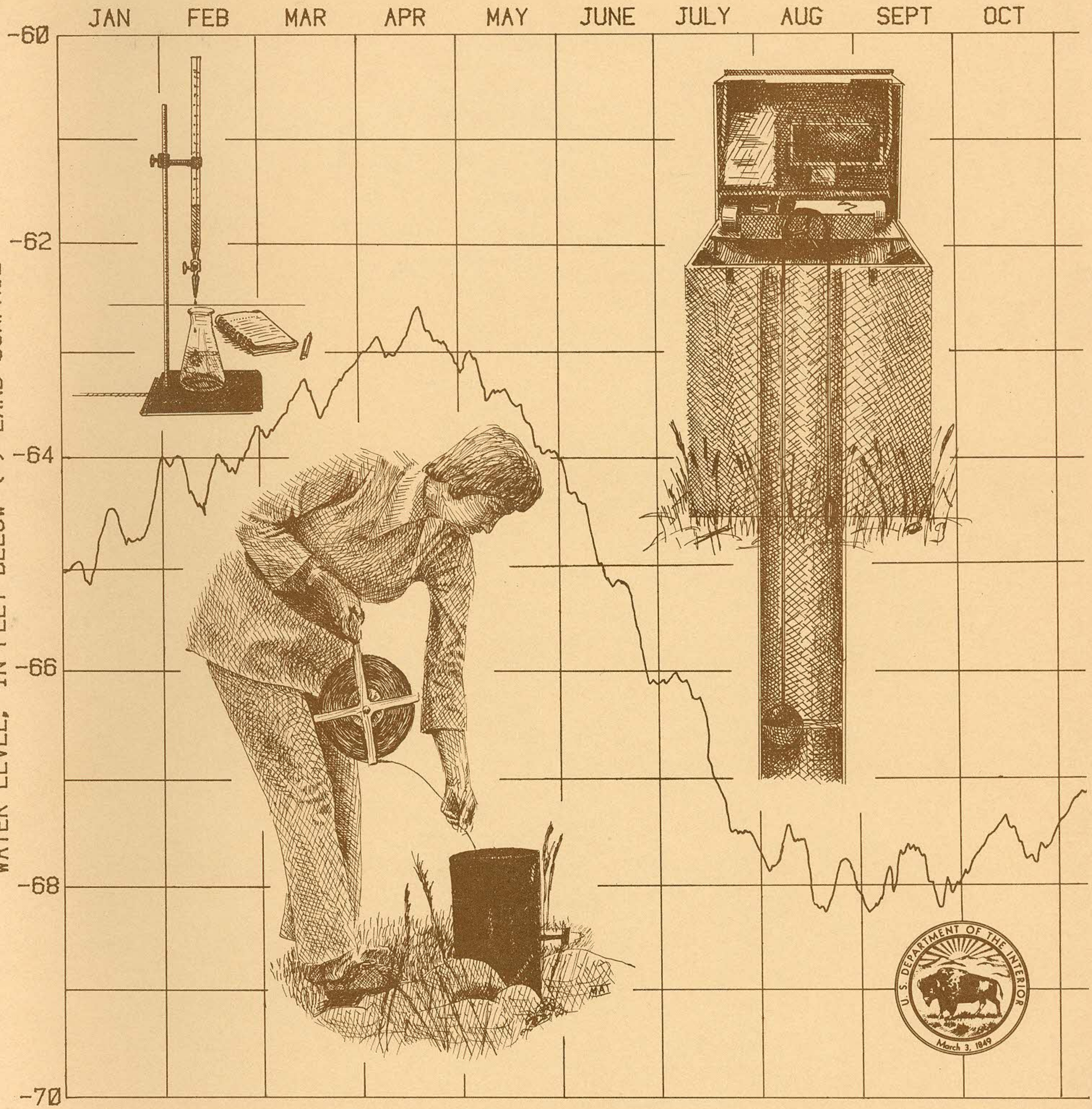
C.N. JOINER

GROUND-WATER LEVELS AND QUALITY DATA FOR GEORGIA, 1977



Open-File Report 79-213

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GROUND-WATER LEVELS AND QUALITY DATA

FOR GEORGIA, 1977

Open-File Report 79-213

Prepared in cooperation with the
Georgia Department of Natural Resources
Geologic and Water Resources Division

Doraville, Georgia

October 1978

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

Open-File Report 79-213

For additional information write to:

U.S. Geological Survey
Suite B
6481 Peachtree Industrial Boulevard
Doraville, Georgia 30360

PREFACE

This report was prepared by personnel of the Georgia District of the Water Resources Division of the U.S. Geological Survey. It was done 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.

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

Multiply inch-pound units	By	To obtain SI units
Foot (ft)	0.3048	meter (m)
Gallon per minute (gal/min)	0.06309	liter per second (L/s)
Million gallon per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
	28.32	liter per second (L/s)
Specific capacity		
Gallon per minute per foot of drawdown [(gal/min)/ft]	0.207	liter per second per meter [(L/s)/m]
Transmissivity		
Foot squared per day (ft^2/s)	0.0929	meter squared per day (m^2/d)

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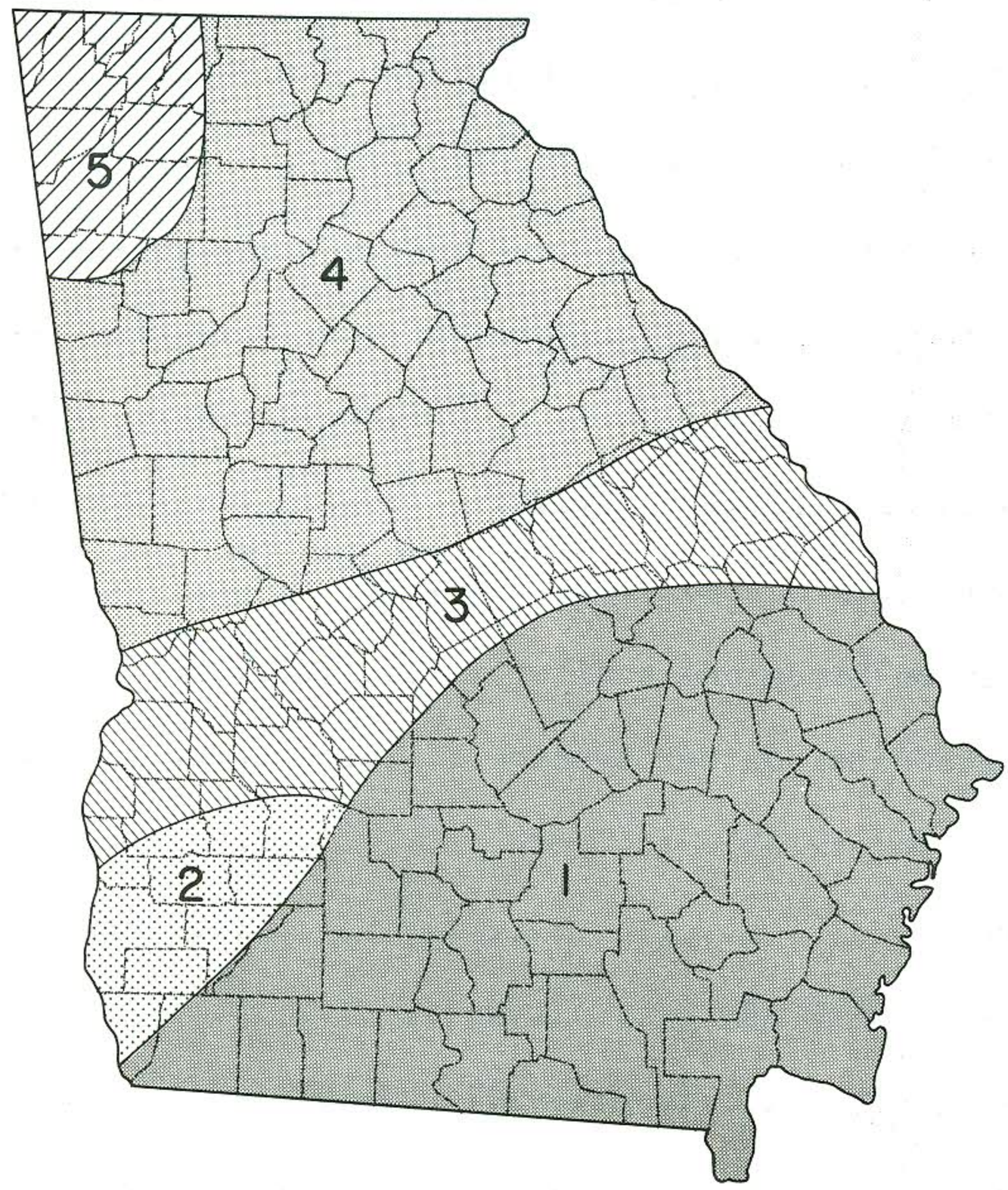


RESERVOIRS AND WELL YIELDS

5

Massive dolomite—yields 5–50 gpm, maximum reported yield 1000 gpm. Limestone, sandstone, mudstone, chert—yields 1–20 gpm, maximum reported yield 50–300 gpm

4

Principally granite, gneiss, and metasediments—yields 1–25 gpm, maximum reported yield 400 gpm

3

Sand and gravel—yields 50–1200 gpm, maximum reported yield 1800 gpm (Cretaceous)

2

Sand and limestone — yields 250–600 gpm, maximum reported yield 1400 gpm (Clayton Limestone—lower Tertiary)

1

Limestone and sand—yields 1000–5000 gpm, maximum reported yield 11,000 gpm (principal artesian aquifer)

GROUND WATER RESERVOIRS

1.0 INTRODUCTION

A New Format, Combining Text and Graphics in Two-Page Units

This report begins a publication format that will present annually both water-level and water-quality data. In this format the information is presented in two-page units: the left page includes 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 for the monthly mean water level the previous 10 years for 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 ground-water levels is essential to the understanding of storage changes and other changes in a ground-water reservoir. Fluctuations and long-term trends in water levels occur as a result of recharge to and discharge from the reservoir, or aquifer. 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 the data gathered 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 often large amount of time between the data collection and publication of the data. 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.

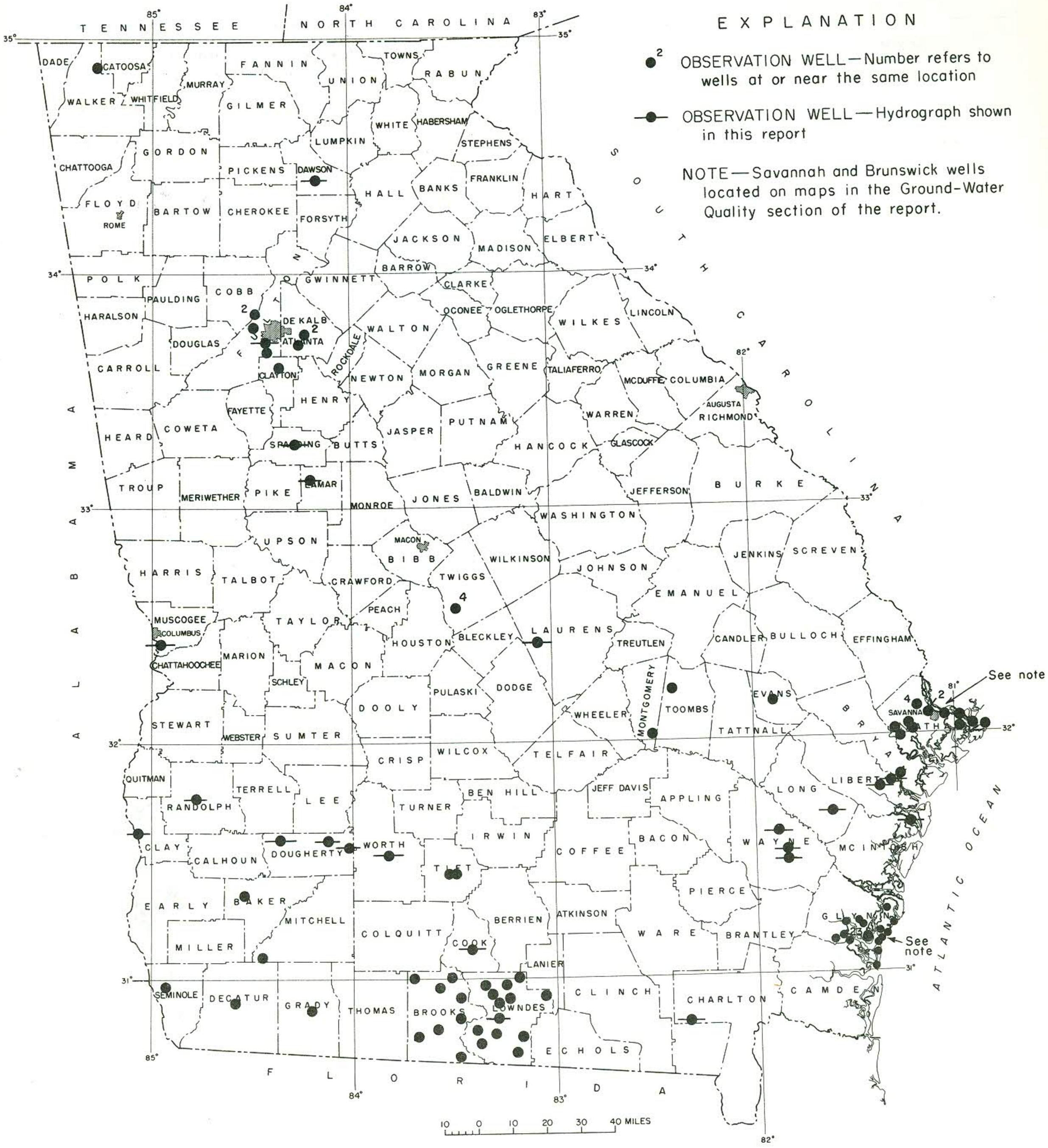
2.0 WATER-LEVEL MEASUREMENT PROGRAM, 1977

More than 2,000 water-level measurements made in Georgia in 1977 provided the basic data for this report.

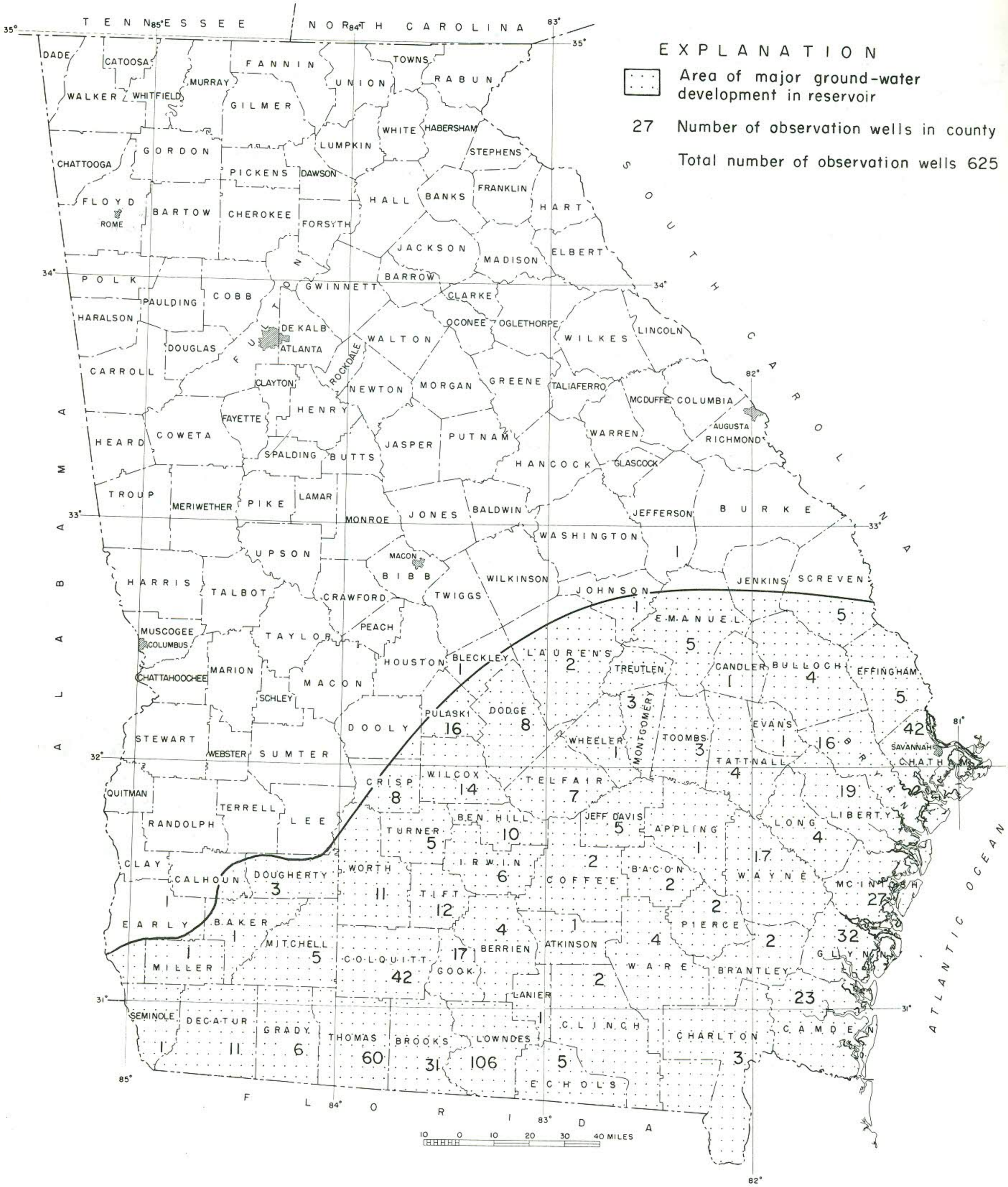
2.1 Locations of Observation Wells and Availability of Data

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 inaugurated 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.

Additional 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 for the principal artesian aquifer and 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.



Location of observation wells showing long-term trends in water levels



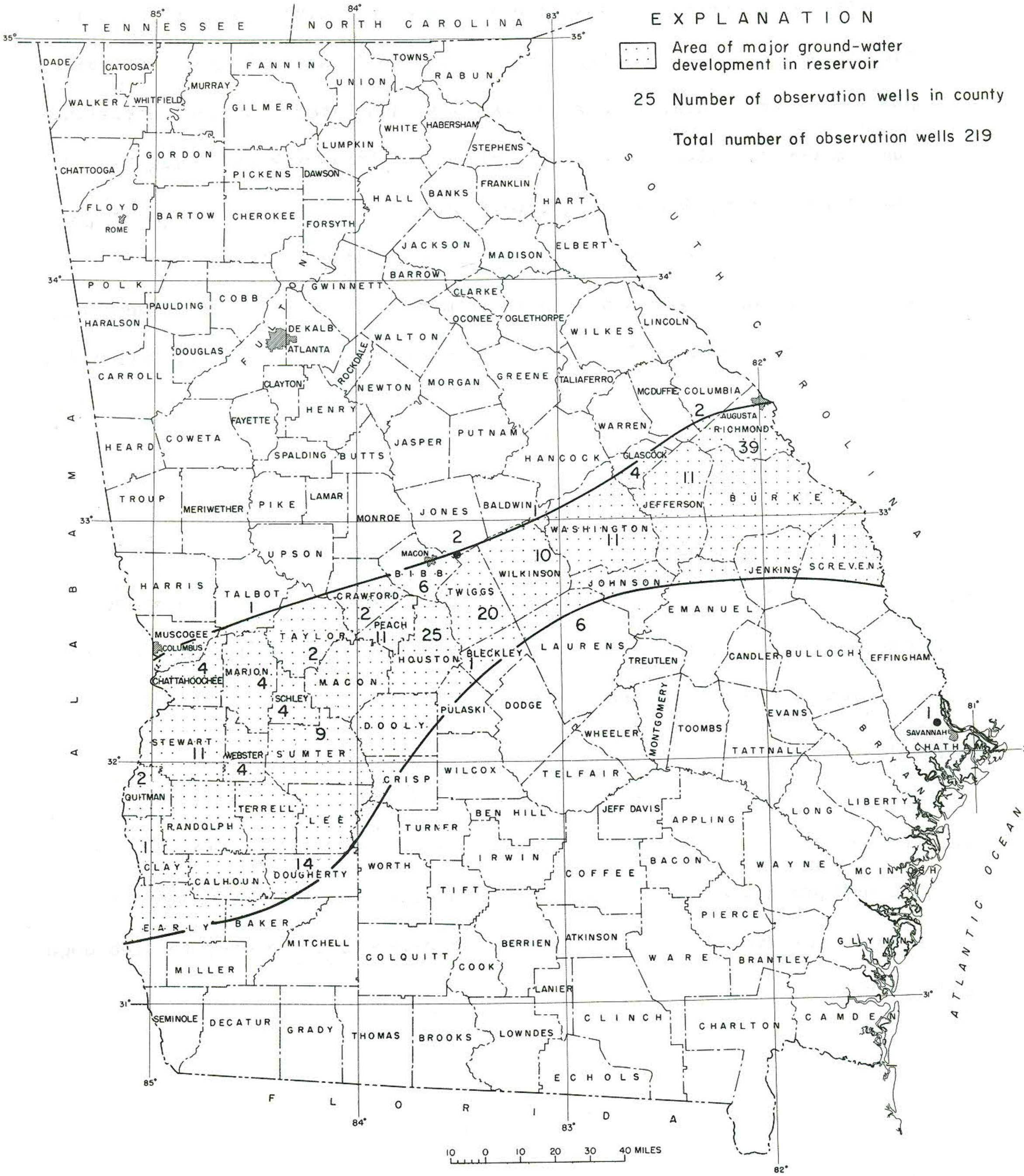
EXPLANATION

Area of major ground-water development in reservoir

27 Number of observation wells in county

Total number of observation wells 625

Ground—water level network for reservoir I (principal artesian aquifer)



Ground-water level network for reservoir 3 (Cretaceous aquifer system).

