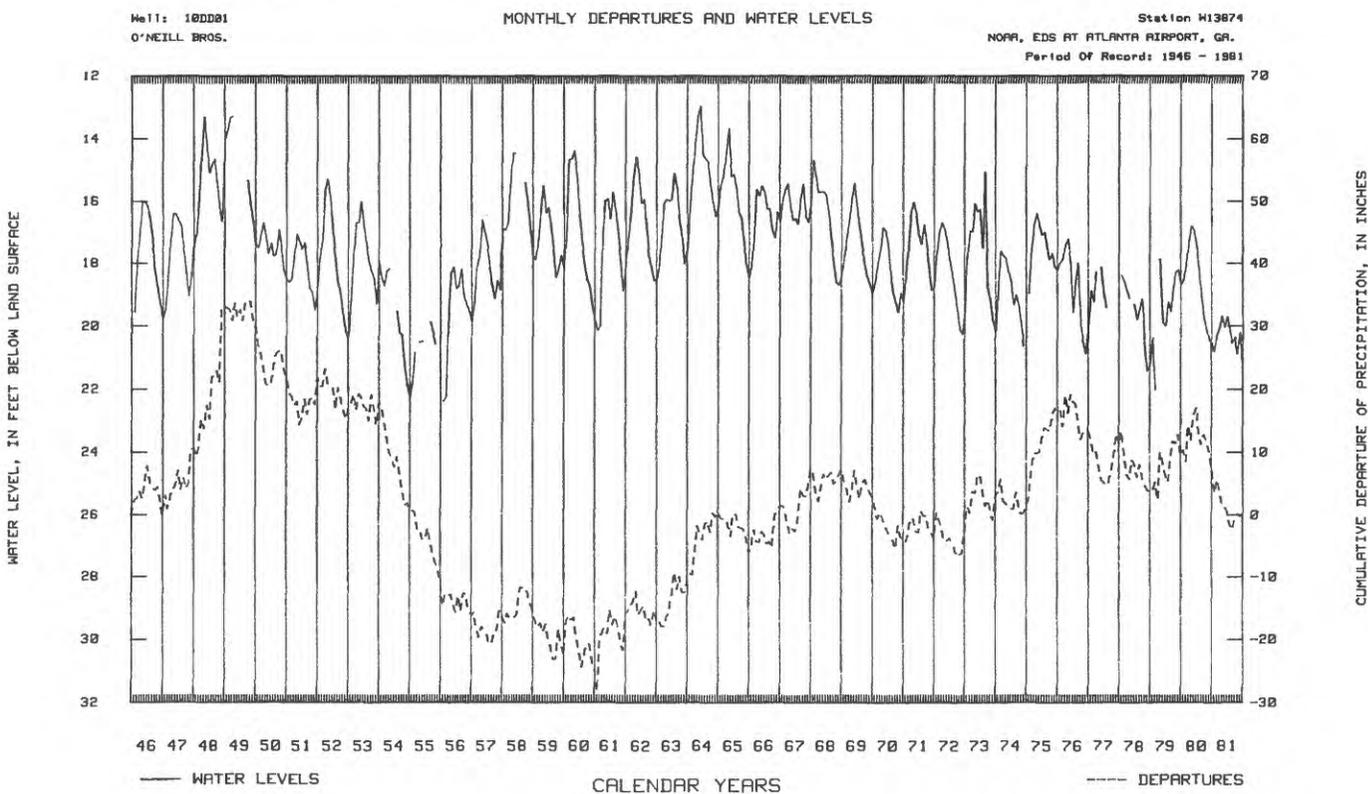


FIGURE 3.5-1.—WATER-LEVEL FLUCTUATIONS IN THE O'NEILL BROTHERS OBSERVATION WELL

Net water-level changes not significant

The mean water level in the Fort McPherson well was 5.09 feet in 1981, or 1.35 feet below the mean for 1980. The 1981 low water level of 6.75 feet in October was only 0.77 foot above the record low of November 1978.

The water level fluctuated about 4 feet during 1981. Rapid recharge from precipitation accounted for sharp water-level rises. This causal relationship is documented in McCollum (1966).

FULTON COUNTY

334207084254801 Local number, 10DD02.
 LOCATION.—Lat 33°42'07", Long 84°25'48", Hydrologic Unit 03130002, 0.25 mi south of main entrance, 260 ft west of Roosevelt Highway.
 Owner: U.S. Army, Ft. McPherson.
 AQUIFER.—Biotite gneiss.
 WELL CHARACTERISTICS.—Drilled unused supply well, diameter 12 in., depth 338 ft, cased to 41 ft, open hole.
 DATUM.—Altitude of land-surface datum is 1,013 ft.
 Measuring point: At land-surface datum.
 REMARKS.—Well pumped and sounded February 14, 1976, to a depth of 338 ft. Borehole geophysical survey conducted November 19, 1974. Interpolated values July 21-August 31.
 PERIOD OF RECORD.—November 1973 to current year.
 EXTREMES FOR PERIOD OF RECORD.—Highest water level, 0.10 ft below land-surface datum, March 30, 1980; lowest, 7.52 ft below land-surface datum, November 8, 1978.

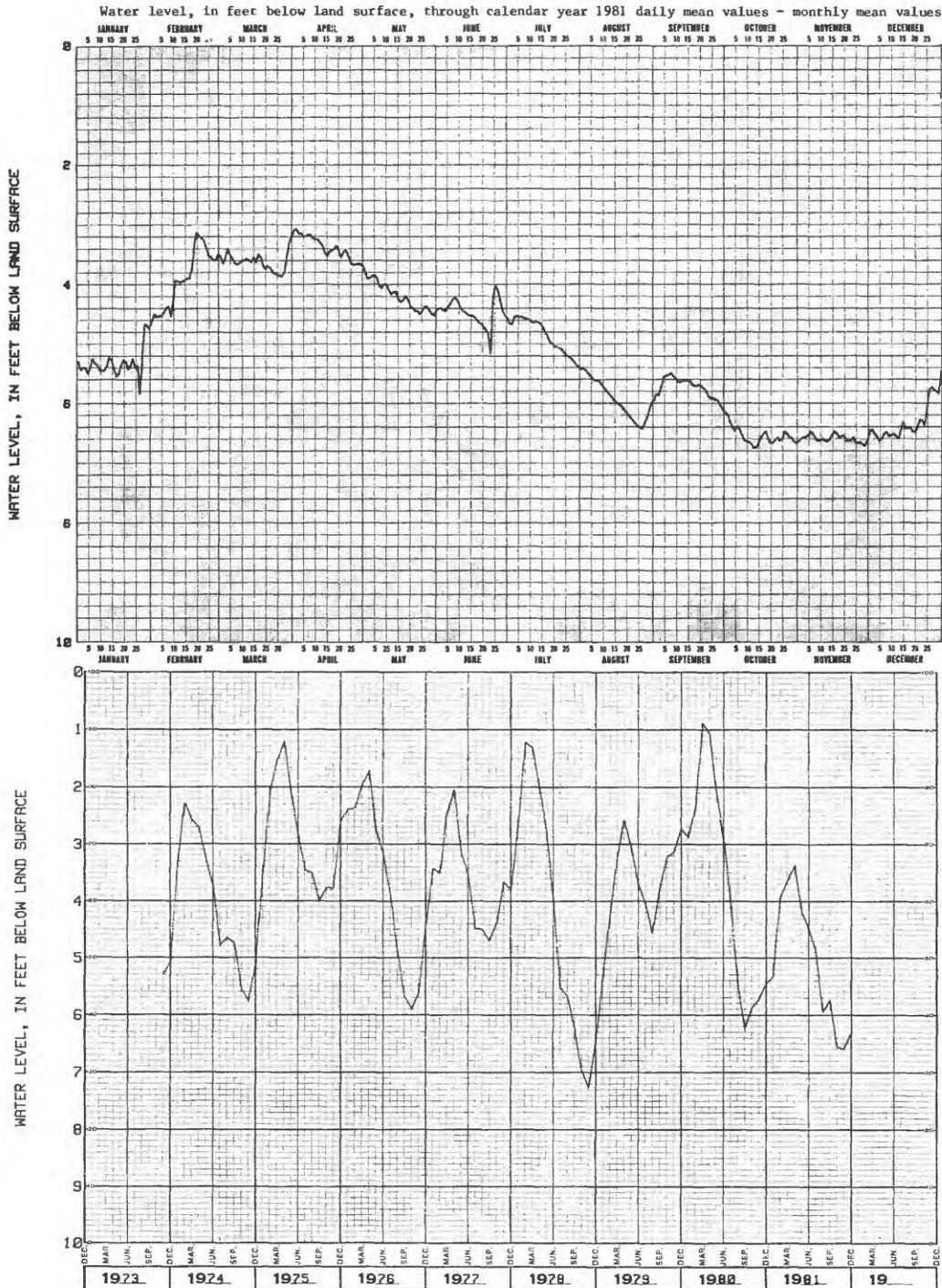


FIGURE 3.5-2.—WATER-LEVEL FLUCTUATIONS IN THE FORT McPHERSON OBSERVATION WELL

Water level responsive to rainfall

In the Dixie Pipeline Co. well, precipitation is the main factor affecting the water level. Heavy rains in February-April caused the sharp water-level rises in the hydrograph. This well is in very porous material underlain by bedrock and shows a marked response to heavy rainfall. The well reached a record low of 15.20 feet in December, or 1.57 feet below the previous record low of December 1970. The 1981 mean water level of 13.0 feet was 3.14 feet below the mean for 1980. The long-term hydrograph covering the entire period of record combined with the cumulative departure curve for precipitation better illustrates the response of water level to rainfall.

LAMAR COUNTY

330858084122901 Local number, 122001.

LOCATION.—Lat 33°08'58", long 84°12'29", Hydrologic Unit 03130005, north of Milner, Ga., at the gas storage center.

Owner: Dixie Pipeline Co.

AQUIFER.—Residuum.

WELL CHARACTERISTICS.—Bored observation well, diameter 24 in., depth 31 ft, cased to 31 ft.

DATUM.—Altitude of land-surface datum is 852 ft.

Measuring point: Floor of recorder shelter, 2.0 ft above land-surface datum.

REMARKS.—None.

PERIOD OF RECORD.—January 1967 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 5.37 ft below land-surface datum, April 9, 1973; lowest, 15.20 ft below land-surface datum, December 1, 1981.

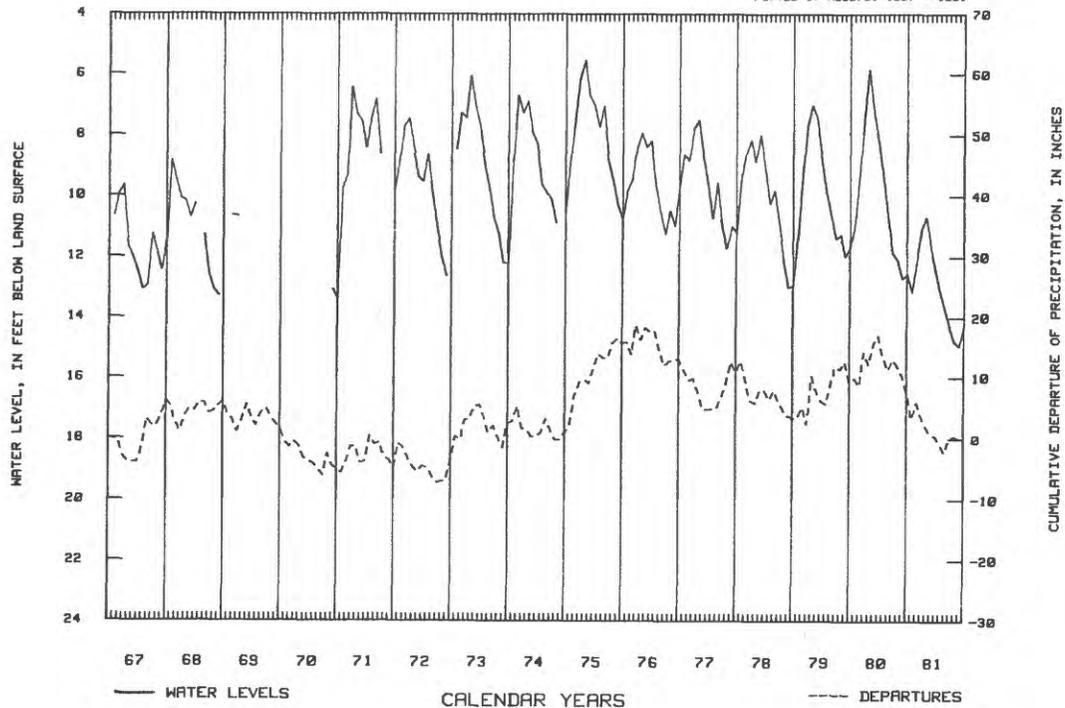
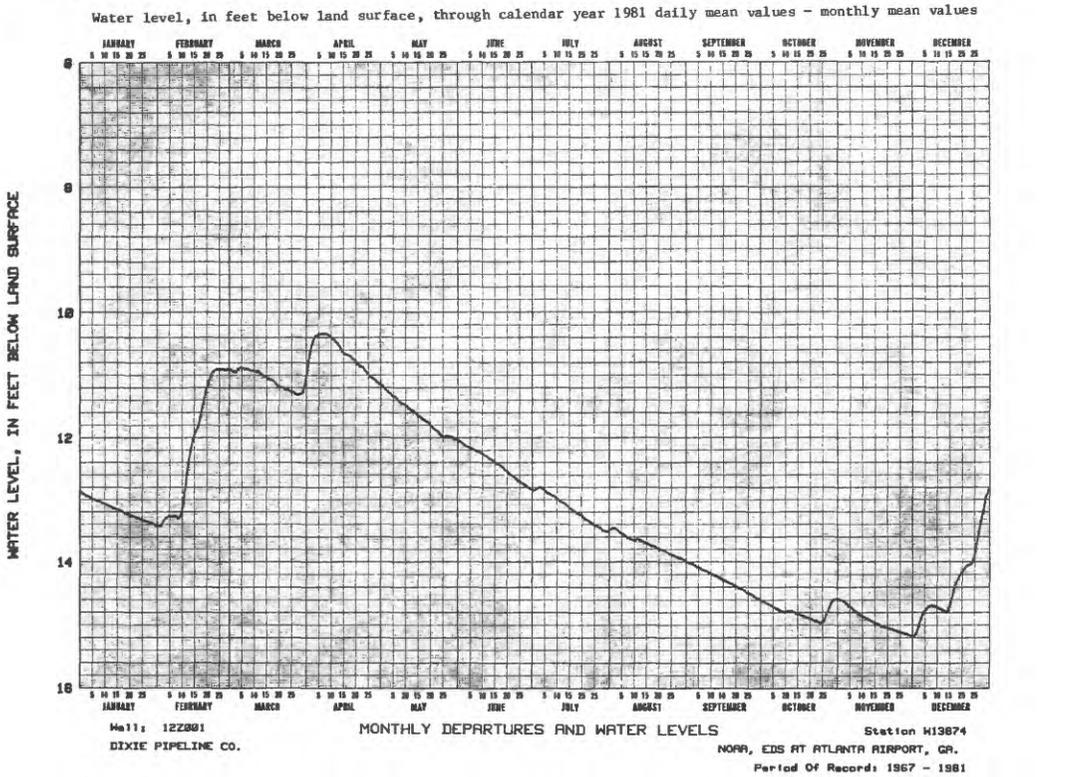