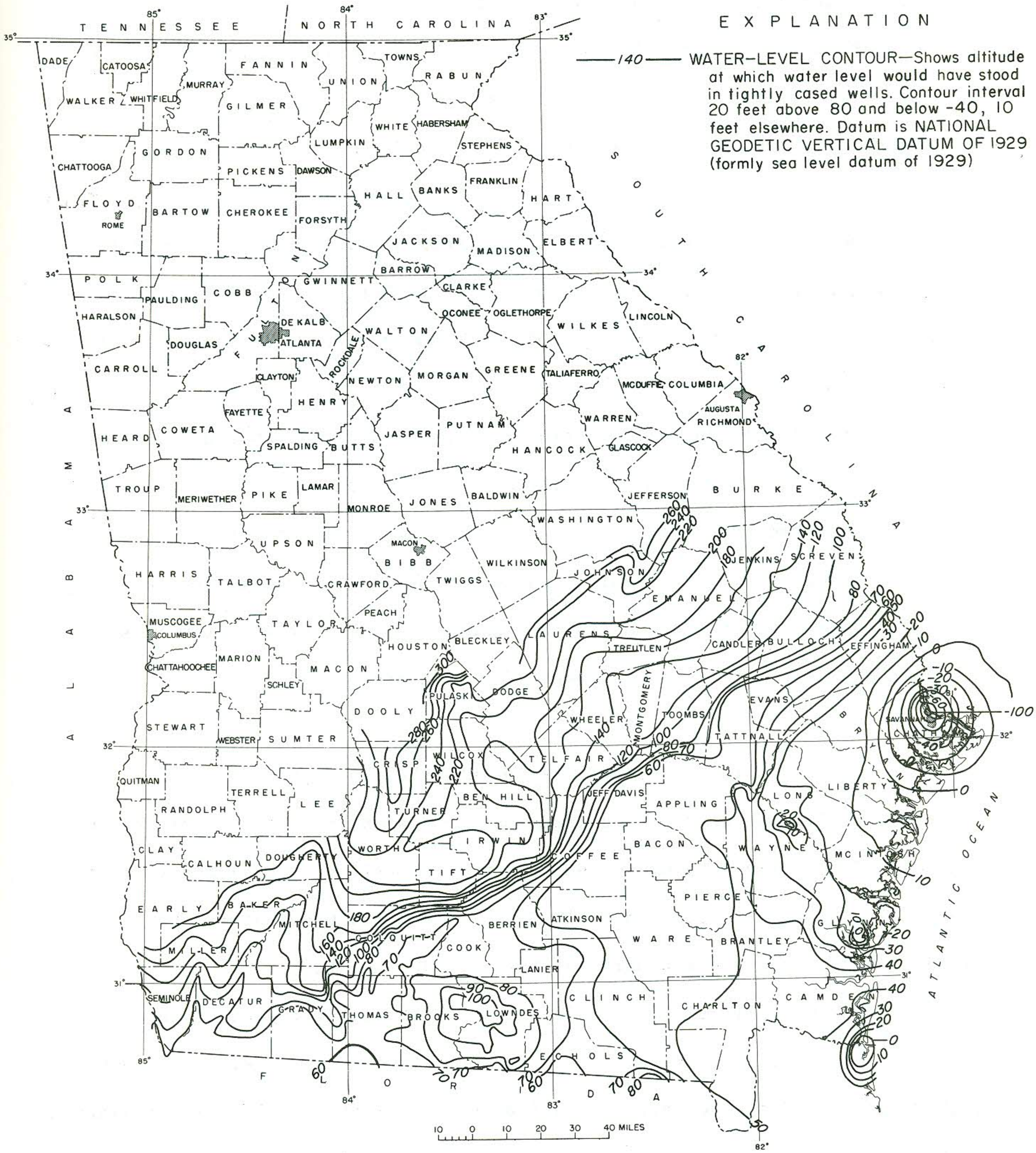
The cooperation and assistance of the following agencies in collecting water-level data during 1977 is gratefully acknowledged: Georgia Department of Natural Resources, Geologic and Water Resources Division; Chatham County; Glynn County; the cities of Brunswick and Valdosta; and the Albany Water, Gas and Light Commission.

Records of all water-level measurements made in these observation wells may be obtained upon request from the U.S. Geological Survey, Water Resources Division, 6481 Peachtree Industrial Blvd., Suite B, Doraville, GA 30360.

3.0 CHANGES IN WATER LEVELS, 1977

One of the most publicized droughts since 1954-55 occurred in Georgia in 1977. Low precipitation, chiefly in the growing season, created a severe agricultural drought. Ground-water levels declined as a result of the lack of recharge from precipitation and the increased withdrawal of ground water for irrigation.

Mean annual water levels were generally lower in 1977 than in at least the previous 2 to 3 years and in some areas were the lowest of record. However, normal precipitation in the autumn and winter of 1977 recharged the ground-water reservoirs, enabling ground-water levels to recover to predrought conditions.



Water-level in reservoir 1 (principal artesian aquifer) in Georgia, January-May 1976.

3.1 Regional Principal Artesian Aquifer

The principal artesian aquifer is one of the most prolific ground-water reservoirs in the United States. Over 300 million gallons of water per day are pumped from the aquifer in Georgia, mostly for industrial use.

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. Thus, water levels are commonly above land surface in wells tapping the aquifer.

Water levels in wells tapping the principal artesian aquifer fluctuate seasonally in response to recharge from streamflow, and hence to precipitation and evapotranspiration near the areas of outcrop. Away from outcrop areas where the aquifer is deeply buried, seasonal fluctuations relating to recharge are less pronounced; ground-water withdrawal is the chief cause of water-level changes in these areas.

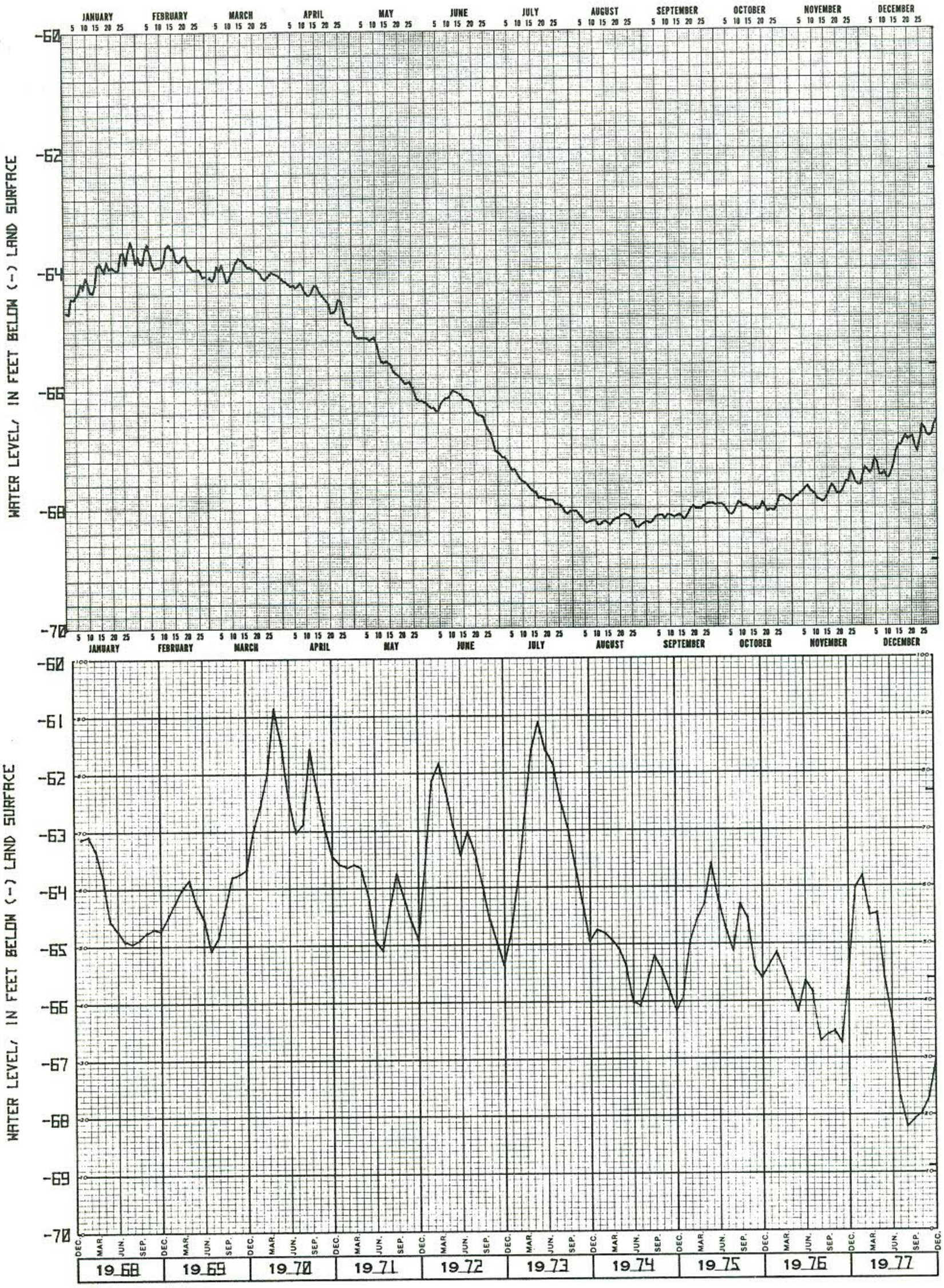
Record low water level established in August

A record low was established in August 1977 when the water level in USGS test well OK 8 declined to 68.34 feet below land surface. The largest fluctuation in a single year occurred in 1977 as the monthly mean water level declined from 63.8 feet in February to 68.2 feet in August.

Although the well is a great distance from the outcrop area of the principal artesian aquifer, seasonal fluctuations in the water level occur that roughly correspond to precipitation and evapotranspiration. This is probably due to the effects of vertical leakage from the Okefenokee Swamp to the aquifer.

3049430822137.01 Local number, 049 0001.
LOCATION.--Lat 30°49'43", long 82°21'37", Hydrologic Unit 03110201, end of Georgia Highway 117 east of Stephen K. 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 and sounded June 15, 1976, to a depth of 484 ft, well open to aquifer below obstruction.
PERIOD OF RECORD.--May 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 58.75 ft below land-surface datum, June 17, 1966; lowest, 68.34 ft below land-surface datum, August 28, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in test well OK 8

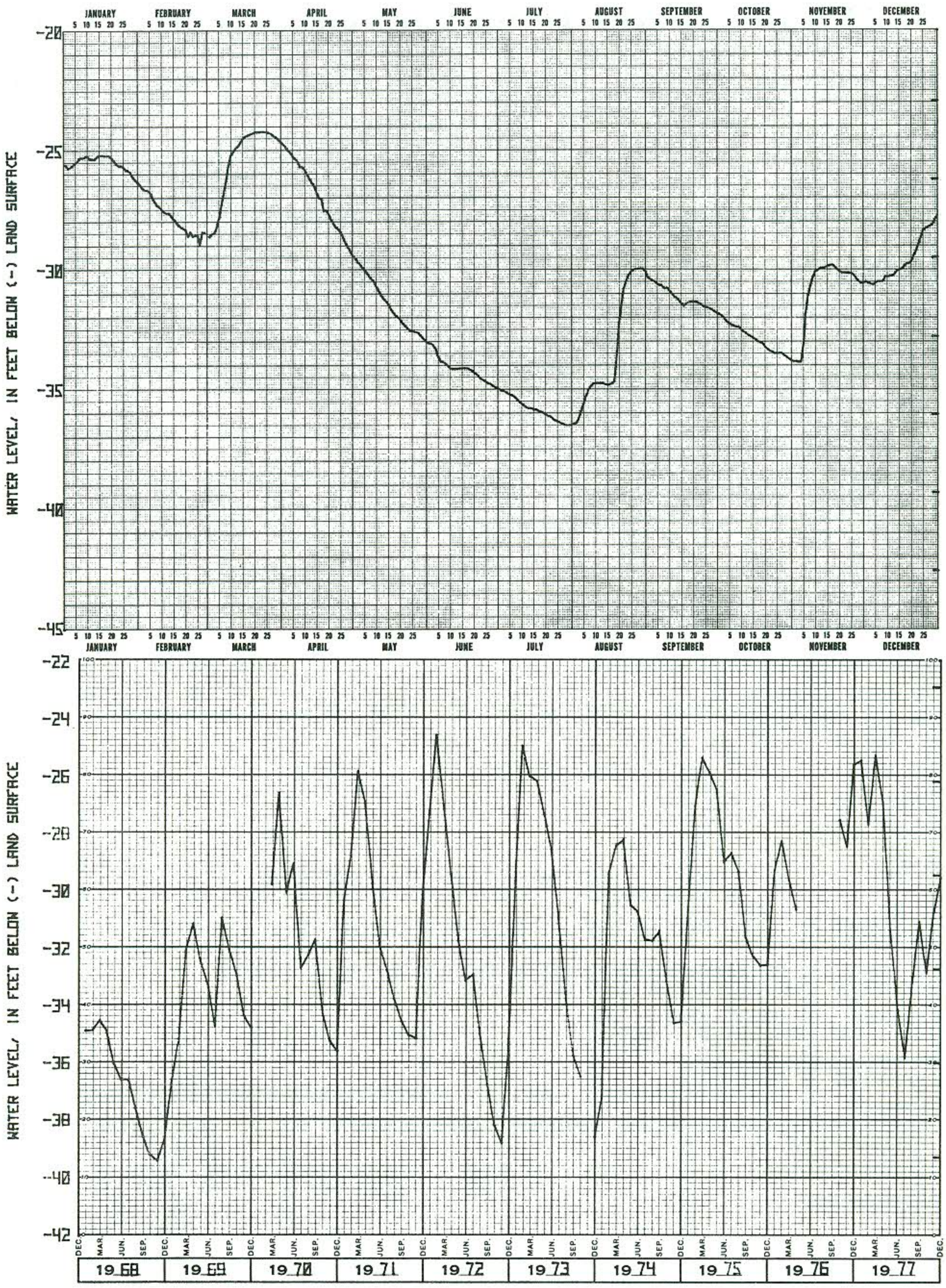
Water level shows long-term rise

Effects of the 1977 drought beginning in late spring lowered the mean monthly water level in the Dexter well to below 35 feet for the first time since 1973-74. The well is very near the area where the aquifer crops out and it responds chiefly to precipitation in the outcrop (recharge) area. The water level in the Dexter well declined from a high of about 24.2 feet in March to about 36.5 feet in July, a period of no precipitation. Notable rises in the water level around August 5 and 20 and November 5 correspond to precipitation.

The long-term trend in the Dexter well is an increase in water level, the greatest increase occurring during 1968-71, corresponding to an increase in precipitation.

3226520830330.01 Local number, 175 0006.
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.
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.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Laurens County well

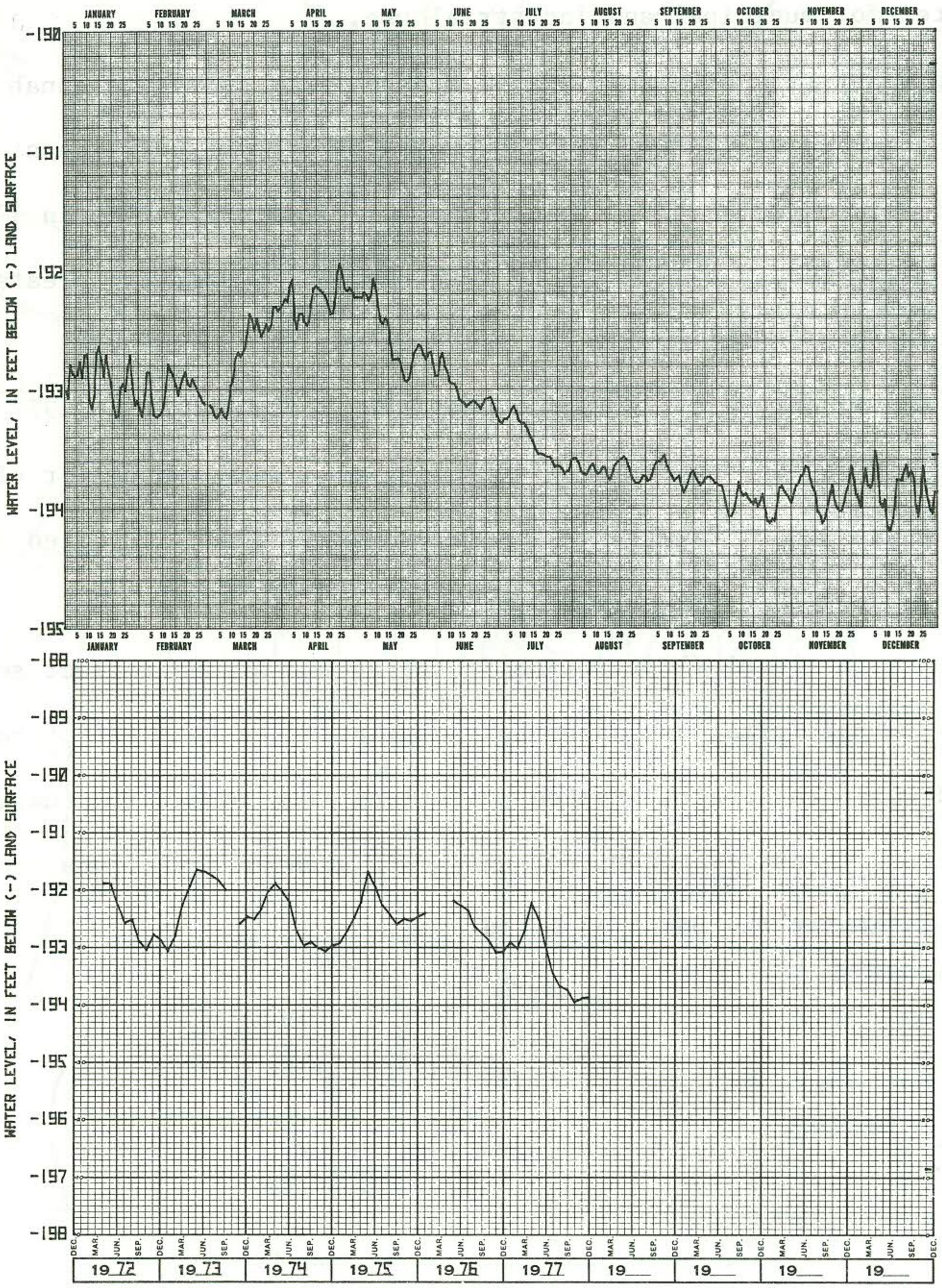
Water level reaches new low in December

Effects of the 1977 drought caused the water level in the Sylvester well to reach a record low of more than 194 feet below land surface in December 1977. Fluctuations in the water level were slight, however, and the maximum change during 1977 was a decline of about 2.2 feet from April to December. The annual mean water level in 1977 was only about 0.7 foot lower than in 1976.

The long-term decline was only about 0.5 foot, mostly occurring from May to December 1977.

3131460834916.01 Local number, 321 0009.
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 June 1976. Borehole geophysical survey conducted June 5, 1975.
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, 194.22 ft below land-surface datum, December 10, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Sylvester observation well

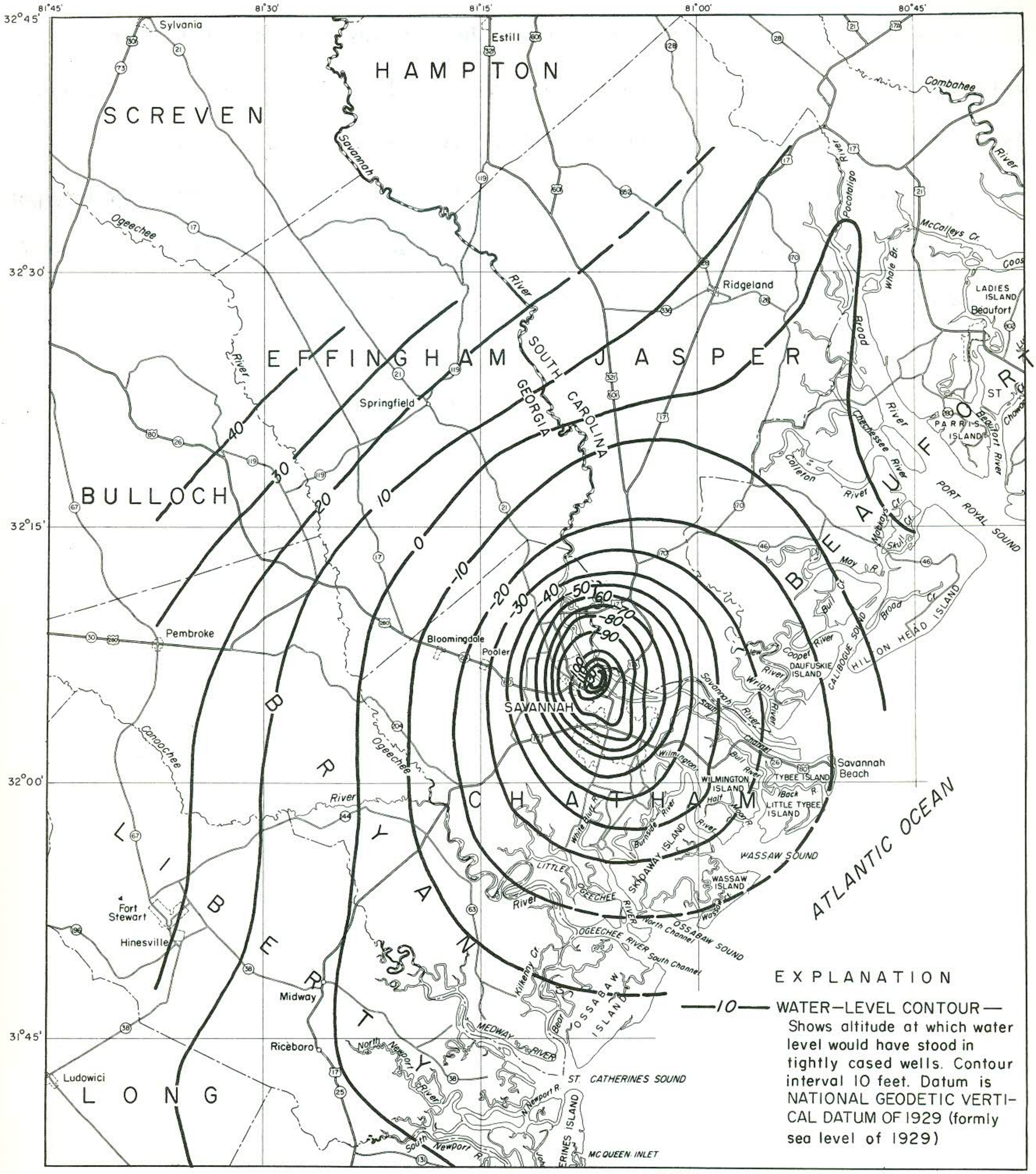
3.1a Savannah Area

Water levels in the Savannah area continued to decline and by 1977 had reached the lowest level in the period of record. The long-term decline in water levels can be attributed to the ever increasing large withdrawal of ground water for municipal and industrial use.

The present rate of withdrawal of ground water in the Savannah area seems to exceed the rate of recharge to the ground-water reservoir, causing a long-term decline in water levels. Lower than normal precipitation in 1977 further depressed water levels by decreasing recharge and by creating greater demands for water throughout the summer and early autumn.

Mean annual water levels ranged from 2 to 9 feet lower in 1977 than in 1976. 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.

Yearly water-level fluctuations in the Savannah area reflect seasonal variations in precipitation and evapotranspiration as they affect recharge to 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.



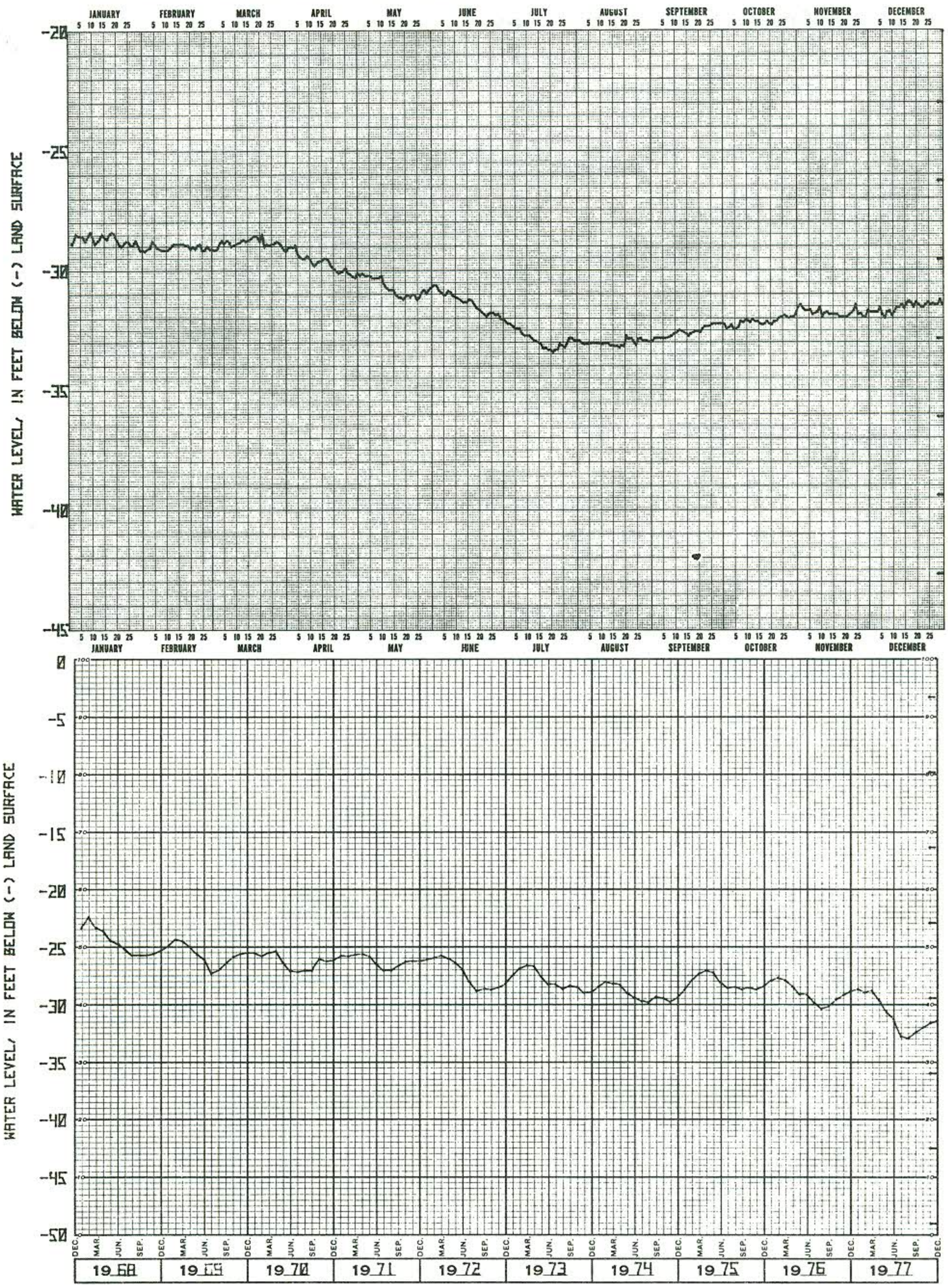
Water level in reservoir I (principal artesian aquifer), Savannah area, December 1977.

New water-level low in July

A record low water level was established in the National Park Service well when the level declined below 33 feet in July 1977. Greater withdrawal for municipal and industrial use together with reduced recharge in the Savannah area due to low precipitation in mid-1977 created a mean annual water level 2 feet lower than in 1976. A decline of about 7 feet from 1968 to 1977 indicates a long-term downward trend in the water level.

3202020805412 Local number, 051 0073.
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, 33.40 ft below land-surface datum, July 21, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the National Park Service well

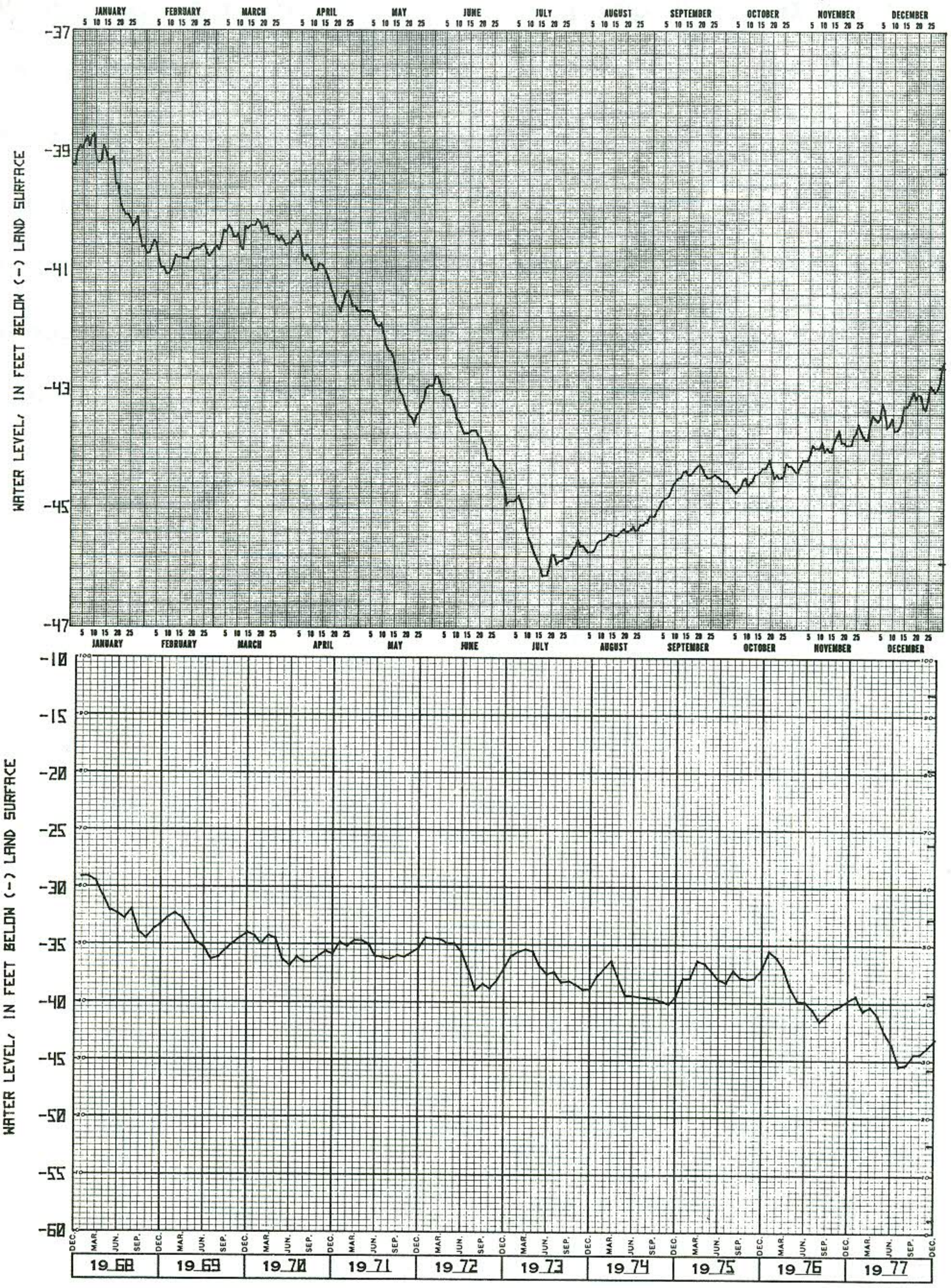
Water level reaches new low in July

The water level in the Morrison well dropped below 46 feet in July 1977, almost 4 feet lower than the previous low experienced in August 1976. The annual mean water level in 1977 was about 4 feet lower than in 1976.

A marked decline in the water level began in 1976, and is related to increased pumpage in the Savannah area. This decline adds to that experienced in the previous 8 years. The decline in the annual mean water level from 1968 to 1977 was about 11 feet.

3200210811248.01 Local number, 051 0089.
LOCATION.--Lat 32°00'21", long 81°12'48", Hydrologic Unit 03060204, 2.7 mi south of intersection of U. S. Highway 17 and 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, 46.15 ft below land-surface datum, July 16, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Morrison observation well

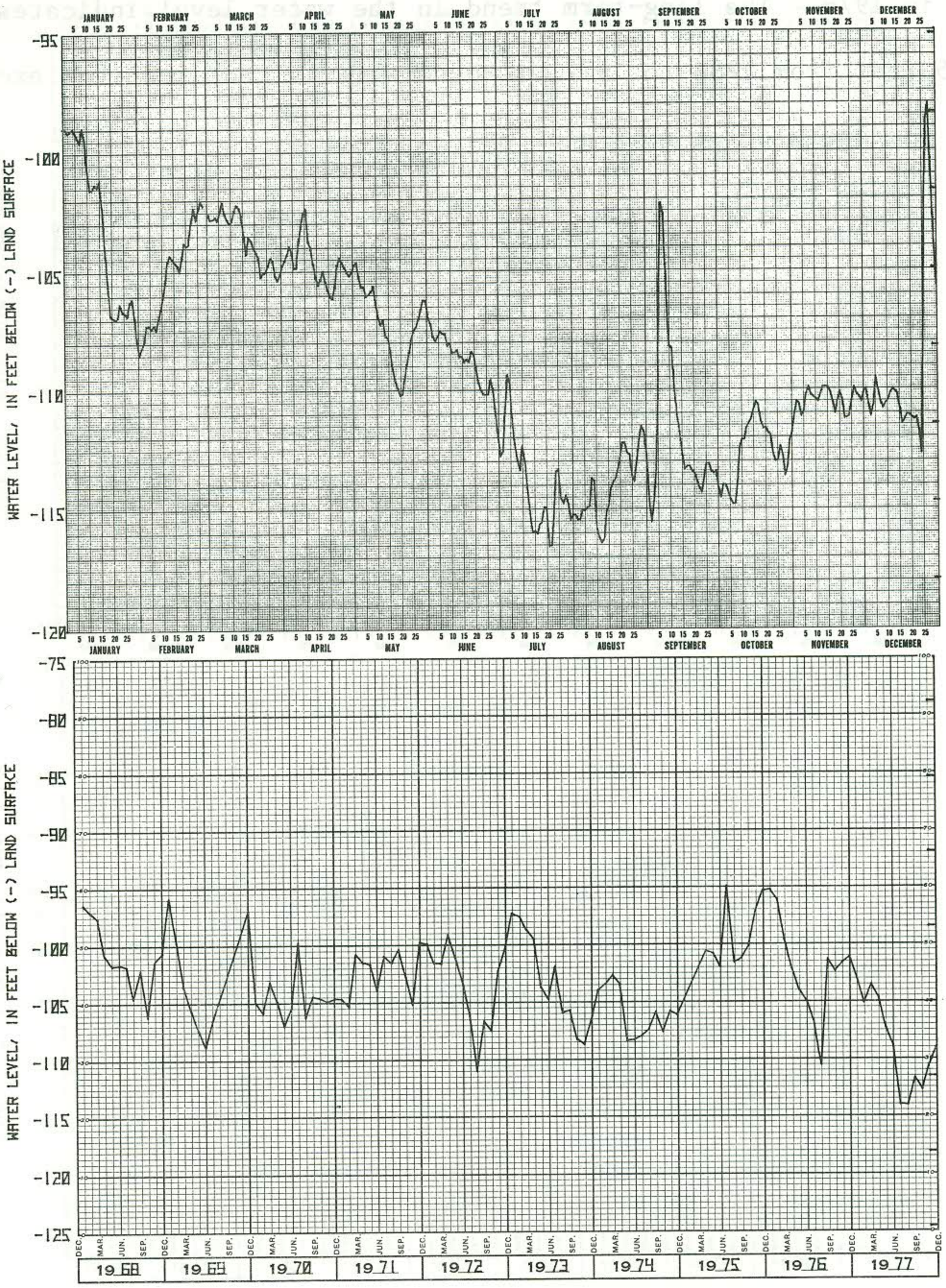
Record low water level in July

A record low was established in the Layne-Atlantic well in July 1977, as the level dropped 0.5 foot below the previous low of 116 feet of August 1972. The annual mean water level was about 6 feet lower in 1977 than in 1976. The water level, after recovery during 1975, began a marked decline in 1976 that continued through 1977. The long-term decline is not as apparent in this well, especially for 1968-74. The decline in 1976, caused by increased ground-water withdrawal, contributed to the 10-year decline of about 8 feet.

Marked water-level deviations are experienced in this well as rates of nearby pumpage fluctuate. The rise and subsequent decline in water level of about 13 feet in September 1977 were caused by the cessation and resumption of pumpage in a nearby well field.

3205300810850.01 Local number, 051 0067.
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, 116.0 below land-surface datum, August 4, 1972.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



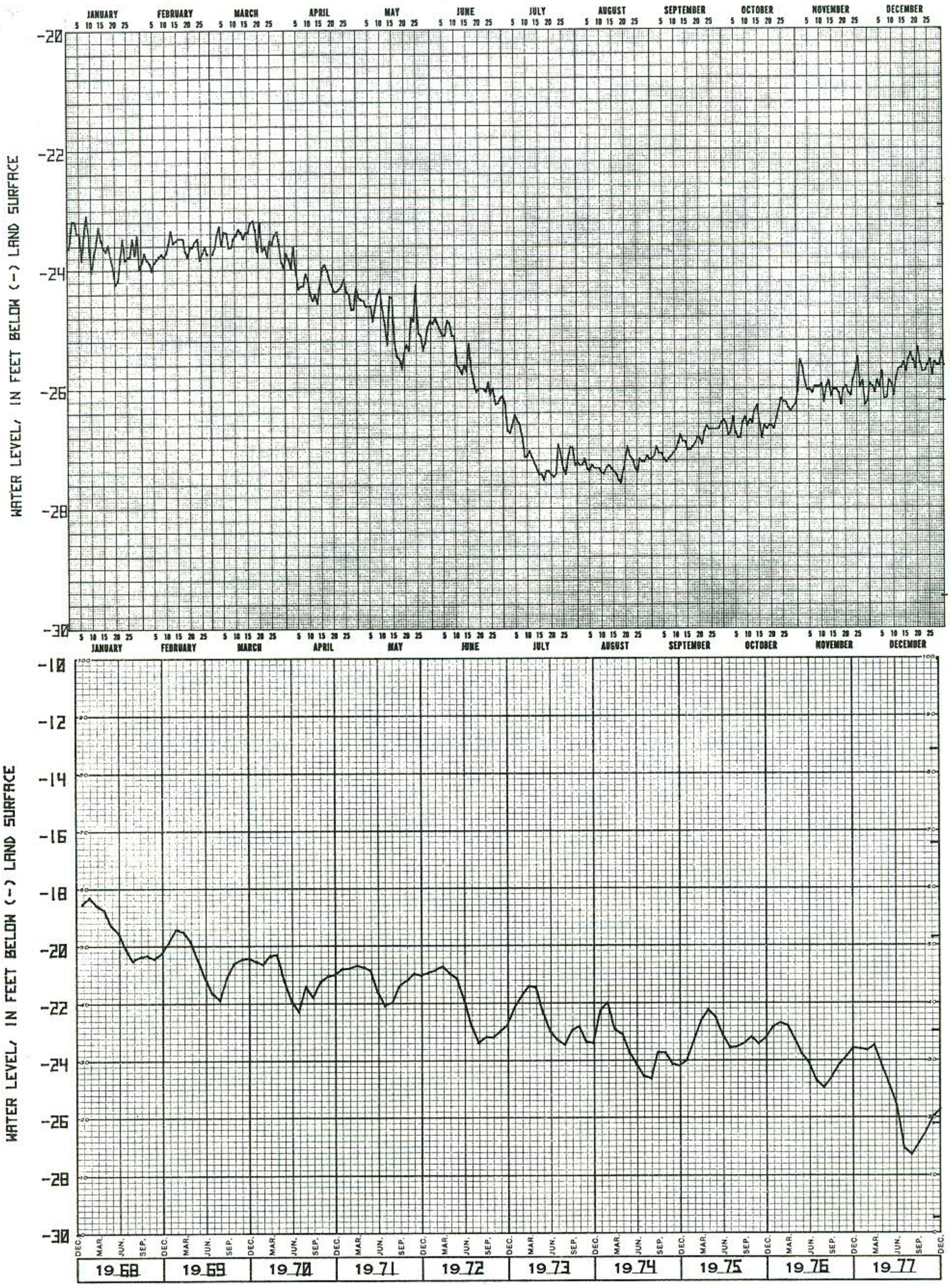
Water-level fluctuations in the Layne-Atlantic observation well

Long-term water-level decline

Record lows were established in U.S. Geological Survey test well 7, as the water level dropped to below 27 feet in July, August, and the first part of September 1977. The annual mean water level was about 1.5 feet lower in 1977 than in 1976. The long-term trend in the water level indicates a decline of about 5 feet from 1968 to 1977. Ground-water withdrawal that exceeds recharge is responsible for this decline.