FIGURE 3.5-3.—WATER-LEVEL FLUCTUATIONS IN THE DIXIE PIPELINE CO. OBSERVATION WELL

Record low water level in December

Recharge from precipitation and water lost to evapotranspiration are the main factors controlling water-level fluctuations in the Spalding County observation well. The mean water level for 1981 was 19.2 feet, or 3.8 feet below that for 1980. The well reached a record low of 21.78 feet in December, or 0.70 foot below the previous record low set in December 1943. The mean water-level for the period 1944-81 has been about 15.6 feet.

The long-term hydrograph shows no long-term trend in the water level. However, small-scale fluctuations on the water-level curve correlate with the cumulative departure curve for precipitation, illustrating how rainfall affects this well.

SPALDING COUNTY

331507084171801 Local number, 11AA01.

LOCATION.—Lat 33°15'07", long 84°17'18", Hydrologic Unit 03070103, University of Georgia Experiment Station, Experiment, Ga.

Owner: University of Georgia.

AQUIFER.—Residuum.

WELL CHARACTERISTICS.—Dug unused water-table well, size 4 x 4 ft, depth 30 ft, open hole.

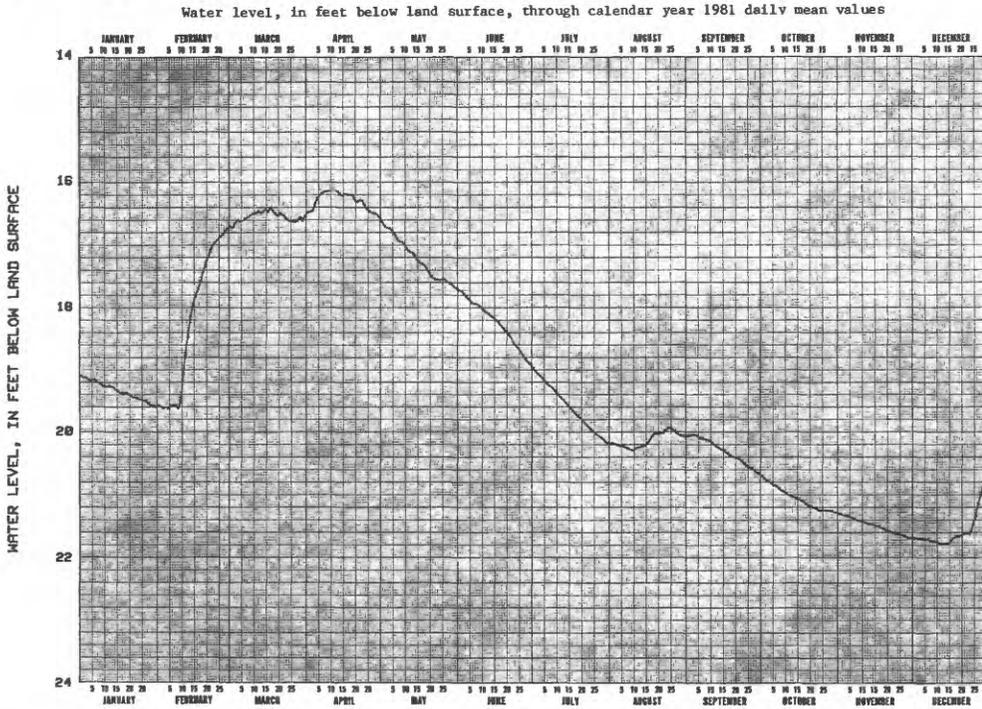
DATUM.—Altitude of land-surface datum is 960 ft.

Measuring point: Hole in floor of recorder shelter, 3.1 ft above land-surface datum.

REMARKS.—None.

PERIOD OF RECORD.—October 1943 to current year.

EXTREMES FOR PERIOD OF RECORD.—Highest water level, 8.26 ft below land-surface datum, March 19, 1948; lowest, 21.78 ft below land-surface datum, December 13, 1981.