3201220805102.01 Local number, 051 0030.
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, 27.60 ft below land-surface datum, August 18, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in Chatham County test well 7

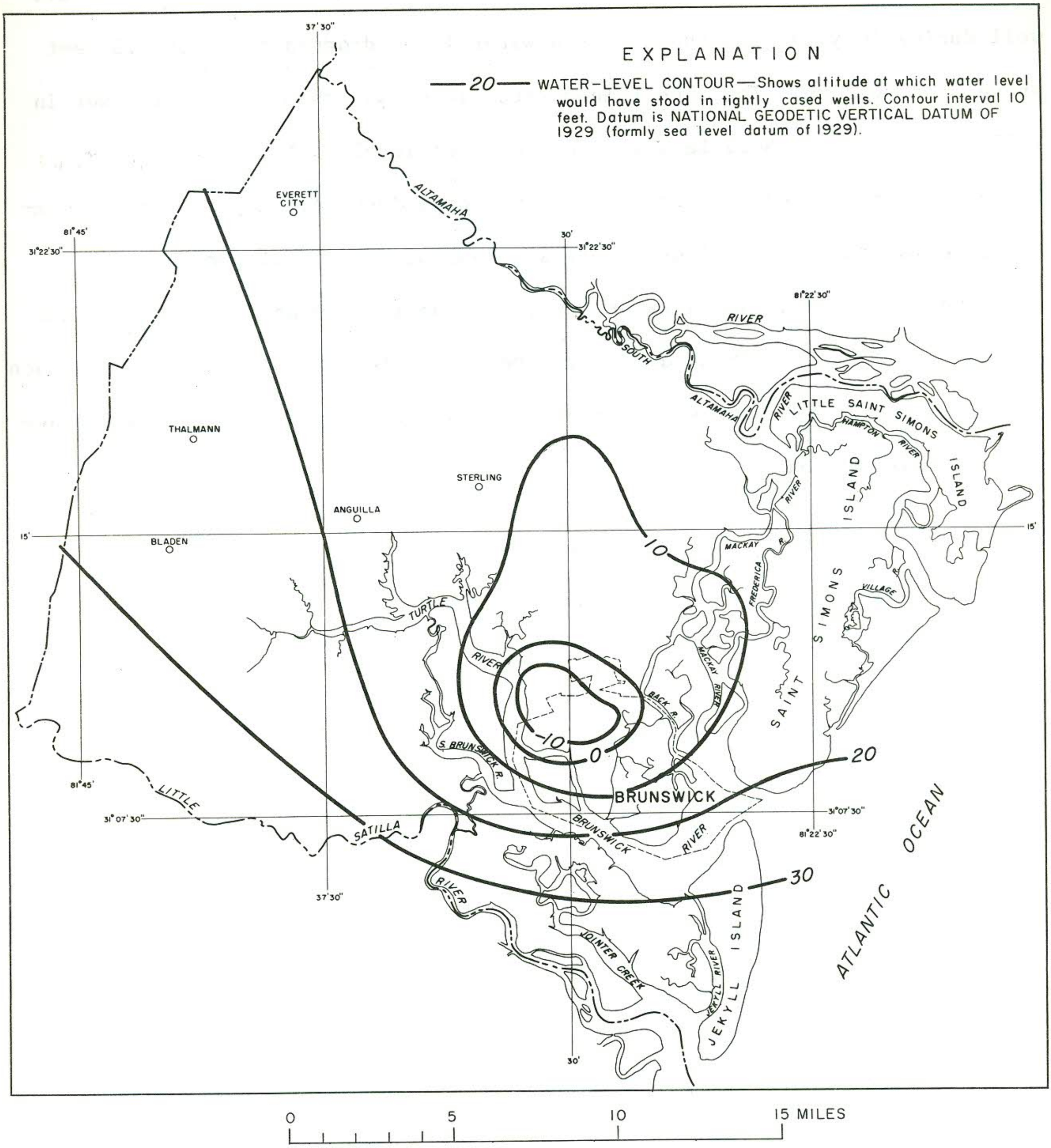
3.1b Brunswick Area

Water levels in the Brunswick area during 1977 were lower than in 1976, and in all of the wells record low water levels were attained in July 1977. Ground-water pumpage of more than 100 million gallons per day in the Brunswick area is the overriding cause of the water-level declines there. Maximum pumpage occurred in 1977, depressing water levels to all-time lows.

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.

Annual mean water levels ranged from 0.5 to 2.5 feet lower in 1977 than in 1976. Long-term declines ranged from about 1 to 5 feet for the period 1968-77. Marked rises and subsequent declines in water levels during March, May, August, and December are attributed to the temporary cessation and resumption of pumpage for industrial use.

The water levels in wells near centers of partial shutdowns respond sooner and rise to a higher level than those in wells farther away.



Water level in reservoir 1 (principal artesian aquifer), Brunswick area, November 1977.

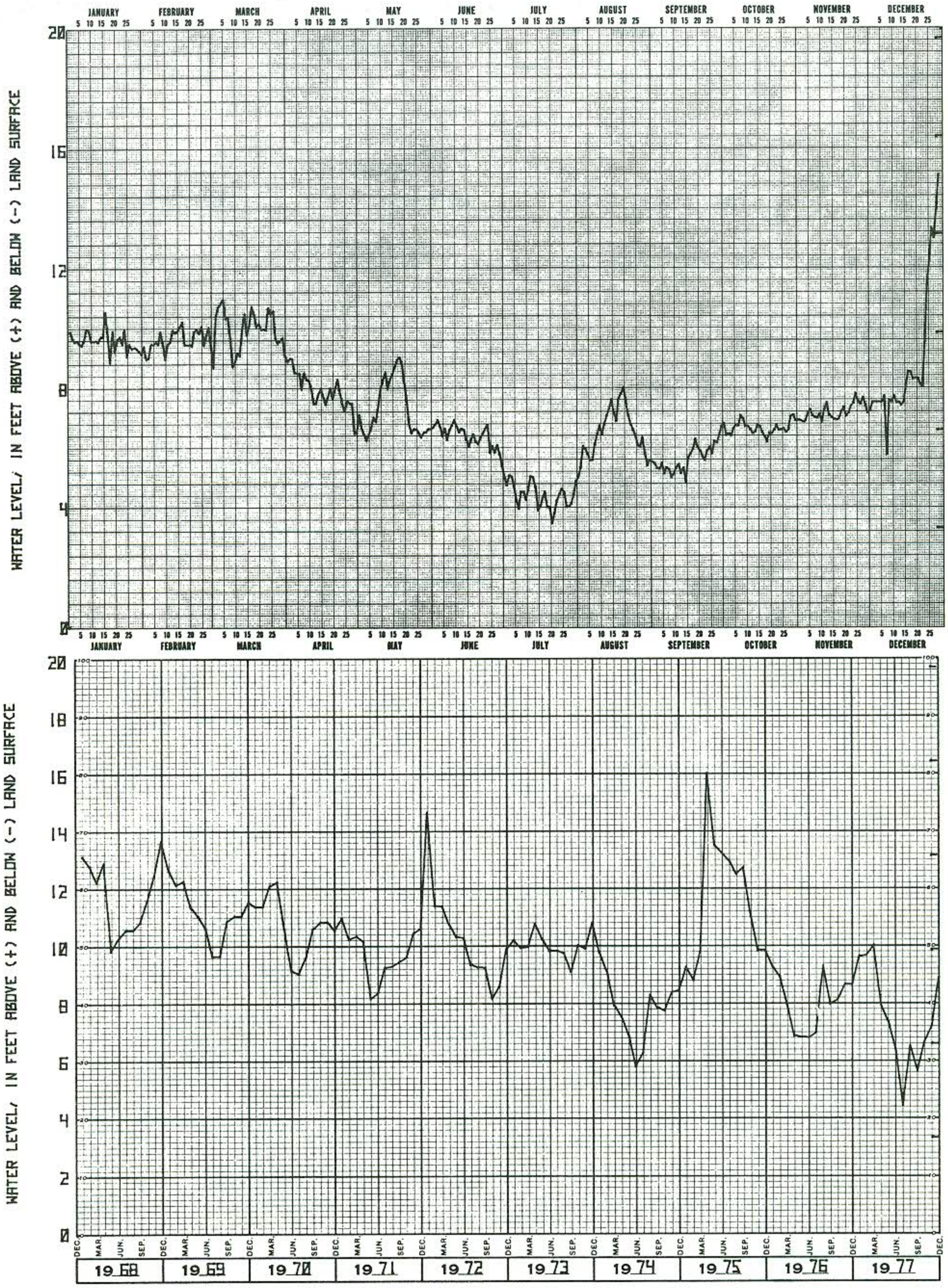
Long-term water-level decline continues

The lowest water level of record occurred in the Babcock and Wilcox Co. well during July 1977 as the artesian water level dropped to about 3.5 feet above land surface. The annual mean water level was about 2.5 feet lower in 1977 than in 1976. Notable rises in the water level in May, August, and December corresponded to partial shutdowns of industrial pumpage. The December rise was due to the almost total shutdown of industrial pumpage.

The long-term trend in water level is a decline of about 5 feet for the period 1968-77. Superimposed on this trend are significant fluctuations, such as the marked rise in the water level in 1975 caused by a decrease in pumpage in the Brunswick area.

3107260812858.01 Local number, 127 0054.
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.
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, 3.47 ft above land-surface datum, July 21, 1977.

Water level, in feet above or below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Babcock and Wilcox Co. well

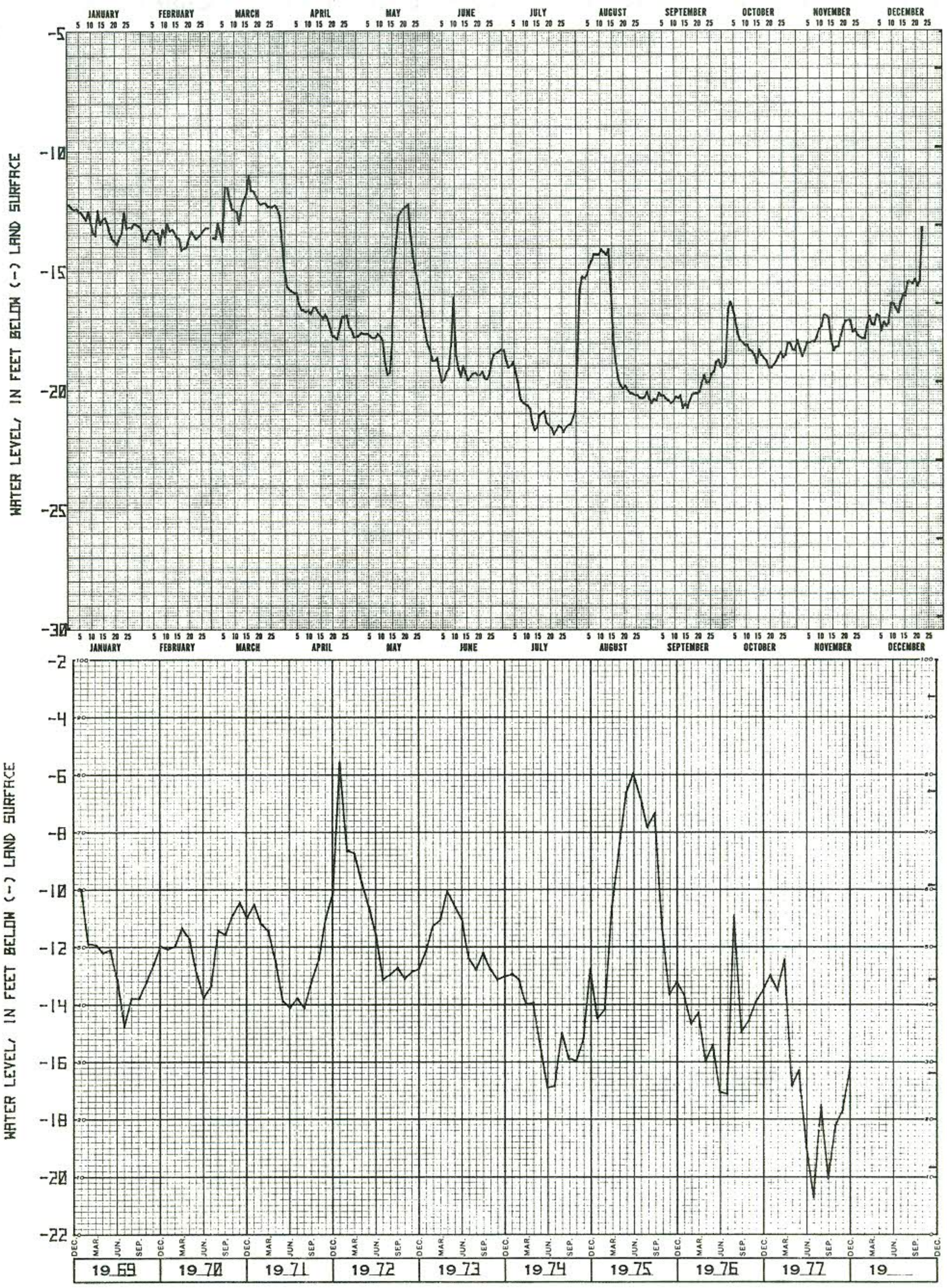
Water level reaches new low in 1977

The water level in U.S. Geological Survey test well 6 dropped to a new low of almost 22 feet below land surface in July 1977. The annual mean water level for 1977 was about 2 feet lower than in 1976. Rises in the water level in March, May, June, August, and October 1977 correspond to partial shutdowns of industrial pumpage, and in December to an almost total industrial shutdown.

The water-level decline for the period 1969-77 has been about 3 feet, most of which occurred during the period 1975-77. Decreased industrial pumpage in 1975 caused the rise in water level then; subsequent increase in pumpage caused the decline in the period 1975-77.

31100708130l7.02 Local number, 127 0023.
LOCATION.--Lat 31°10'07", long 81°30'17", Hydrologic Unit 03070203, near the intersection of Newcastle and Oak Streets, 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.
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.

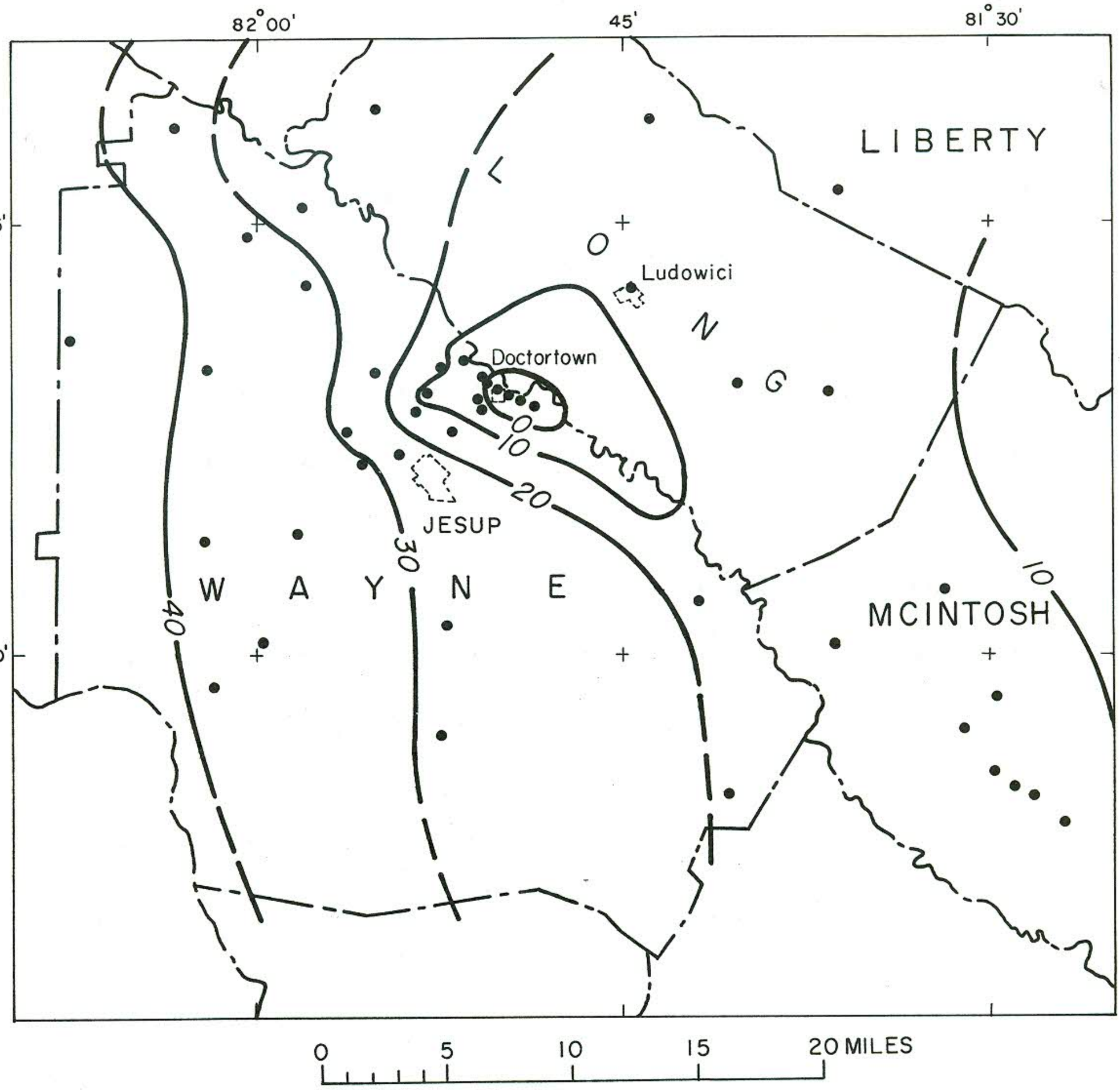
Water level, in feet above or below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in Glynn County test well 6

3.1c 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. Industrial pumpage in Brunswick and Riceboro also affects water levels in the Jesup area, but to a much lesser extent.



EXPLANATION

—20— WATER—LEVEL CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Contour interval 10 feet. Datum is NATIONAL GEODETIC VERTICAL DATUM OF 1929 (formerly sea level datum of 1929).

Water—level surface of the principal artesian aquifer, Jesup area, October 1—3, 1977.

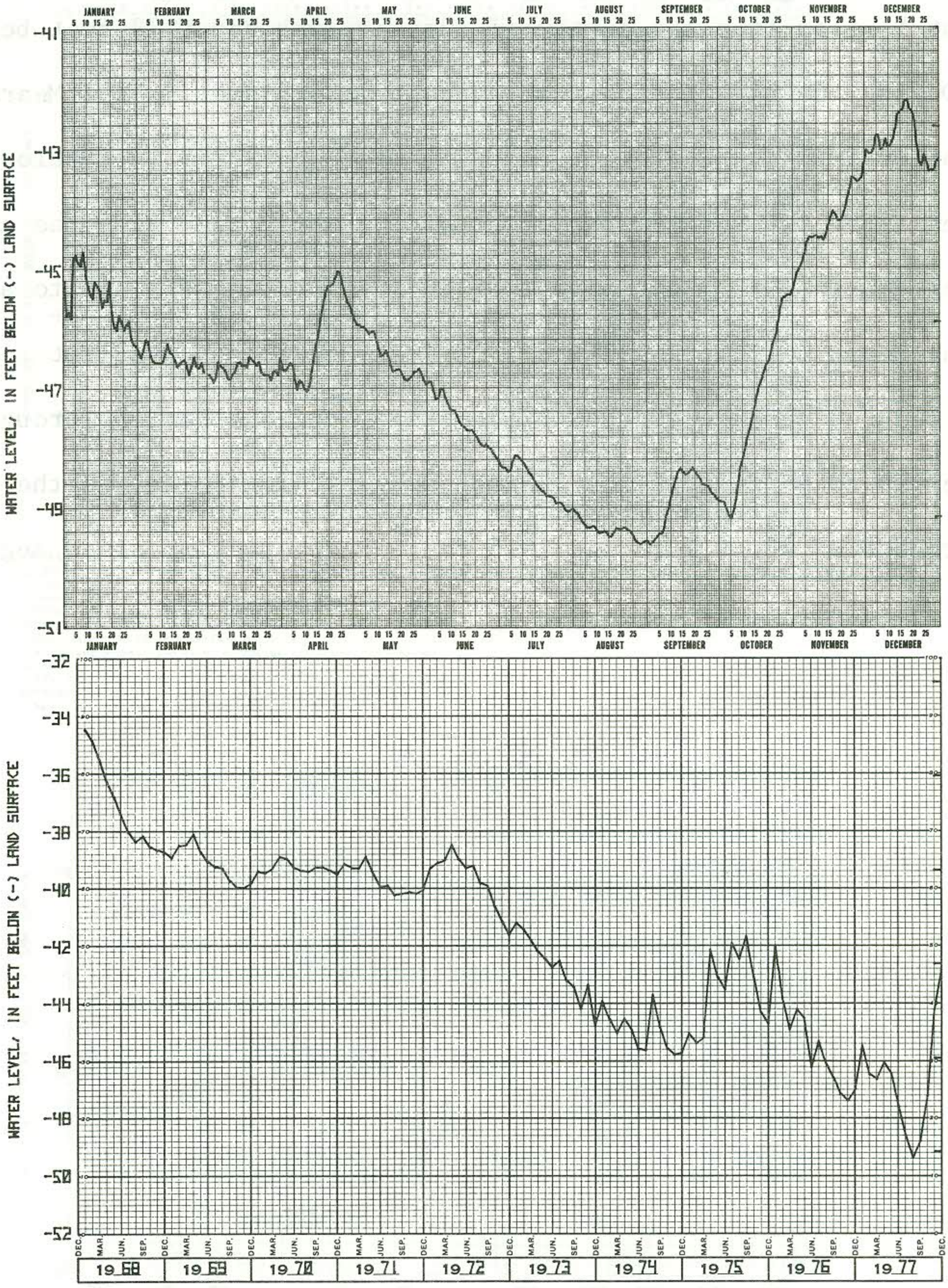
Water level rises

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.

Industrial pumpage began in Riceboro in 1968 and caused the corresponding decline in water level in test well 3. 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 until 1977, when almost all industrial pumping in the Jesup area was temporarily stopped. Rises in the water level in April and September 1977 represent partial industrial shutdowns, and the dramatic rise in October 1977 represents the almost total shutdown of industrial pumping.