Well: 11A881
UNIV GA EXP STA

MONTHLY DEPARTURES AND WATER LEVELS

Station W13874
NOAA, EDS AT ATLANTA AIRPORT, GA.
Period of Record: 1944 - 1981

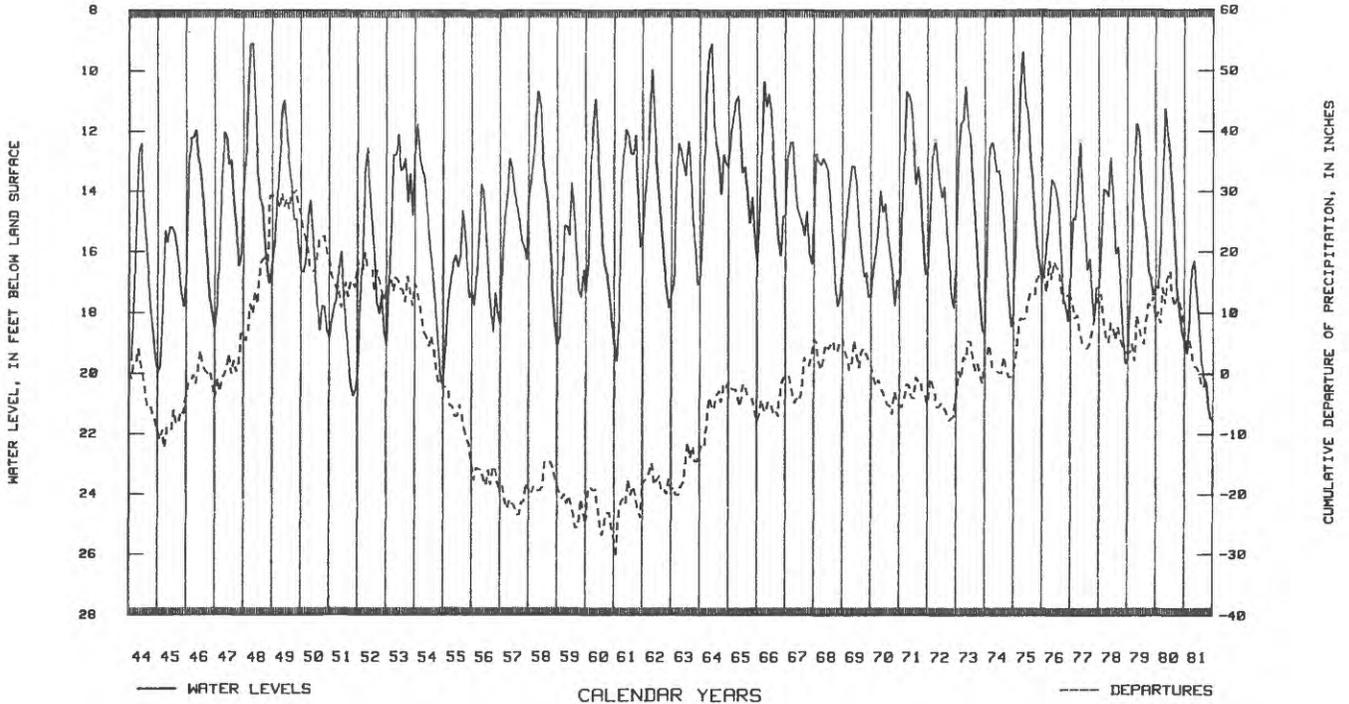


FIGURE 3.5-4.—WATER-LEVEL FLUCTUATIONS IN THE SPALDING COUNTY OBSERVATION WELL

4.0 GROUND-WATER QUALITY NETWORKS

Water-quality samples are collected periodically throughout Georgia and analyzed as part of areal and regional ground-water studies. Wells in the water-level monitoring networks also are pumped and sampled periodically to note any changes in water quality that may occur in the various aquifers of the State.

Where water-quality problems are noted, or are considered likely to occur, samples are collected more frequently and analyzed for water-quality constituents indicative of the problem. Streams are also sampled for water quality in those areas where the stream water, sometimes polluted, recharges an aquifer. Large withdrawals of ground water often induce water-quality problems that might not have otherwise occurred. However, water-quality problems exist in Georgia that do not seem to be related to pumpage.

4.1 Savannah Area

Ground-water pumpage, now totaling approximately 80 million gallons per day in the Savannah area, has lowered the artesian water level in the principal artesian aquifer by as much as 130 feet since pumping began in the late 1800's. This head decrease has caused no significant increase in chloride concentration in the principal artesian aquifer monitored during the past 20 years. The brackish-water zones underlying the principal artesian aquifer contain water having a maximum concentration of about 13,000 mg/L (milligrams per liter) of chloride. These zones have been monitored for chloride concentration since the late 1950's; 12 wells in the Savannah area are pumped and sampled monthly for chloride analysis. Chloride is indicative of brackish-water contamination and is readily analyzed in the field.