3138440813614.01 Local number, 183 0007.
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.
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, 49.65 ft below land-surface datum, August 28, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



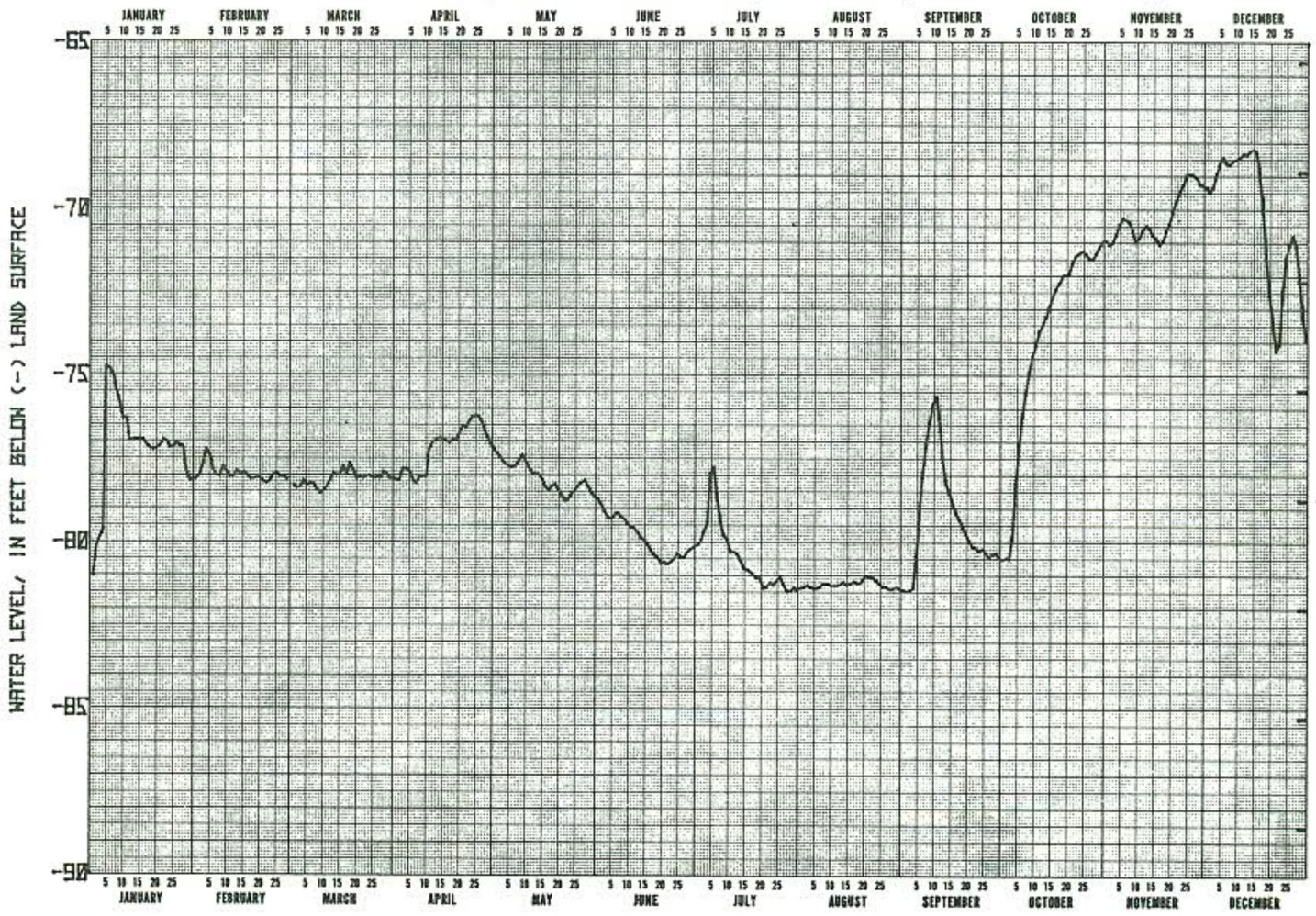
Water-level fluctuations in Long County test well 3

Water levels reflect changes in industrial pumpage

Ground-water levels in wells near Jesup dramatically reflect changes in industrial pumpage at Doctortown. During February and March 1977 when pumpage was about 75 million gallons per day, the average water level in the Johnson well, about 5 miles from the center of pumpage, was about 78 feet below land surface. During the same period, the average water level in the Mears well, about 10 miles from the center of pumpage, was about 22.5 feet below land surface. Even after two partial shutdowns during April and July, the average water level declined to about 81.3 feet in the Johnson well and to about 25.5 feet in the Mears well during August. By mid-December, an almost total shutdown that reduced pumpage to about 2-3 million gallons per day brought the water level up to 68 feet in the Johnson well and to 15 feet in the Mears well, increases of about 13.3 and 10.5 feet, respectively, since August.

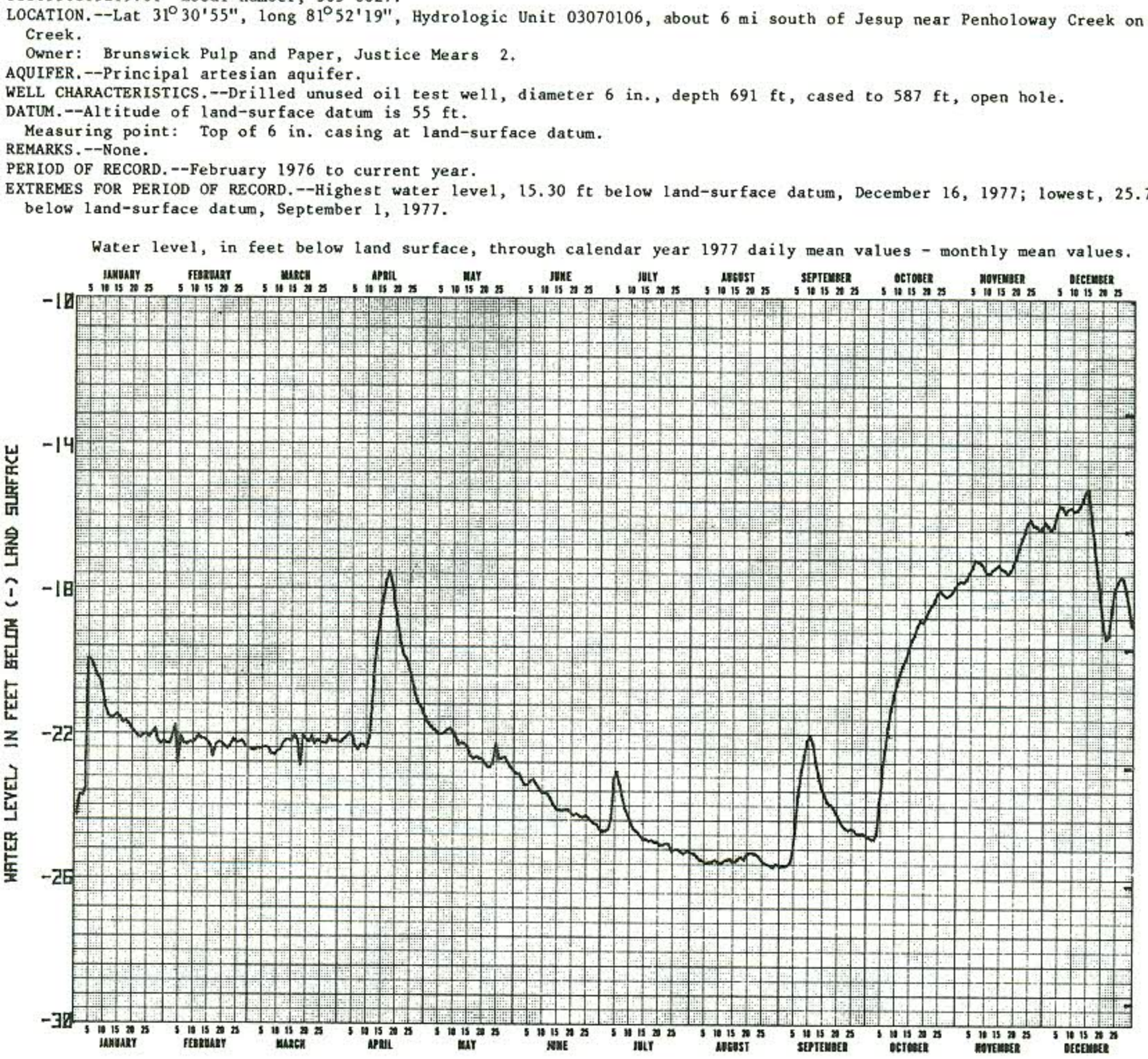
3137010815435.01 Local number, 3050025.
LOCATION.--Lat 31°37'01", long 81°54'35", Hydrologic Unit 03070106, about 0.5 mi west of Jesup city limits near intersection of Highway 341 and Sunset Drive.
Owner: Homer Johnson.
AQUIFER.--Principal artesian aquifer.
WELL CHARACTERISTICS.--Drilled unused domestic 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 81.80 ft below land-surface datum, December 29, 1976.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



3130550815219.01 Local number, 305 0027.
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.--None.
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, 25.70 ft below land-surface datum, September 1, 1977.

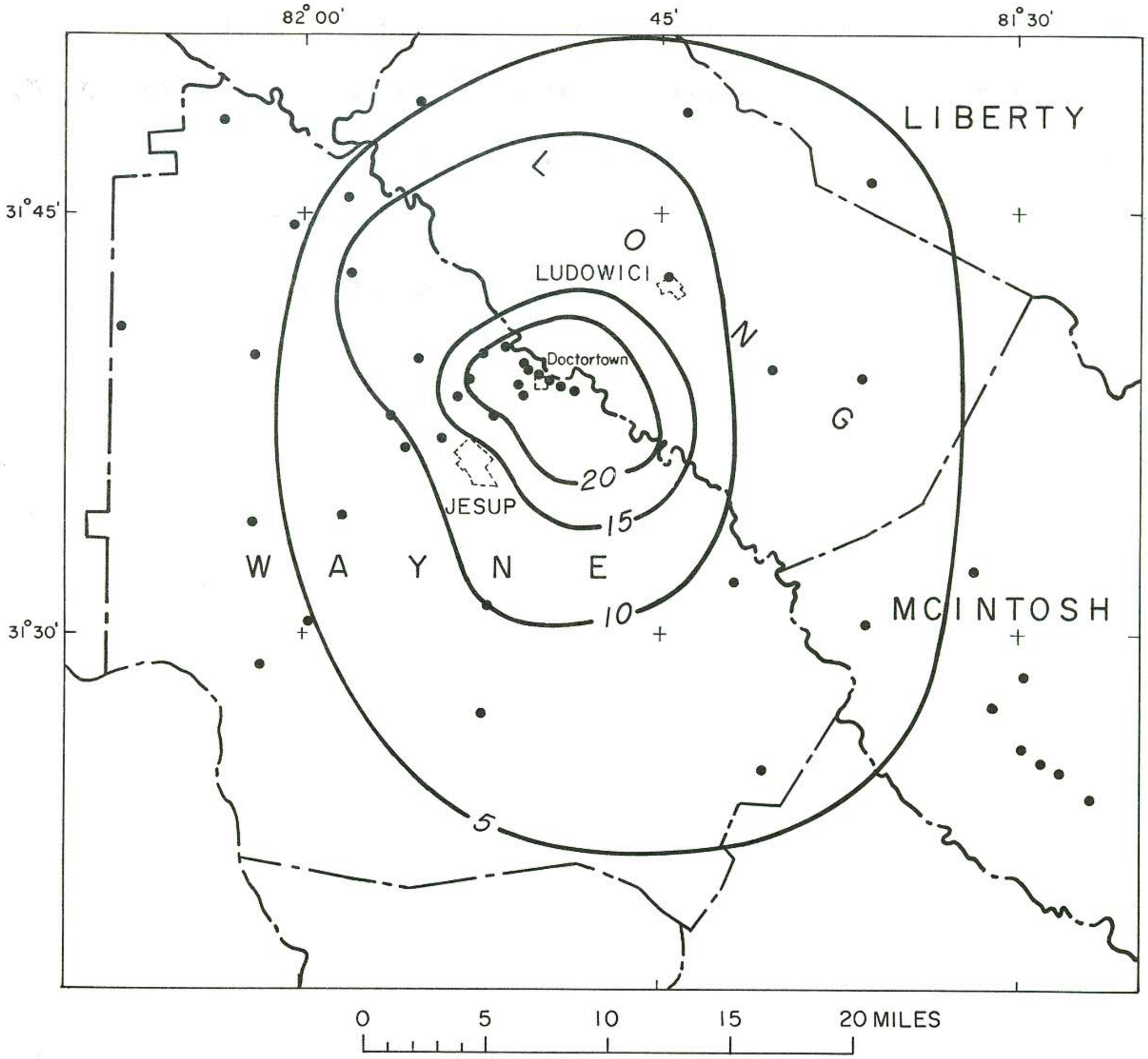
Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Johnson and Justice Mears 2 observation wells

Water level rises from industrial shutdown

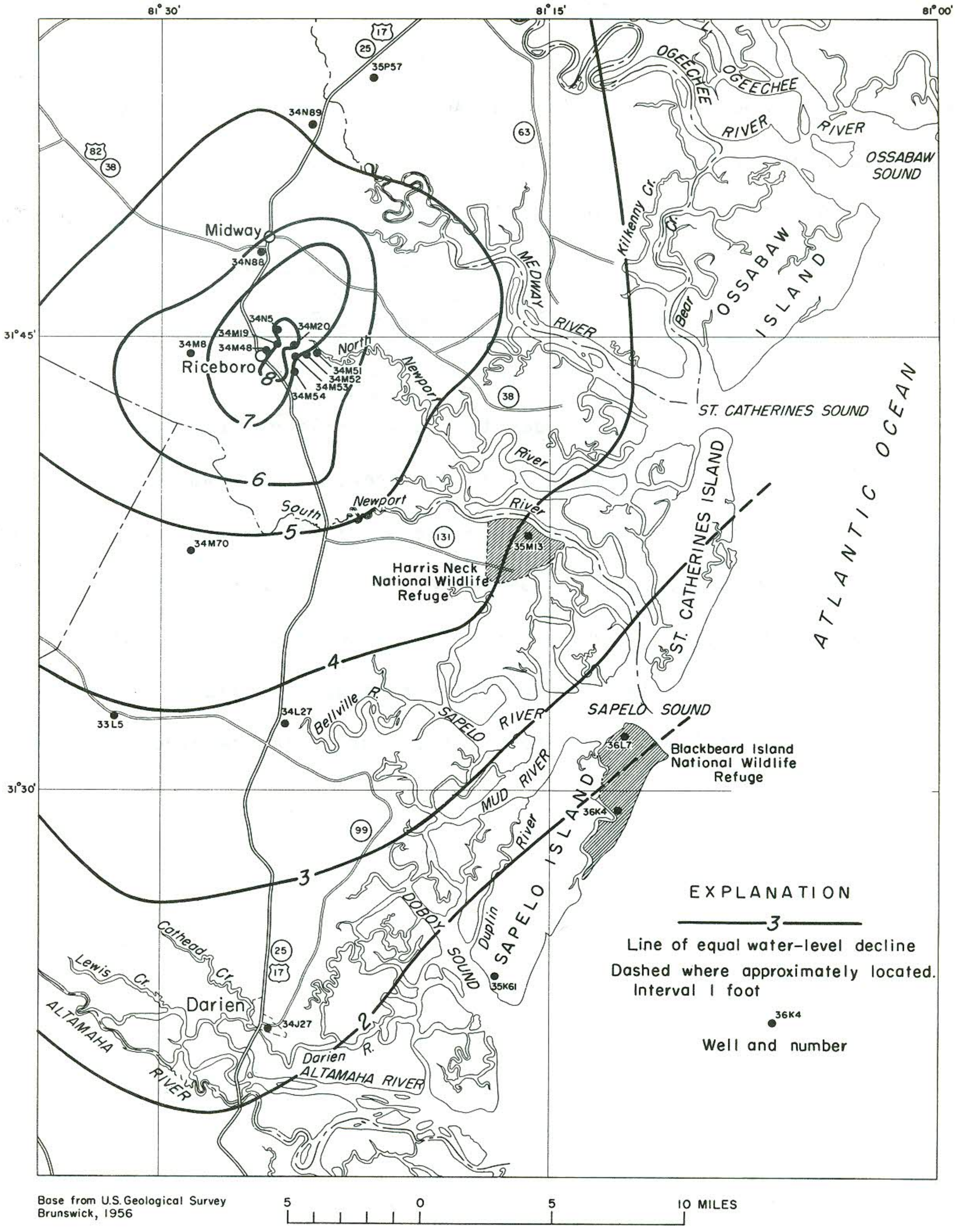
During the fall of 1977, when industrial pumpage at Doctortown decreased from about 75 to about 7 million gallons per day, the water level rose more than 20 feet in wells about 2 miles from the center of pumpage and 10 feet in a well 9.5 miles from the center of pumpage.



Water-level recovery, Jesup area, October 1 to December 16, 1977.

3.1d 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 most 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 the observation wells in the Riceboro area.



Base from U.S. Geological Survey
Brunswick, 1956

Water–level decline, Riceboro area December 1967–68 (from Krause, 1972)

New water-level low in August

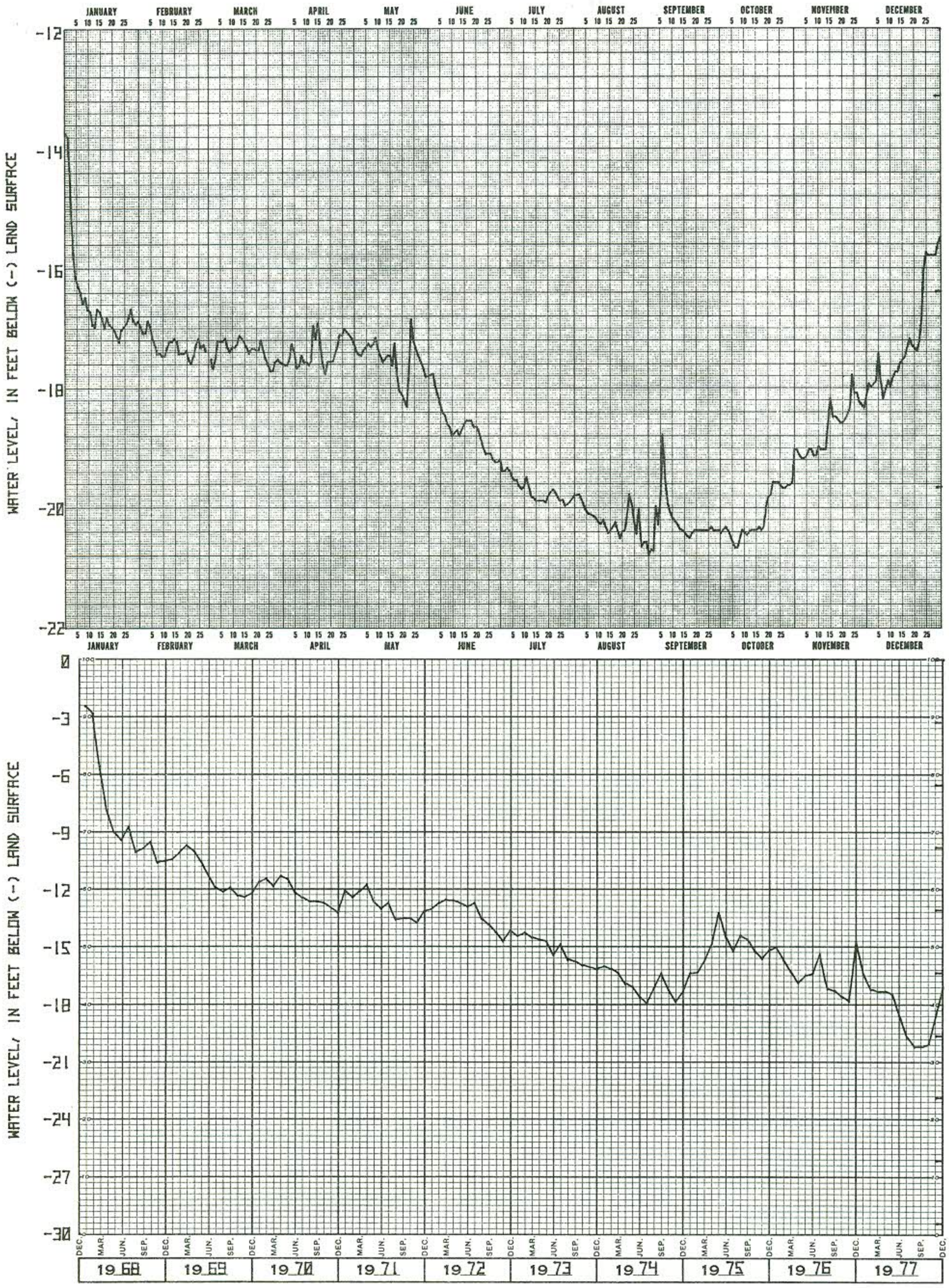
The water level in U.S. Geological Survey test well 2 reached an all time low of 20.8 feet below land surface on August 31, 1977. The annual mean water level in 1977 was 2 feet lower than in 1976. The long-term decline in water level was about 9 feet for the period 1968-77.

Noticeable deviations in the water level are due mainly to changes in pumpage. The rise of about 2 feet in September 1977 represents a partial shutdown in industrial pumpage.

The long-term trend shows a decline in water level of about 7 feet corresponding to the 10-million gallon per day increase in pumpage at Riceboro. The decline became greater in 1972 as a result of the 30-million gallon per day increase at Doctortown. The coastal-wide reduction in pumpage in 1975 allowed the water level to recover some before pumpage resumed and increased through September 1975. In October 1977 almost all pumpage at Doctortown ceased and the water level rose about 5 feet during the remainder of 1977.

3143430812519.01 Local number, 179 0006.
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 May 26, 1976; 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, 0.85 ft below land-surface datum, February 5, 1967; lowest, 20.80 ft below land-surface datum, August 31, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values- monthly mean values.



Water-level fluctuations in Liberty County test well 2

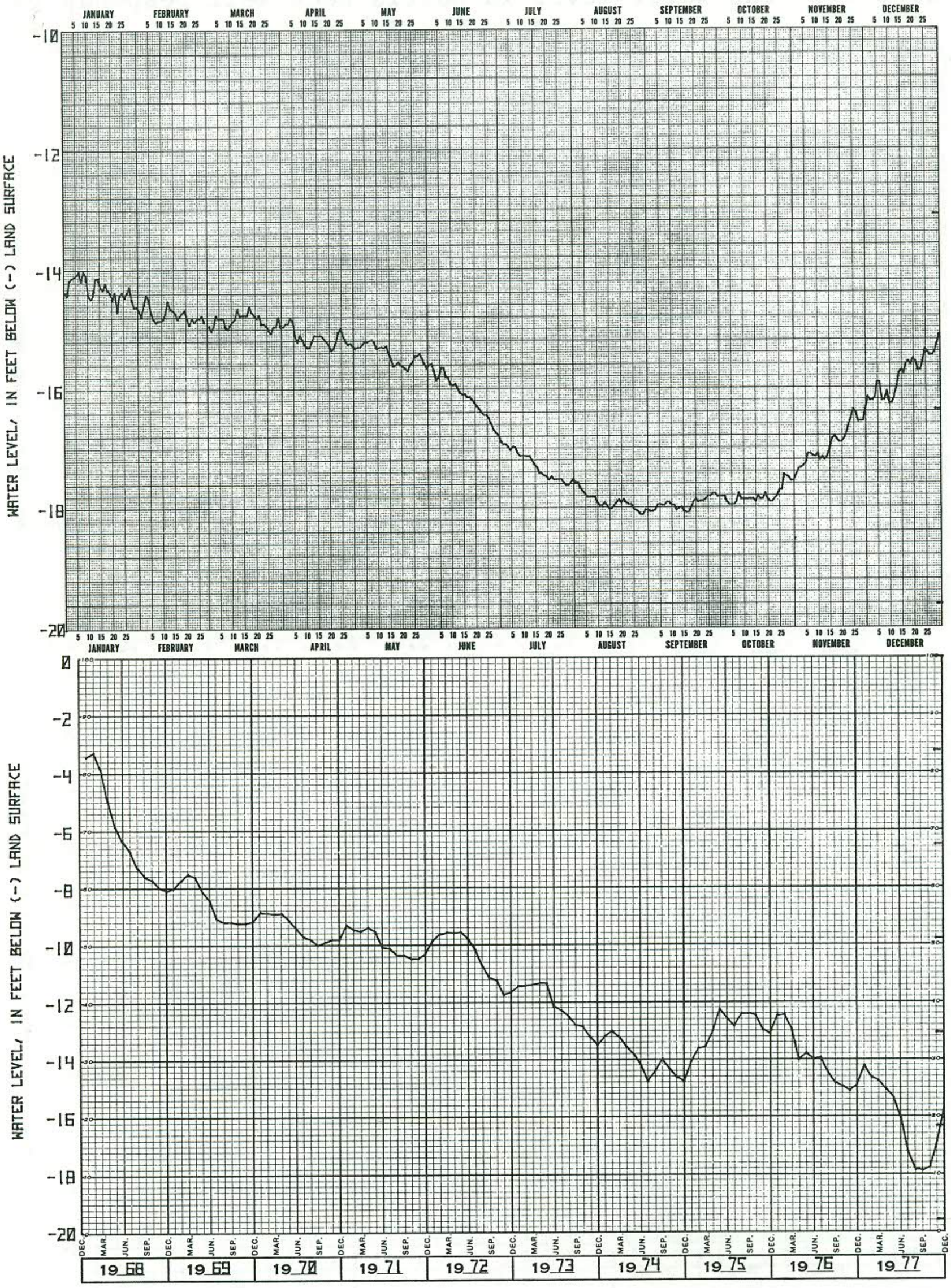
August water level sets new low

A low water level of 18.2 feet below land surface was reached in test well 1 in August 1977. The annual mean water level during 1977 was about 2.5 feet lower than in 1976. The long-term trend in the water level was a decline of about 11 feet in the period 1968-77.

U.S. Geological Survey test well 1, 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 degree.

3152140812353.01 Local number, 179 0007.
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 May 26, 1976; 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, 18.15 ft below land-surface datum, August 28, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



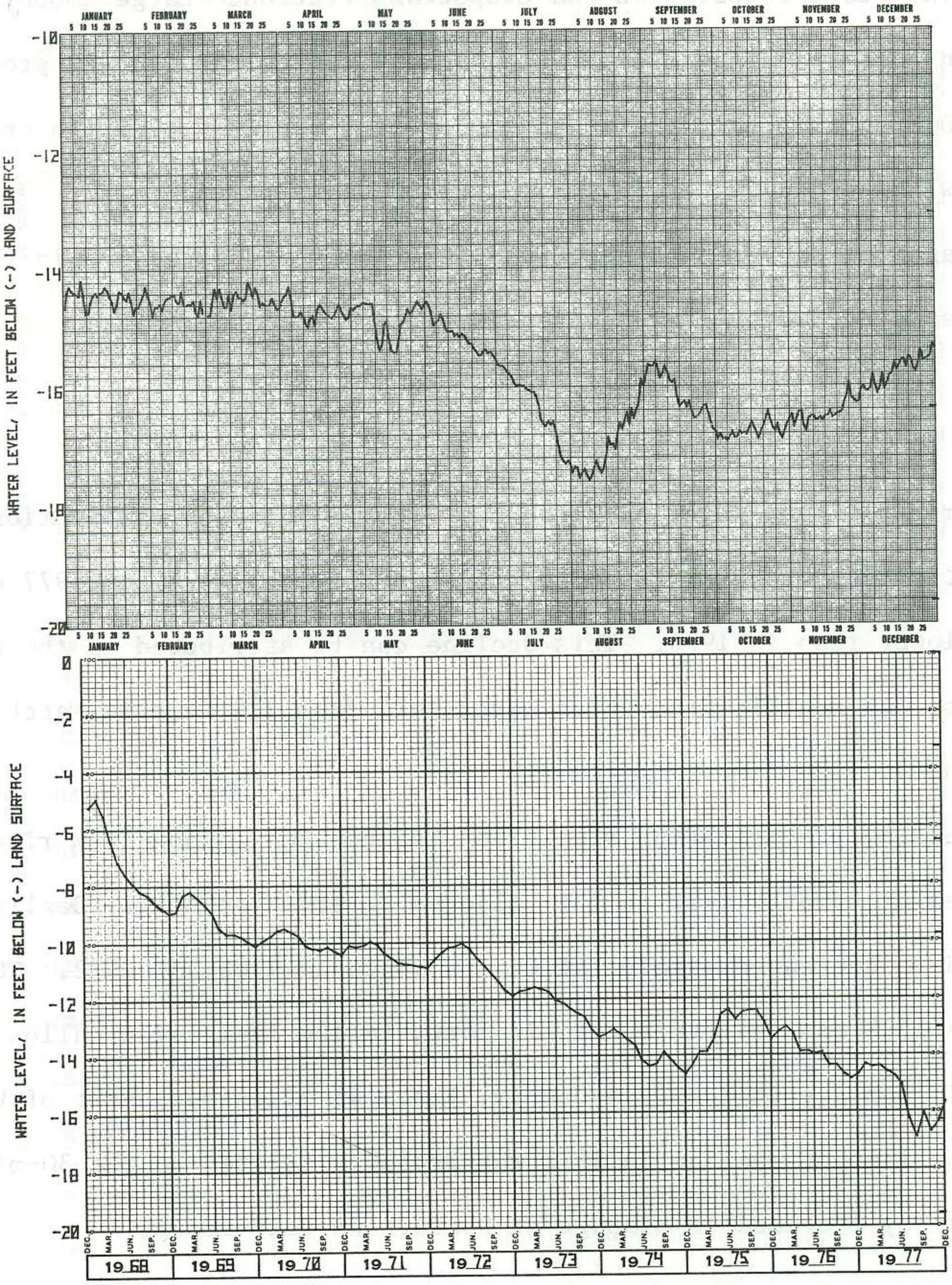
Water-level fluctuations in Liberty County test well 1

Water-level decline continues

The Harris Neck well experienced an all time low water level of 17.6 feet on August 8, 1977. The annual mean water level during 1977 was about 1.5 feet lower than in 1976. The long-term decline in water level was about 8 feet for the period 1968-77. The water level in Harris Neck well responds to pumpage the same as test wells 1 and 2.

3138230811542.01 Local number, 191 0027.
LOCATION.--Lat 31°38'23", long 81°15'42", 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 May 27, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 16, 1976.
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, 17.60 ft below land-surface datum, August 8, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in McIntosh County test well

3.1e Valdosta Area

Ground-water levels in the immediate Valdosta area are mainly controlled by local recharge. The Withlacoochee 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 create high ground-water levels. Decreased precipitation and increased evapotranspiration create low streamflow and ground-water levels in summer and autumn.

Pumpage in the Valdosta area, and in other pumping centers in the Coastal Plain, also affects the ground-water level.

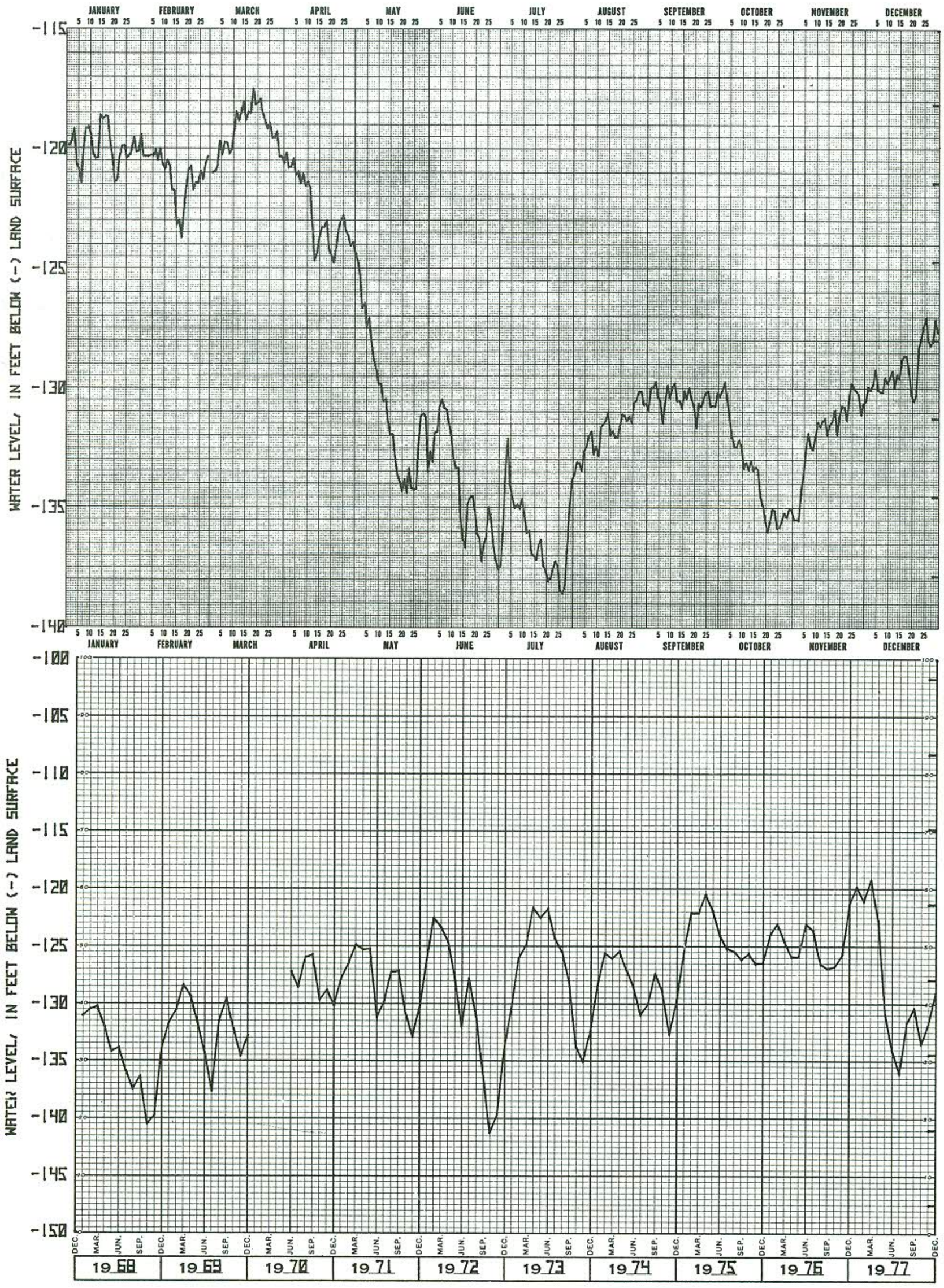
July water level lowest since 1972

The monthly mean water level in July in the Valdosta observation well was the lowest since October 1972. The annual mean water level in 1977 was about 2.5 feet lower than in 1976. This decline can be attributed to the mid-1977 drought, as the monthly mean water level fell from 119 feet in March to 136 feet in July.

Increasing precipitation since 1968 has created a long-term rise in the water level of about 5 feet in the Valdosta observation well. Declines not attributed to decreased precipitation are those in 1968 and 1972. The 10-foot decline in 1968 can be attributed, in part, to the 15-million gallon per day increase in pumpage in Hamilton County, Fla., 45 miles southeast of Valdosta. Part of the 18-foot decline in 1972 was probably related to the 30-million gallon per day increase in pumpage at Doctortown near Jesup.

3049490831653.01 Local number, 185 0007.
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 June 22, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted April 11, 1963.
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, 143.50 ft below land-surface datum, October 31, 1968.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in Valdosta observation well

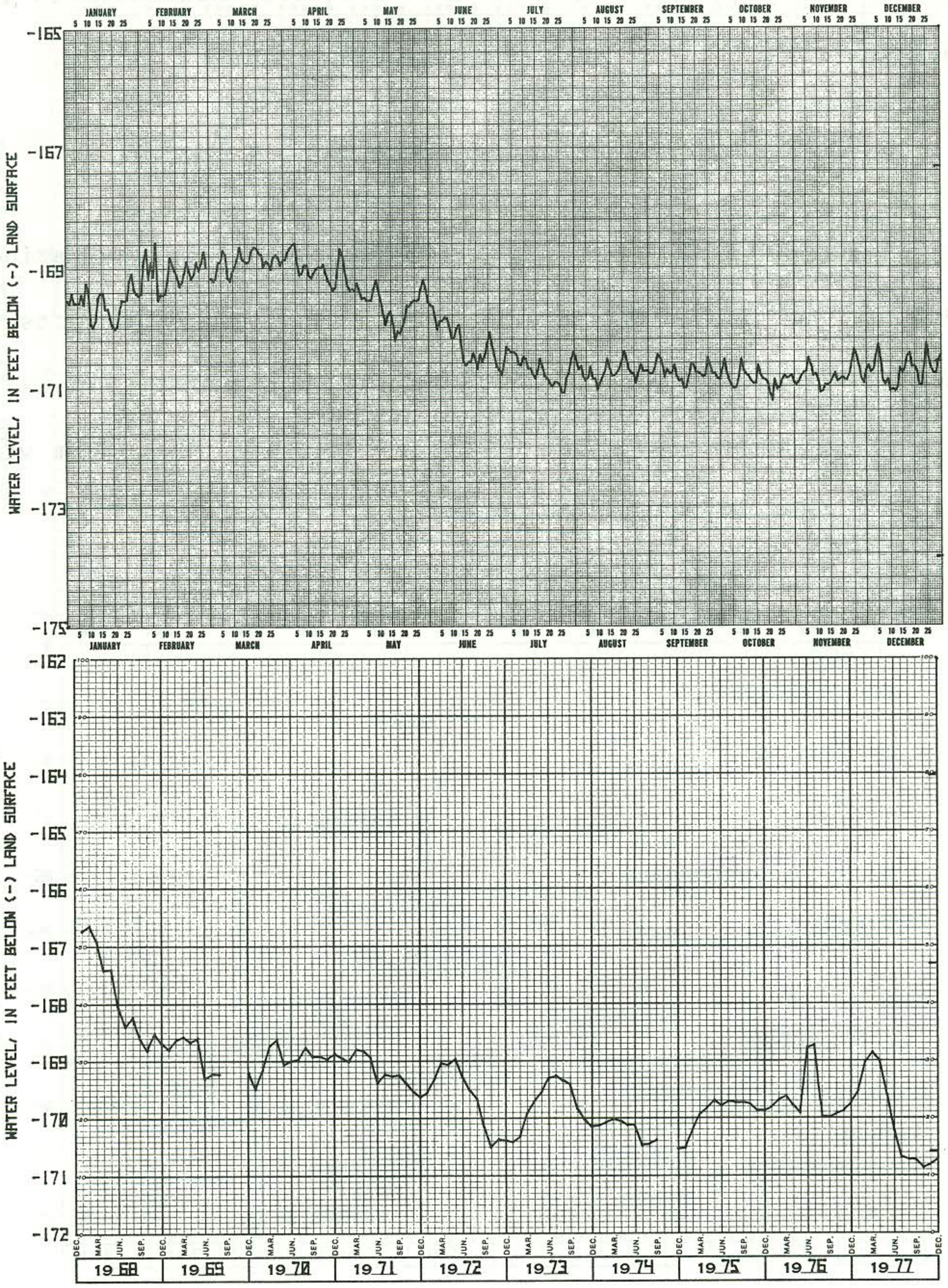
Record low water level in October

A record low water level of 171.4 feet was attained in the Adel test well on October 22, 1977. The annual mean water level was about 0.5 foot lower in 1977 than in 1976. A greater decline occurred during 1977, and can be attributed to the mid-1977 drought. The monthly mean water level dropped from 168.9 feet in March to 170.9 feet in October. The long-term water-level trend was a decline of about 2 feet for the period 1968-77.

A decline of about 2 feet in 1968 can be attributed, in part, to the 15-million gallon per day increase in pumpage in Hamilton County, Fla., 65 miles southeast of Adel. The decline in 1972 was probably related to the 30-million gallon per day increase in pumpage at Doctortown near Jesup.

3108130832603.01 Local number, 075 0014.
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 June 22, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted October 24, 1974.
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, 171.24 ft below land-surface datum, October 22, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in Adel test well

3.1f Dougherty Plain Area

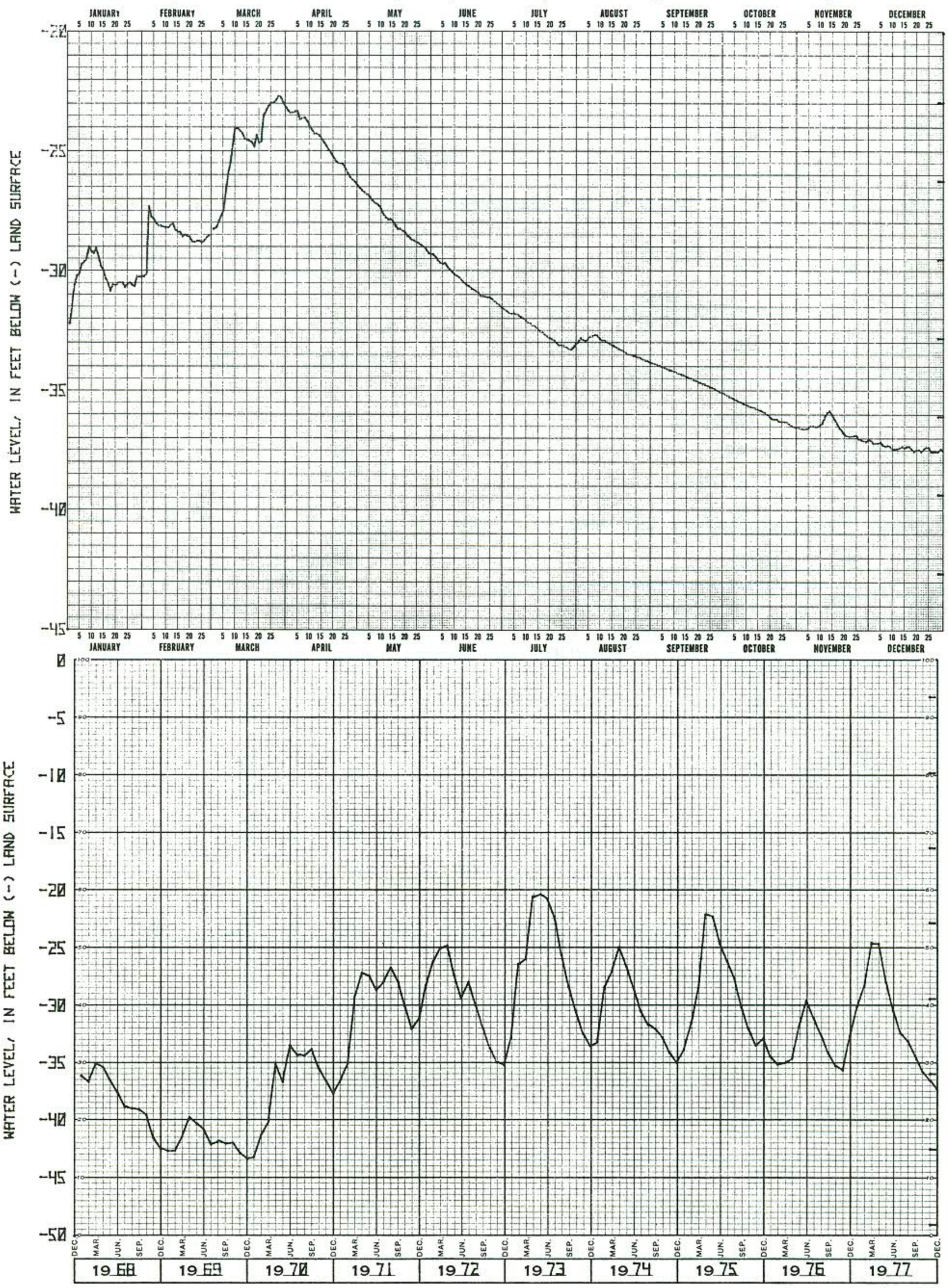
Ground-water levels in the Dougherty Plain respond chiefly to fluctuations in streamflow, and hence, precipitation and evapotranspiration. The Flint River recharges the aquifer north of Albany, so ground-water levels fluctuate correspondingly. Pumpage from the aquifer also affects the water levels, but the effects are local and not widespread.