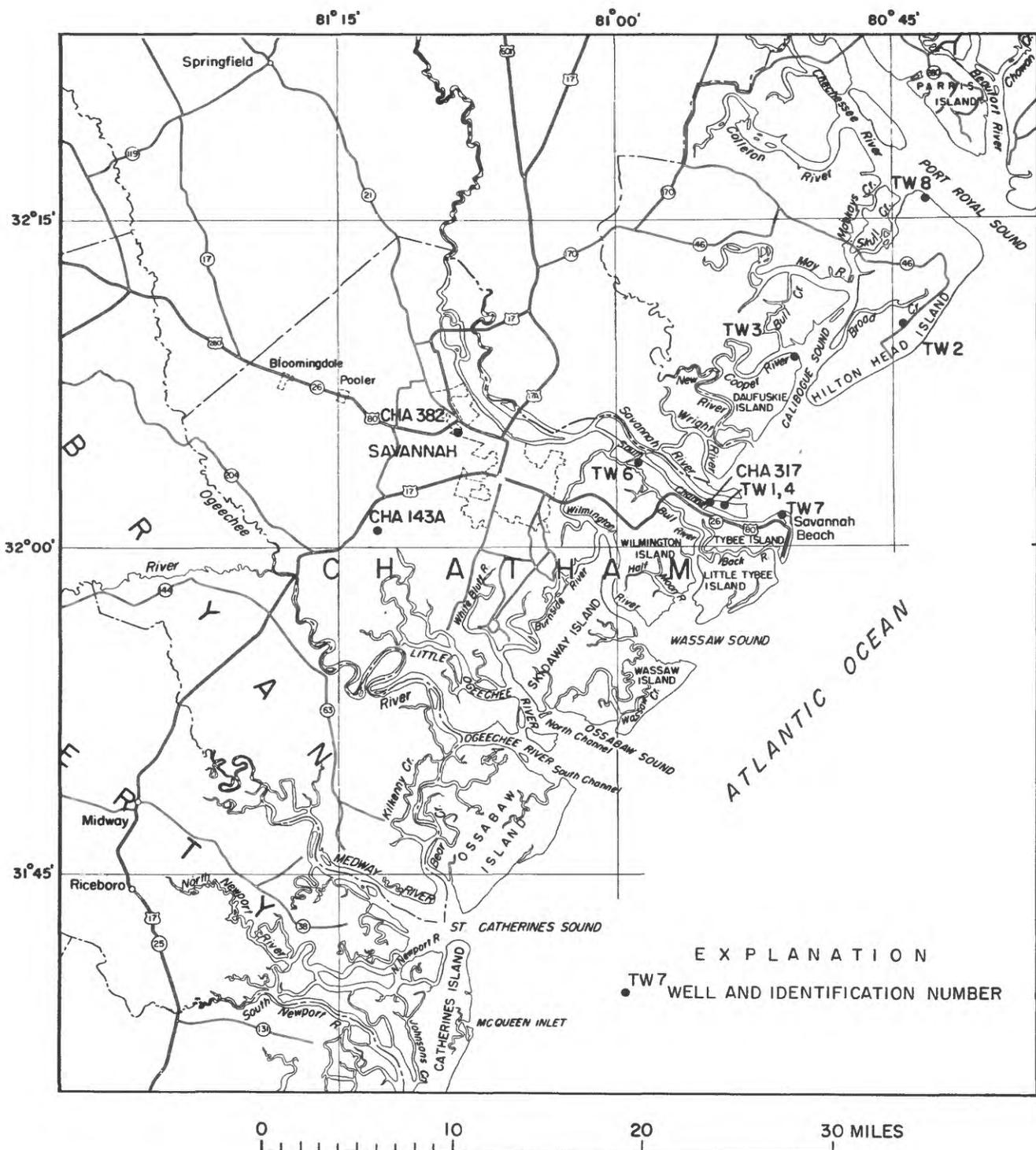


FIGURE 4.1-1.—CHLORIDE-MONITORING NETWORK IN THE SAVANNAH AREA

Chloride concentrations remain stable in the Savannah area

Chloride concentrations in test wells tapping the brackish-water zones beneath the principal artesian aquifer in the Savannah area have remained stable for the past 20 years. A slight decrease in chloride concentration was recorded during 1981 in the deepest brackish-water zone (test well 2, PT 1). All other chloride concentrations in the various zones of test wells 1 and 2 have remained fairly stable, as evidenced by the 10-year graphs.

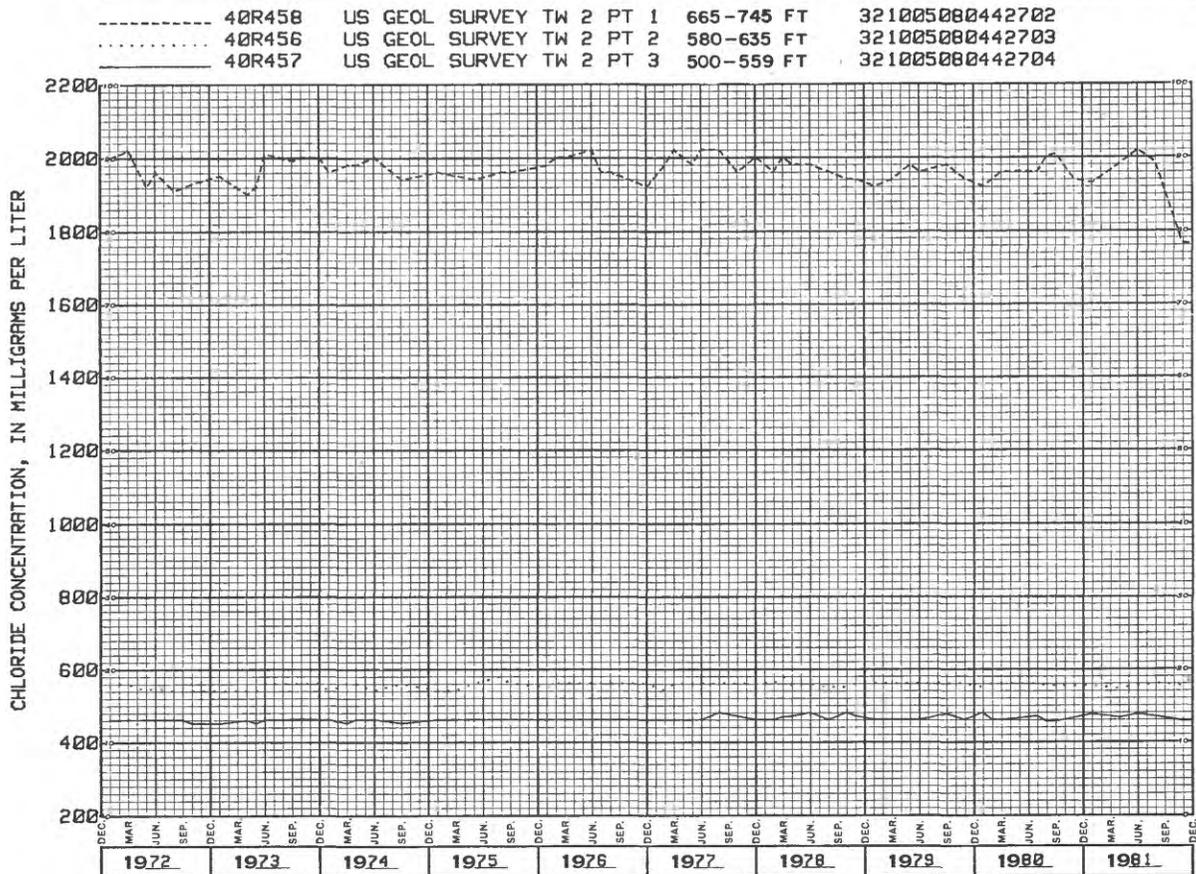
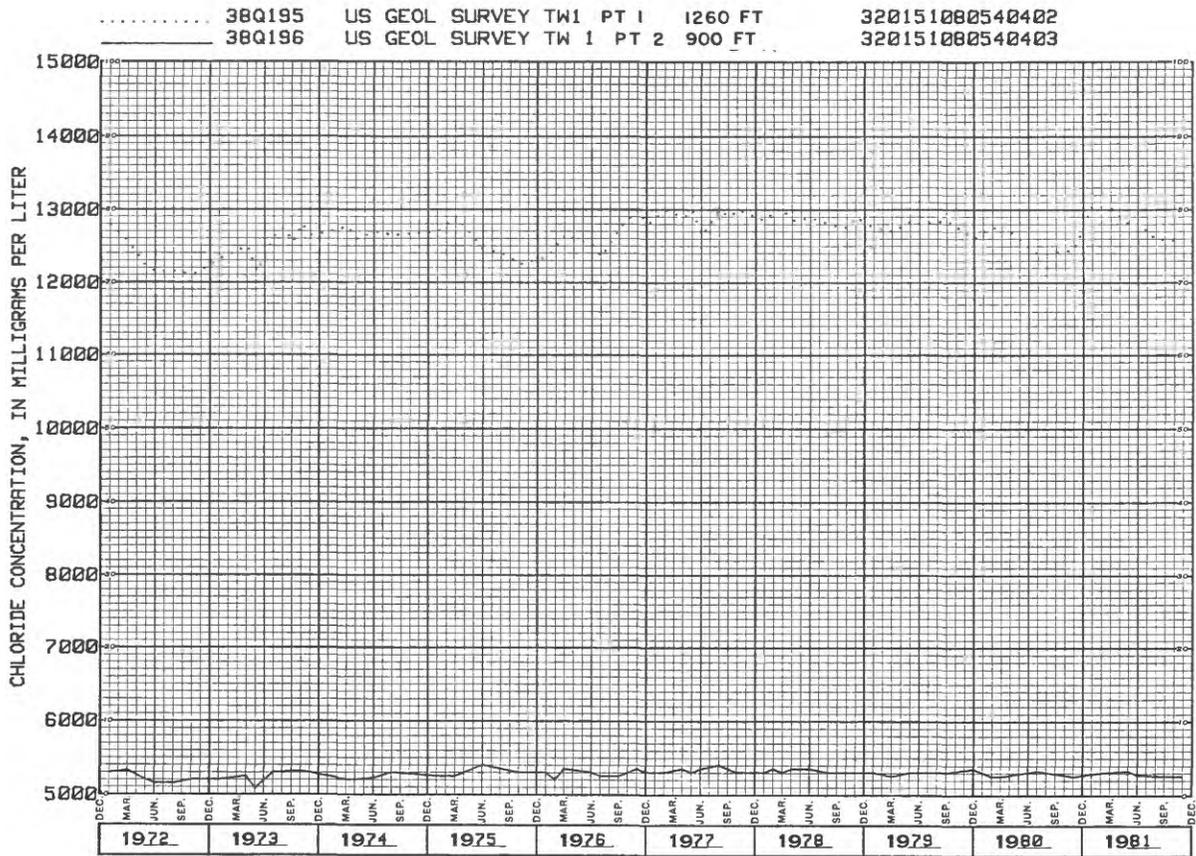