Water level lowest since 1970

The monthly mean water level during December 1977 in the Marine Corps well dropped to the lowest level since 1970. The combined effects of the drought during the middle part of 1977 and regional pumpage created this decline. Increasing precipitation since 1968 caused a long-term water-level rise of about 5 feet in the period 1968-77.

3137480840029.01 Local number, 095 0018.
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 April 28, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted March 17, 1977.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.52 ft below land-surface datum, March 30, 1965; lowest, 48.66 ft below land-surface datum, September 9, 1957.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the U.S.M.C. observation well

3.2 Regional Clayton Limestone Aquifer

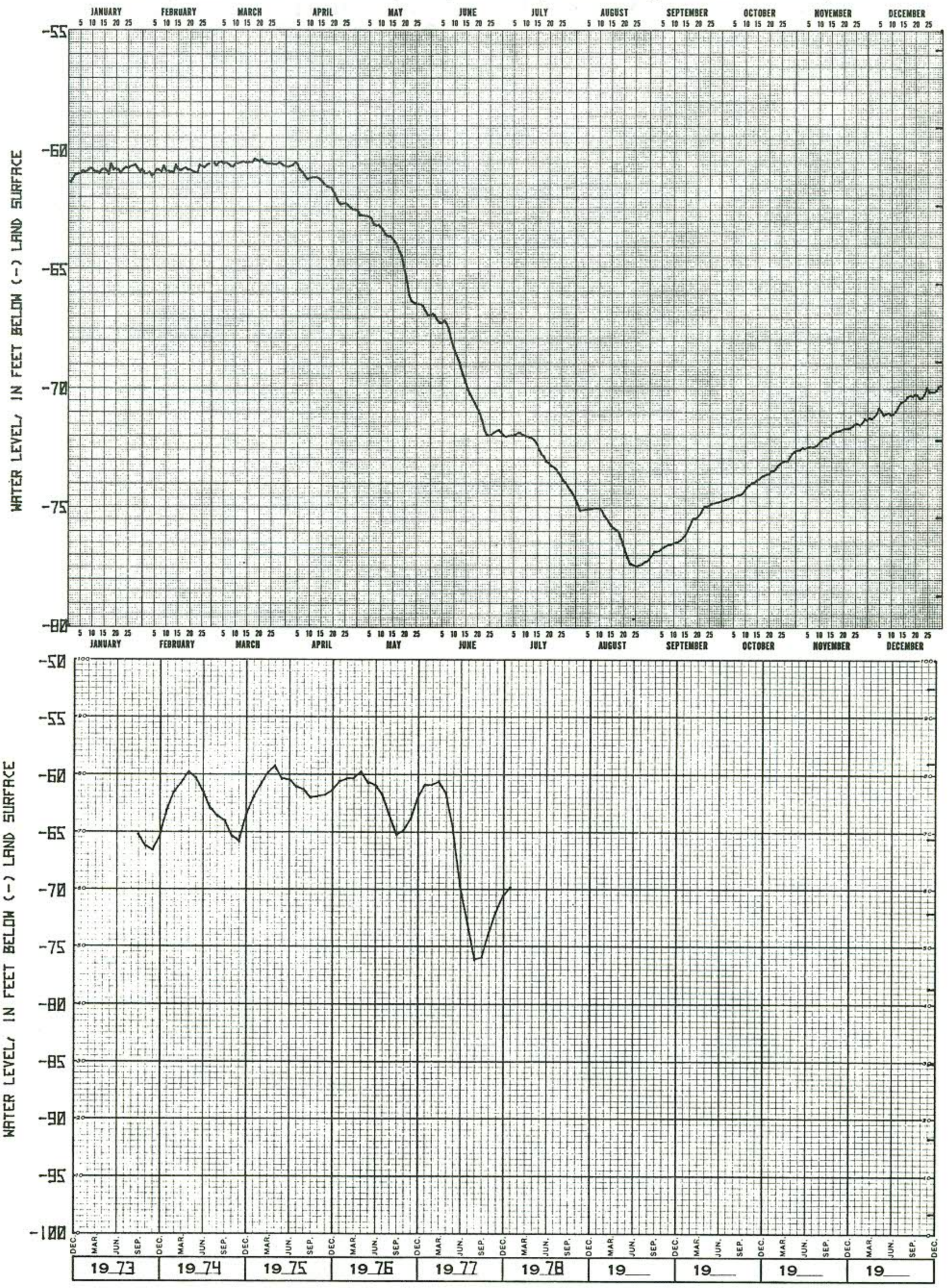
The Clayton Limestone aquifer supplies water for municipalities and agriculture in the central-west part of the Coastal Plain. Recharge to this aquifer is primarily from rainfall in the outcrop area. Where large quantities of ground water are needed, water is produced from the Clayton aquifer and from an underlying or overlying aquifer. In general, there have been no indications of long-term water-level declines except in those areas where the use of ground water for irrigation has increased.

New water-level low in August

Operation of nearby irrigation wells and reduced rainfall caused a pronounced water-level decline in the Game and Fish well that reached a new low during August. The August low was 11 feet below the low of the preceeding year. By the end of 1977 the level had recovered about 6 feet, but remained 8.5 feet below the level at the end of 1976.

3135300842032.01 Local number, 095 0019.
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.
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, 77.48 ft below land-surface datum, August 25, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



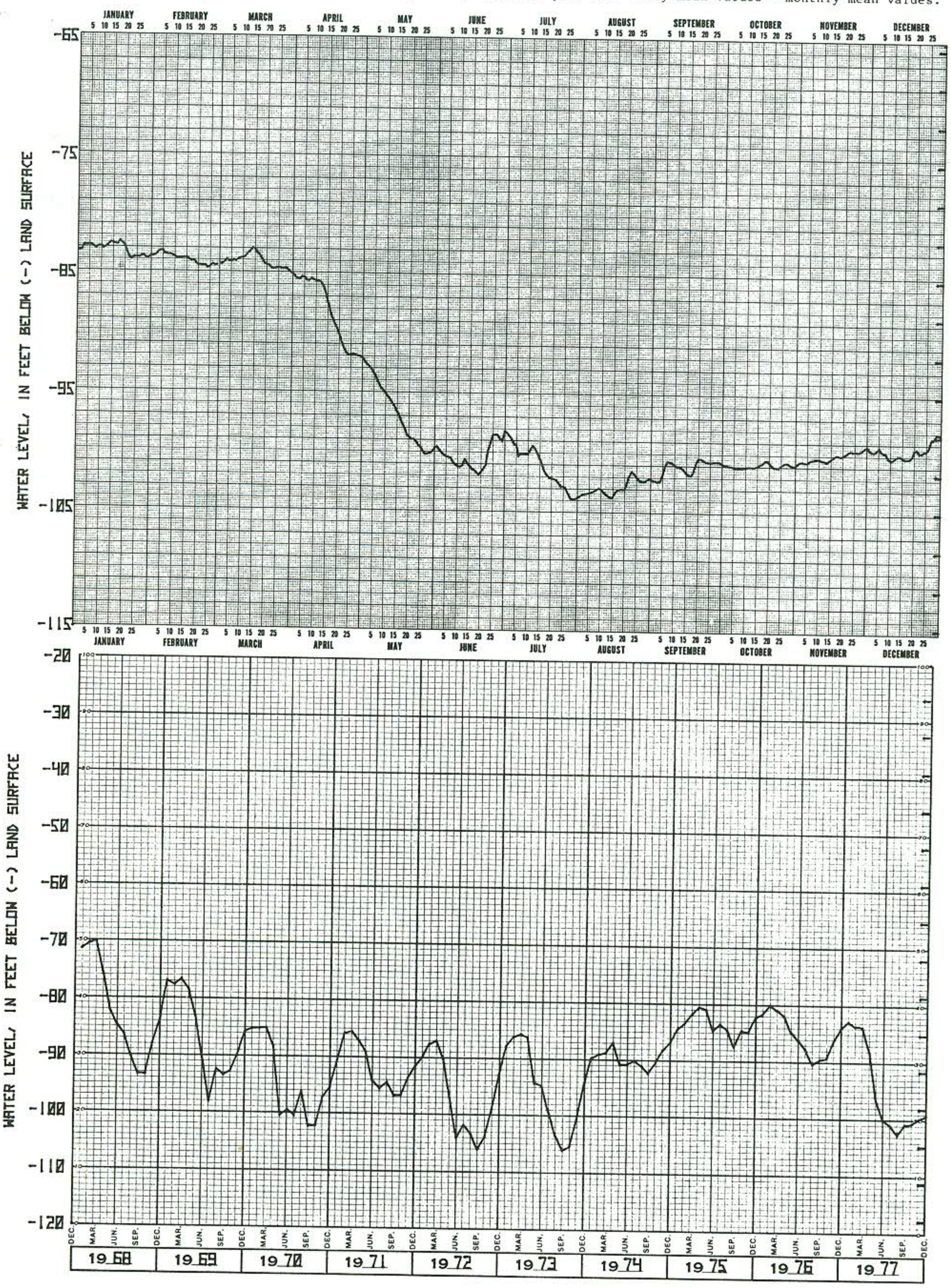
Water-level fluctuation in the Tallahassee Plantation observation well

Summer water level lowest in 4 years

The water level in the Turner City well was about 98 feet below land surface at the end of 1977, a decline of about 15 feet below the level at the end of 1976 and the lowest level reached in 4 years. The low of July 1977 was about 12 feet below that of August 1976, but remained about 4 feet above the record low of 1973. Average water levels in this well for the past 10 years show a cyclic fluctuation, but no long-term trend. Regional pumpage and precipitation are the main factors affecting the water level in this well.

3135540840626.01 Local number, 095 0001.
LOCATION.--Lat 31°35'52", long 84°06'26", 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, April 28, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted March 17, 1977.
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, 108.24 ft below land-surface datum, September 9, 1973.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Turner City observation well

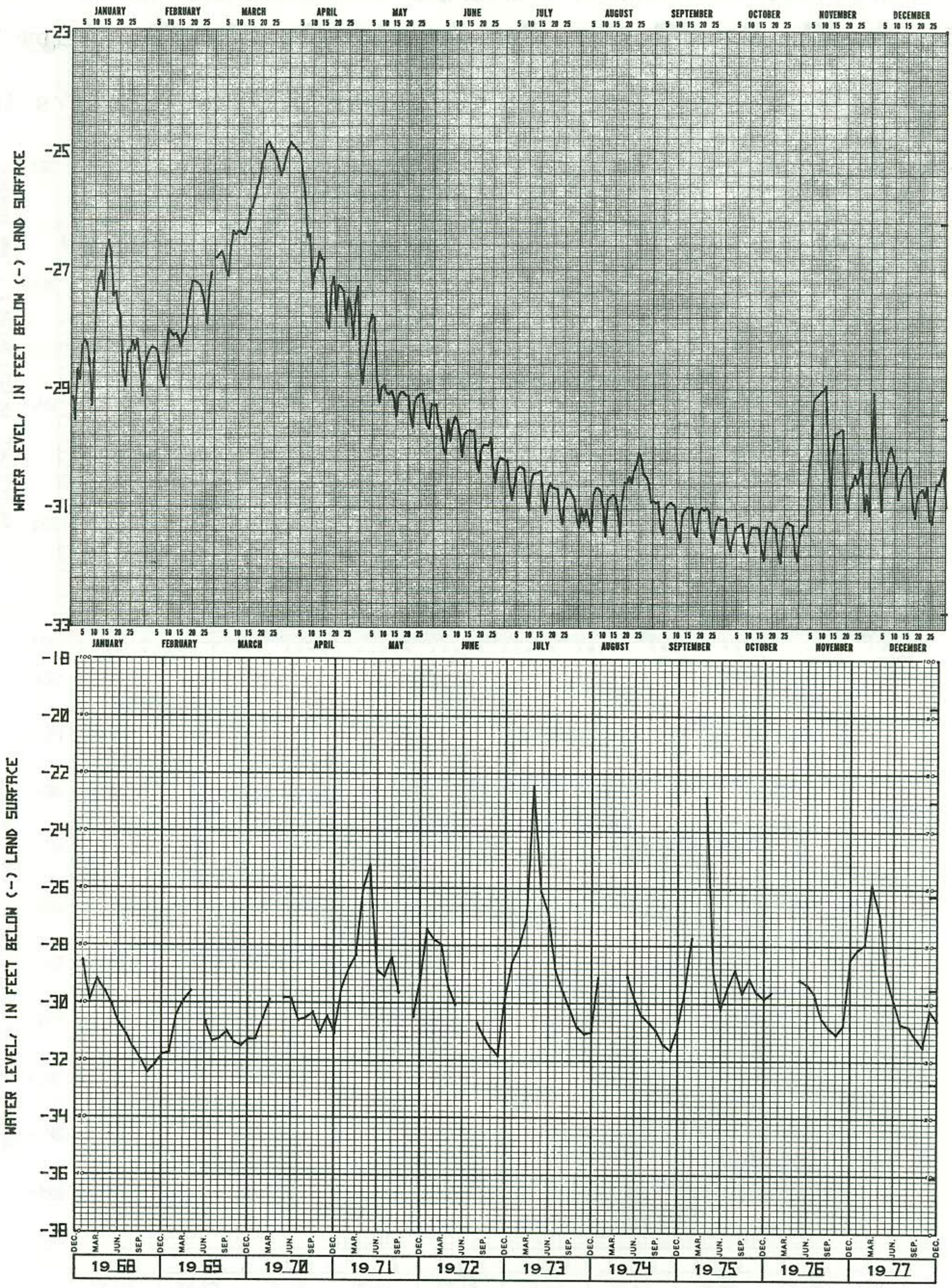
Water level controlled by reservoir and river stages

In the U.S. Army Corps of Engineers well the water level was 1.8 feet lower at the end of 1977 than at the end of 1976, but remained 4.9 feet above the record low of 1963. The low for 1977 was about 0.5 foot below that of the preceeding year.

Annual water-level fluctuations in this well of as much as 8 feet are controlled mainly by changing stages in Walter F. George Reservoir. Sharp, small-scale fluctuations occurring throughout the year reflect responses of the aquifer to changing river stages caused by the operation of the dam. Average water levels during the past 10 years do not indicate a long-term trend.

3136370850326.01 Local number, 061 0003.
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.--None.
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, 35.88 ft below land-surface datum, August 17, 1963.

Water level, in feet below land surface, calendar year 1977 daily mean values - monthly mean values.



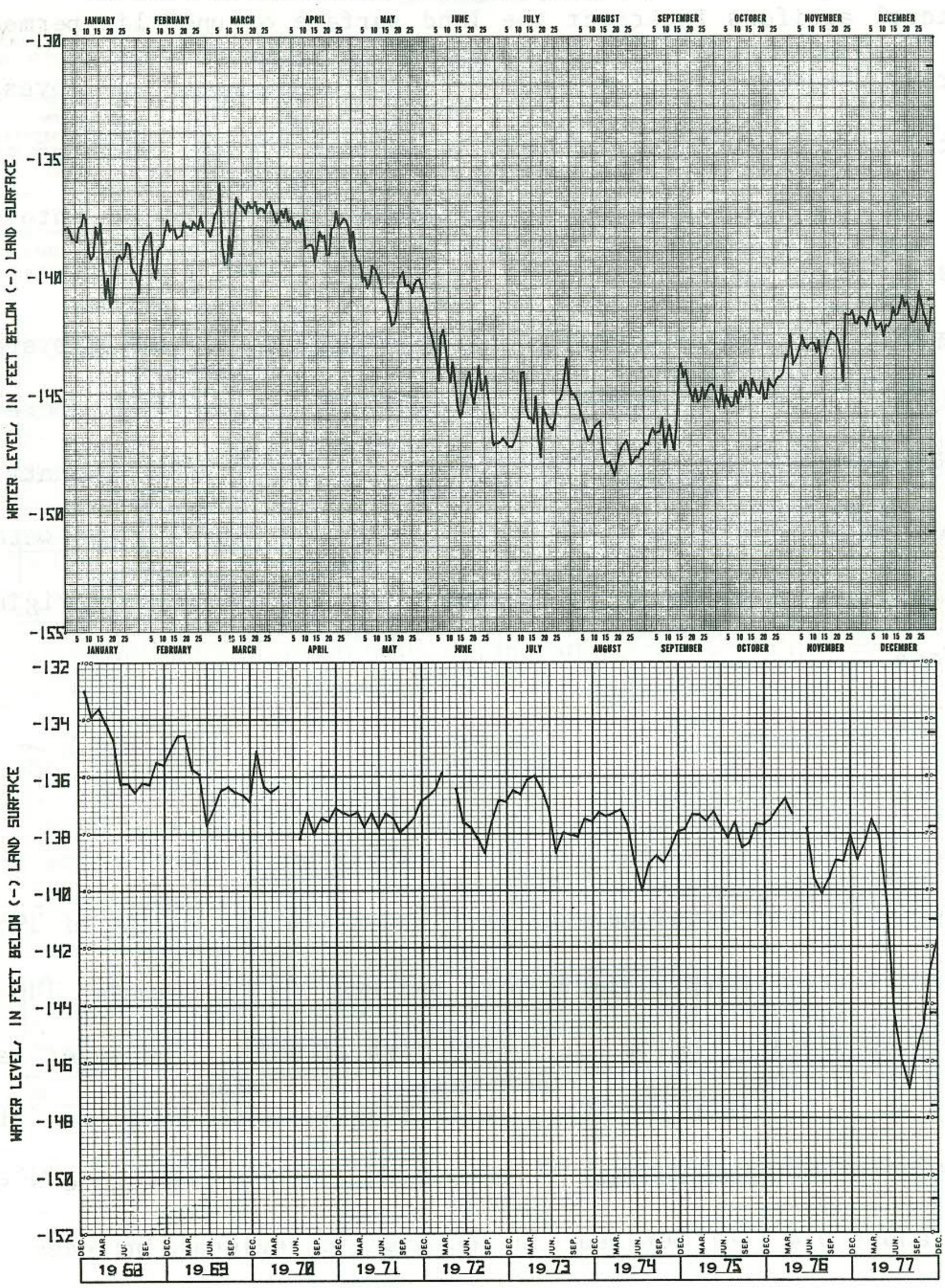
Water-level fluctuations in the Clay County observation well

Water level shows long-term decline

The combination of regional pumpage and deficient rainfall reduced the water level in the Cuthbert city well to a new low in August. From March to August the water level underwent a rapid decline of about 11.5 feet. By year end it had recovered about 7 feet, but remained nearly 4 feet below the level at the end of 1976. Average water levels during the past 10 years indicate a slight downward trend.

3146020844737.01 Local number, 243 0005.
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 Cuthbert.
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.--Unable to conduct geophysical survey due to local electrical interference.
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, 148.5 ft below land-surface datum, August 19, 1977.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Cuthbert 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 sediments and moves downgradient toward the southeast through the aquifer system. Most of the natural discharge from the aquifer system in the areas of major use is into streams and rivers crossing the outcrop area.