FIGURE 4.1-2.—CHLORIDE CONCENTRATIONS IN SAVANNAH AREA TEST WELLS 1 AND 2

Chloride concentrations continue to rise

Chloride concentrations in test well 8 at Hilton Head Island continued to rise during 1981. The chloride concentration in the lower part of the principal artesian aquifer (test well 8 PT 1) has risen only slightly over the 10-year period shown on the long-term graph. The chloride concentration below 200 feet in test well 8 PT 2 has risen significantly since 1978. This increase may indicate movement of brackish water in the principal artesian aquifer in response to increases in pumpage. There are, however, no data to indicate that there has been any increase in chloride in the upper part of the aquifer where municipal supplies are withdrawn.

..... 40S316 US GEOL SURVEY TW 8 PT 1 450-483 FT 32155800431302
 _____ 40S317 US GEOL SURVEY TW 8 PT 2 150-410 FT 32155800431303

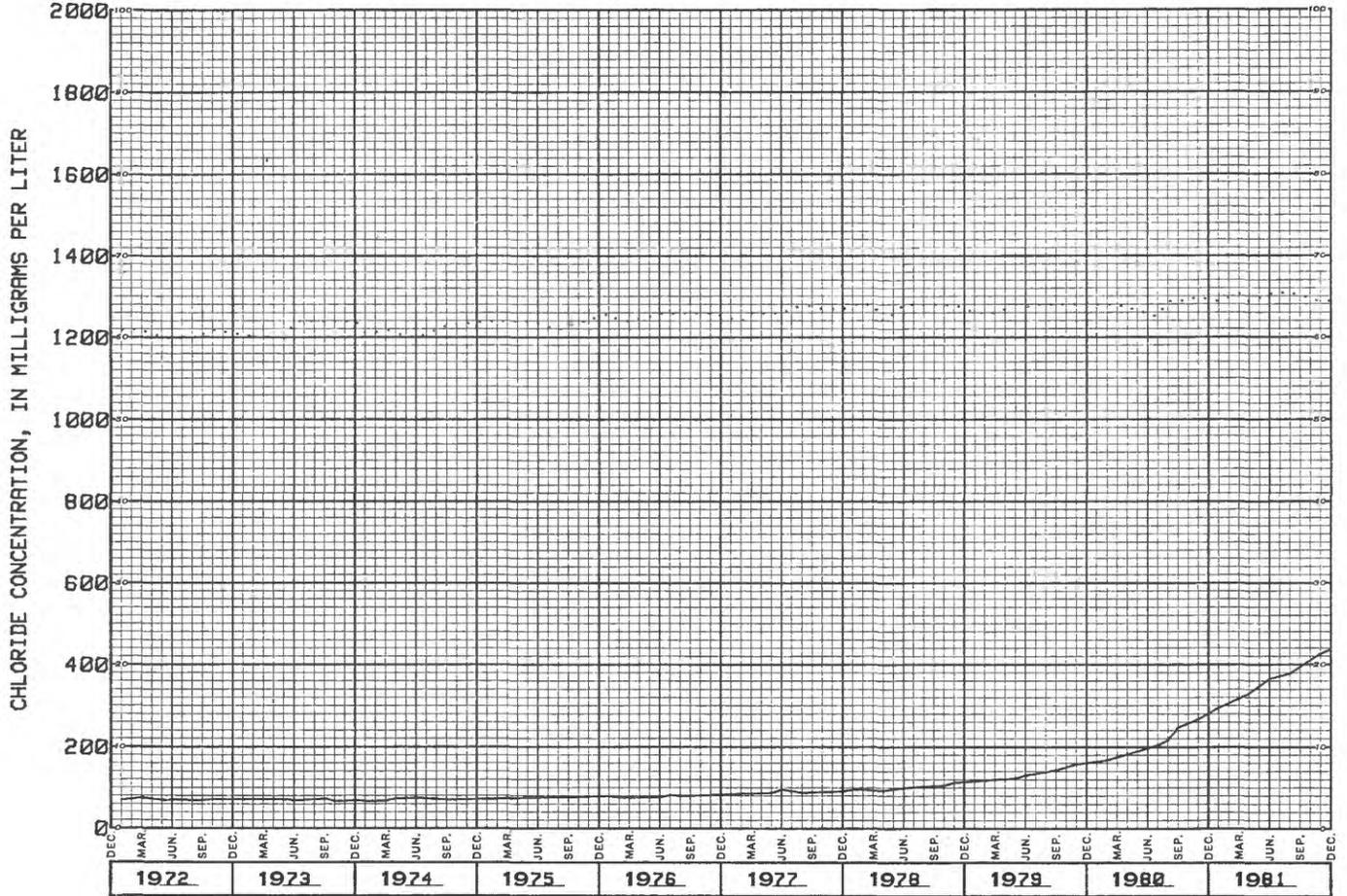


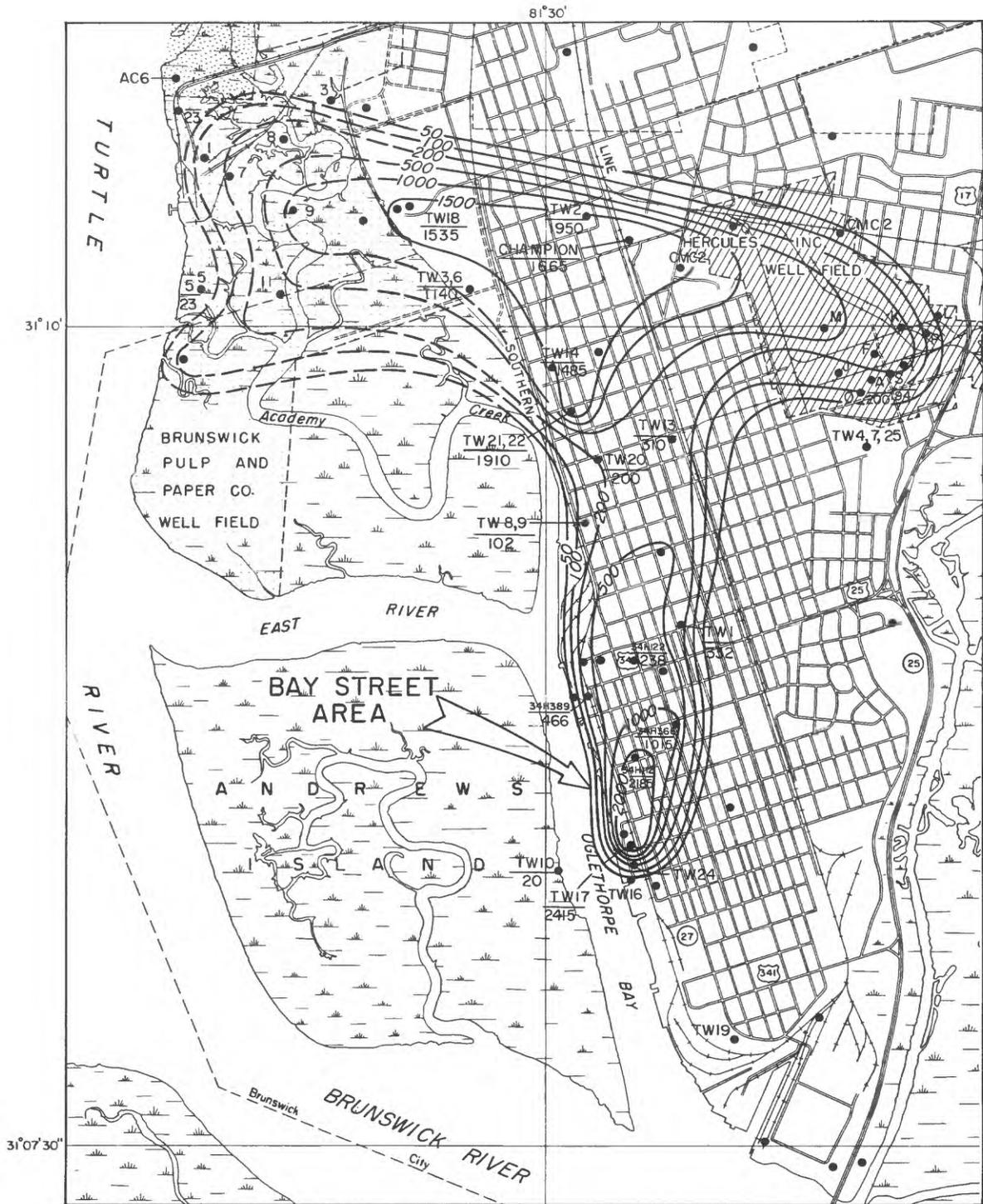
FIGURE 4.1-3.—CHLORIDE CONCENTRATIONS IN THE HILTON HEAD ISLAND AREA

4.2 Brunswick area

Since pumping began in the late 1800's, ground-water withdrawal, now totaling over 105 million gallons per day in the Brunswick area of Glynn County, has lowered the artesian water level in the principal artesian aquifer by as much as 25 to 65 feet. This head decrease has allowed brackish water from underlying formations to migrate into the aquifer at three locations in Brunswick and move downgradient toward the centers of pumpage.

The brackish water underlying the aquifer in the Brunswick area has a chloride concentration of more than 6,000 mg/L. At two locations in Brunswick, the chloride concentration in the principal artesian aquifer has risen to almost 2,000 mg/L, and in one location the chloride concentration is more than 2,400 mg/L.

One hundred wells in Glynn County, mostly in the Brunswick area, are pumped and sampled periodically for chloride analysis.



Base from U.S. Geological Survey Brunswick East 1:24,000, 1956, Brunswick West 1:24,000, 1956, Dover Bluff 1:24,000, 1961, and Jekyll Island 1:24,000, 1957



E X P L A N A T I O N

- 1000 — LINE OF EQUAL CHLORIDE CONCENTRATION — Interval varies, in milligrams per liter
- TW 1 / 332 DATA POINT — Top number is well identification; bottom number is chloride concentration in milligrams per liter

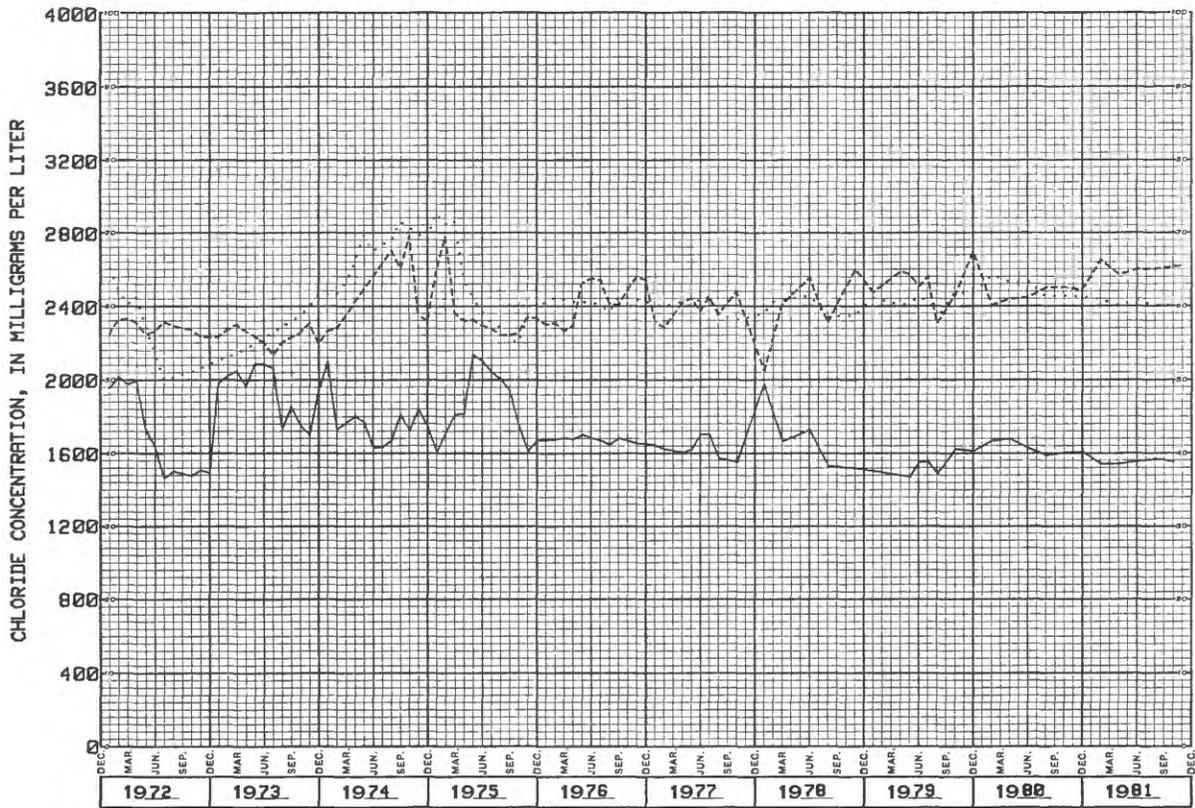
FIGURE 4.2-1.—CHLORIDE CONCENTRATIONS, PRINCIPAL ARTESIAN AQUIFER, BRUNSWICK AREA, SEPTEMBER-OCTOBER 1981

Chloride concentration responds to pumpage

Chloride concentrations in the Bay Street area are responsive to local pumpage. The upper hydrograph shows an increase in chloride concentration for the years 1974-75. This corresponds to a period of increased pumpage in that area.

Test well 17 (depth 723 ft) taps the upper part of the principal artesian aquifer in the Bay Street area. This well had a chloride concentration of about 2,400 mg/L. Test well 24 (depth 982 ft) is in the lower part of the aquifer and yields water containing about 1,570 mg/L chloride. Test well 16 (depth 1,159 ft) taps the brackish-water zone beneath the principal artesian aquifer and yields water having a chloride concentration of about 2,600 mg/L. Test well 19 (depth 1,218 ft) also taps the brackish-water zone and has shown a steady increase in chloride concentration since 1969. The concentration at the end of 1981 was about 6,760 mg/L, an increase of about 2,070 mg/L since 1972. This indicates that saltwater is invading the brackish-water zone from a deeper source in the cavernous limestone (H. E. Gill, U.S. Geological Survey, oral commun., 1979; Gregg and Zimmerman, 1974).

- - - - - 34H391 US GEOL SURVEY, TW 16 1159 FT 310818081294201
 ······ 34H393 US GEOL SURVEY, TW 17 723 FT 310825081294201
 _____ 34H403 US GEOL SURVEY, TW 24 982 FT 310822081294201



_____ 34H399 US GEOL SURVEY, TW 19 1218 FT 310750081292001

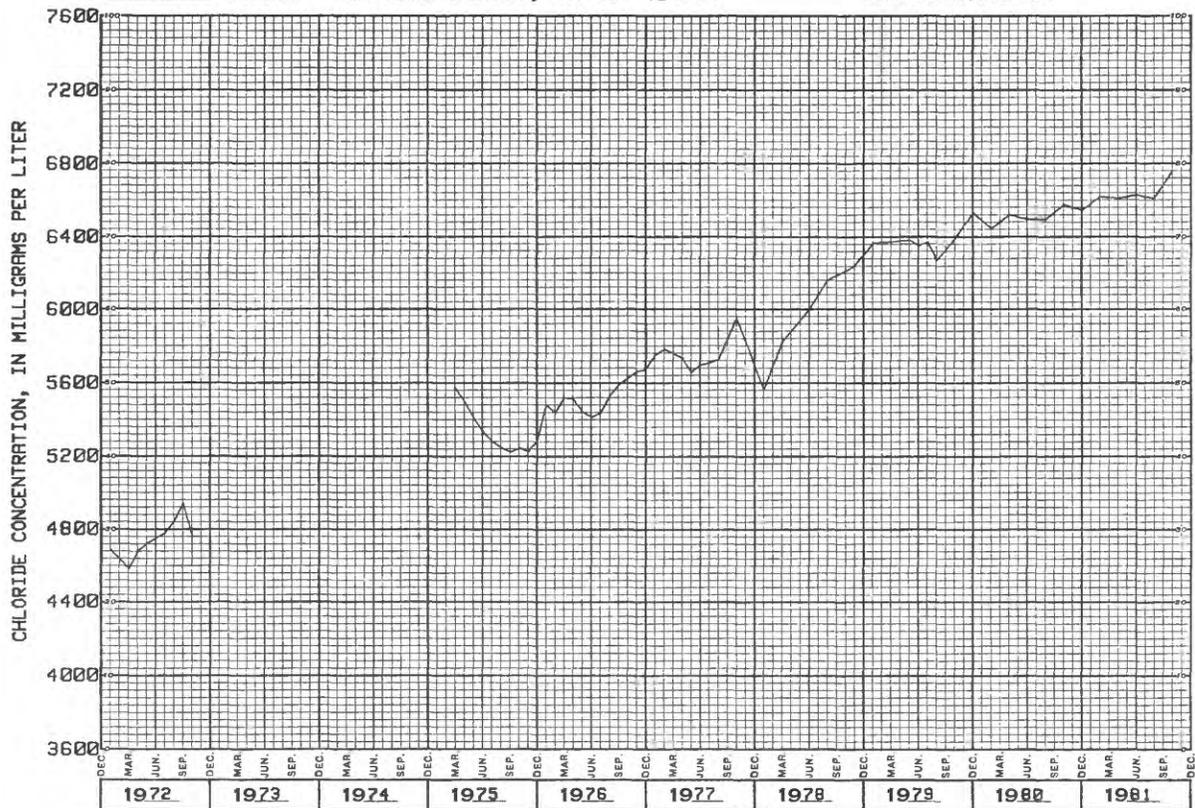


FIGURE 4.2-2.—CHLORIDE CONCENTRATIONS IN WELLS IN THE BAY STREET AREA

.Chloride concentrations continue to rise in north Brunswick

Chloride concentrations continued to rise in the north Brunswick area during 1981. Since 1973 there has been a sharp increase in chloride concentration in test well 2. This increase indicates a new point of brackish-water leakage into the principal artesian aquifer. Test well 3 has remained fairly stable for the last 10-year period. Test well 6 has experienced a sharp increase in the chloride concentration for 1980-81. The Champion well has shown several fluctuations in the chloride concentration in the past, and it is difficult to determine if the decrease in chloride concentration at the end of 1981 is temporary or long term.

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