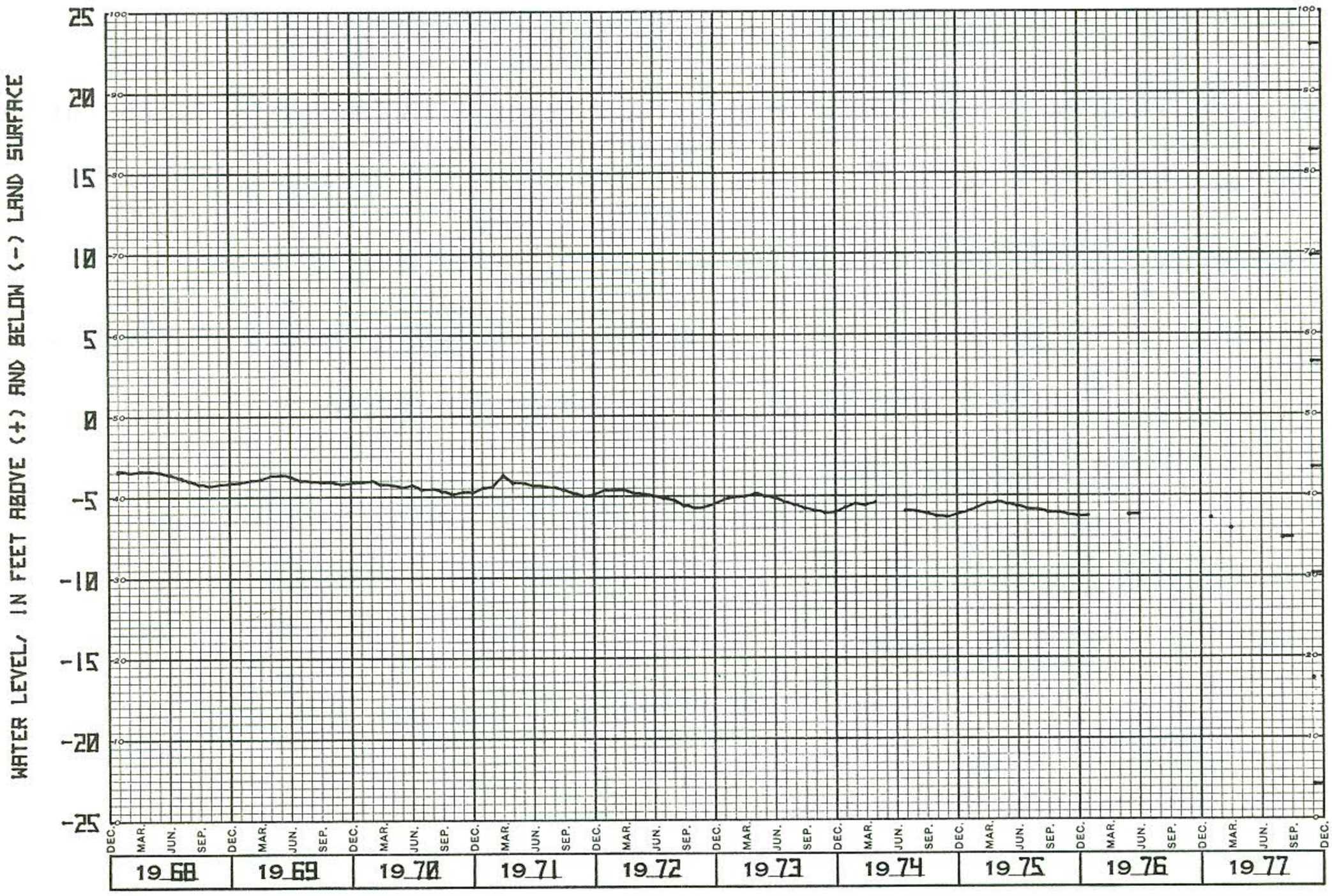
In general, water-level declines in the Cretaceous aquifer system have been negligible. The only exceptions have been in those areas where pumpage has been heavy: Houston-Twiggs Counties, northwest Wilkinson County, central Washington County, and the eastern part of Richmond County. The water-level declines in these areas vary from 10 feet to 40 feet below the original water-level surface.

Long-term water-level decline

The water level in the Fort Benning well during September was the lowest recorded for 1977, but remained 22.2 feet above the record low of 1958 that resulted from nearby heavy pumpage which has been discontinued. The September water level was 7.9 feet below the record high of 1964. The water level fluctuates only about 1.5 feet per year, reflecting seasonal variations in precipitation. During the past 10 years, the water level has undergone a steady decline of about 0.4 foot per year in response to regional increases in pumpage. The steady lowering seems to indicate a long-term trend of water-level decline.

3220360845903.01 Local number, 053 0002.
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 Group.
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.--None.
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, through calendar year 1977 monthly mean values.



Water-level fluctuations in the Fort Benning observation well

3.4 Coastal Plain Water-Table Aquifers

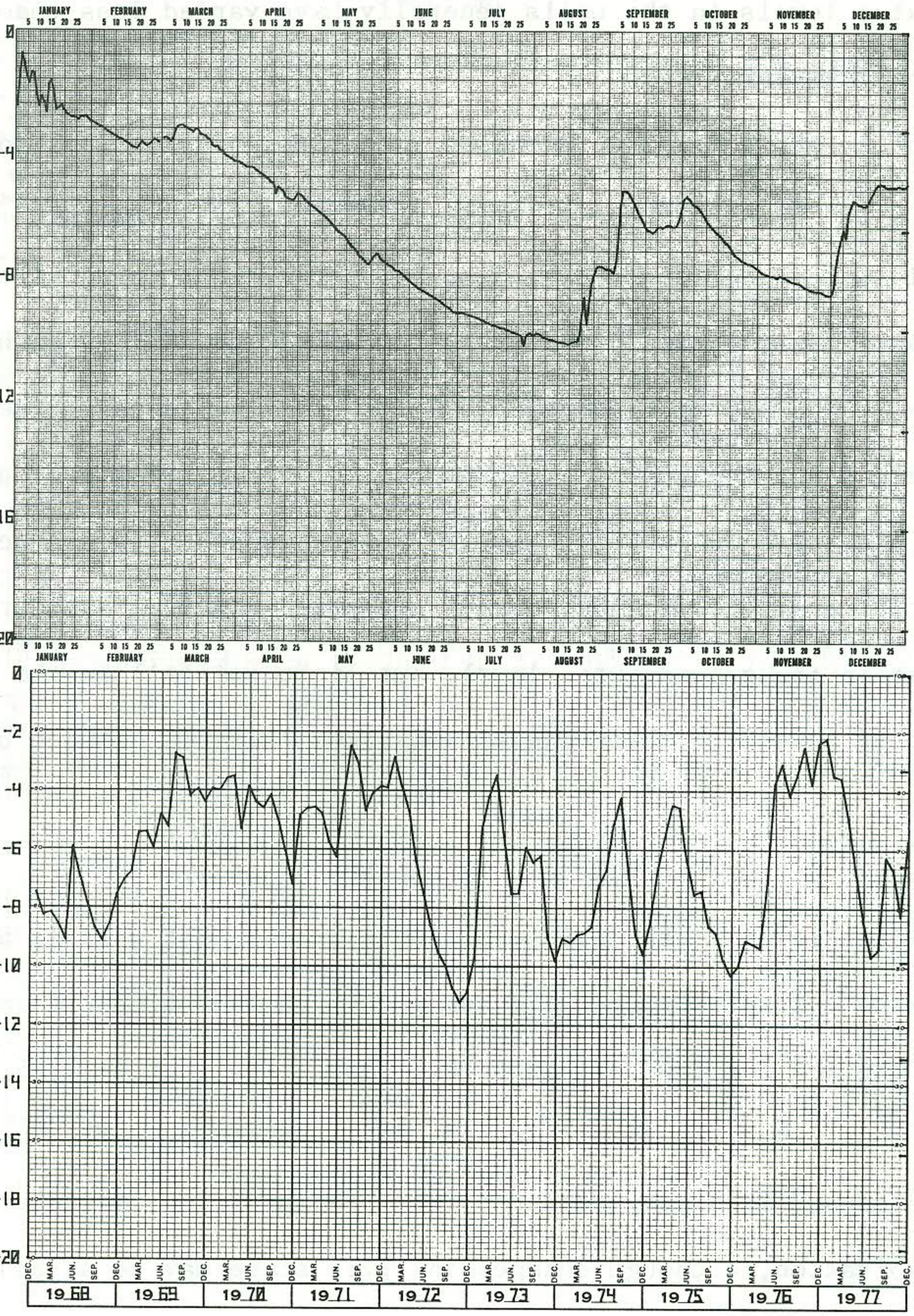
Shallow water-table aquifers in some areas of the Coastal Plain are used for domestic and stock supplies. Precipitation is the main factor affecting water levels in these aquifers. They respond rapidly to changes in precipitation and show marked seasonal fluctuations that correspond to variations in 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.

Water level slightly lower in 1977

In this shallow water-table well, precipitation is the main factor affecting the water level. At the end of 1977 the water level was 3.3 feet lower than at the end of 1976, but remained 7.7 feet higher than the record low reached in 1972. Yearly fluctuations in the water table generally range between 3 and 8 feet. The average water level over the period of record indicates no long-term trend.

315950081161 2.01 Local number, 051 0081.
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 ages.
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, Nov. 30, 1972.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the U.S.D.A. observation well

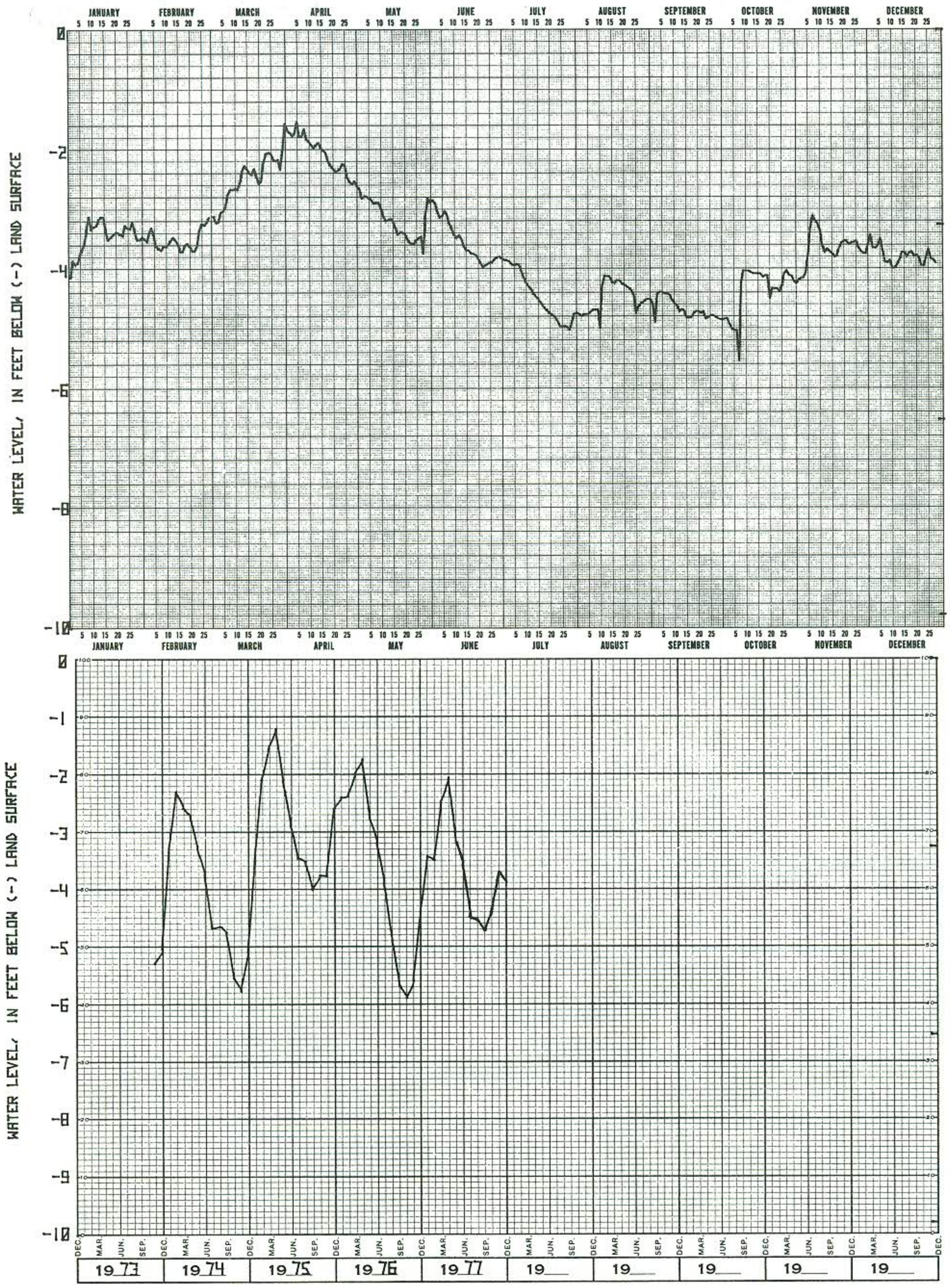
Net water-level change not significant

The water level in the Fort McPherson well was about 0.5 foot higher at the end of 1977 than at the end of 1976. The low-water level for the year was about 1.4 feet above the low of 1976, which also was the low of record.

The water table at the well site fluctuates between about 1 and 6 feet below the land surface. Rapid recharge from precipitation accounts for sharp water-level rises.

3342070842548.01 Local number, 121 0008.
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.
PERIOD OF RECORD.--November 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.77 ft below land-surface datum, March 19, 1975; lowest, 6.01 ft below land-surface datum, October 4, 1976.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



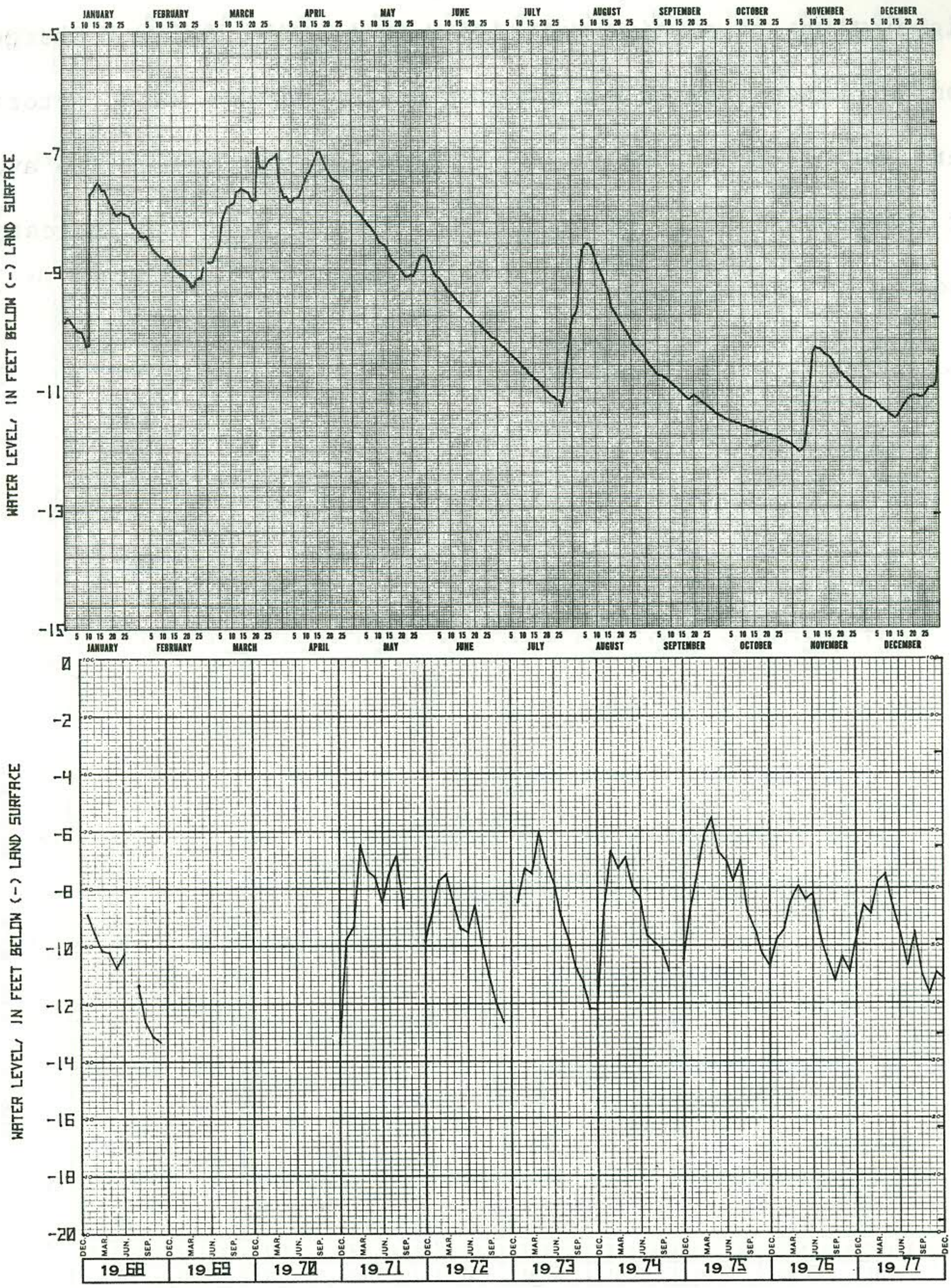
Water-level fluctuations in the Fort McPherson observation well

Water level nearly unchanged

Water level in the Dixie Pipe Line well was about 1 foot lower at the end of 1977 than at the end of 1976. The lowest water level for 1977 was 0.5 foot below that for 1976, but 1.6 feet above the record low of 1970. This well is in saprolite above bedrock and commonly shows a marked response to heavy mid-summer rainfall.

3308580841229.01 Local number, 171 0003.
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, 13.63 ft below land-surface datum, December 15, 1970.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



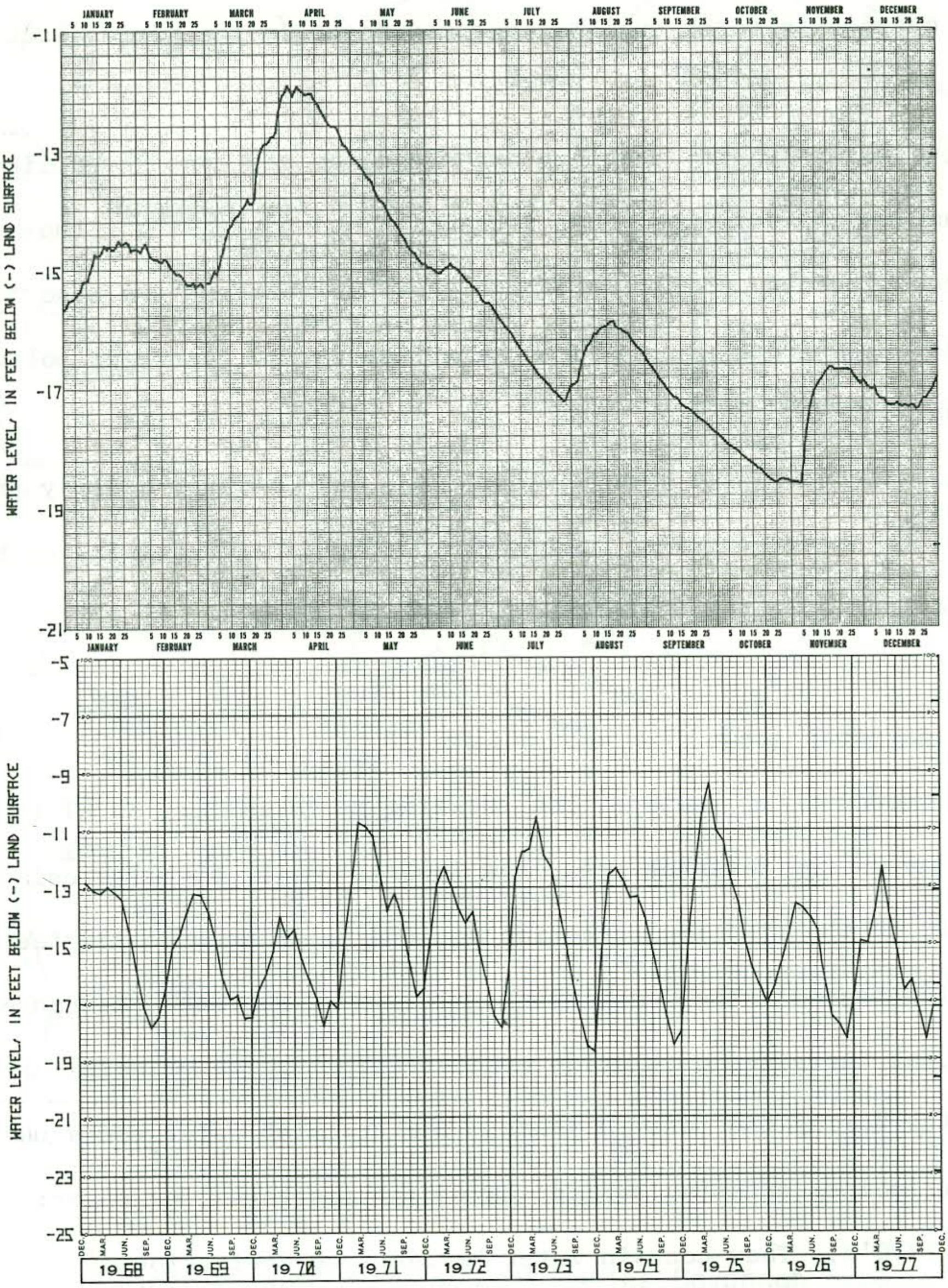
Water-level fluctuations in the Dixie Pipeline Co. observation well

Water level remains constant in 1977

The water level in the University of Georgia Experiment Station well was about the same at the end of 1977 as it was at the end of 1976. The low-water level for the year, about the same as that for the preceeding year, was nearly 3 feet higher than the alltime record low reached in 1943. Recharge from precipitation and water loss to evapotranspiration are the main factors controlling water-table fluctuations in the vicinity of this well. The average water level for the past 10 years has fluctuated about 2 feet and indicates no long-term trend.

3315070841718.01 Local number, 255 0004.
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, 21.08 ft below land-surface datum, December 8, 1943.

Water level, in feet below land surface, through calendar year 1977 daily mean values - monthly mean values.



Water-level fluctuations in the Spalding County observation well

4.0 GROUND-WATER QUALITY NETWORKS

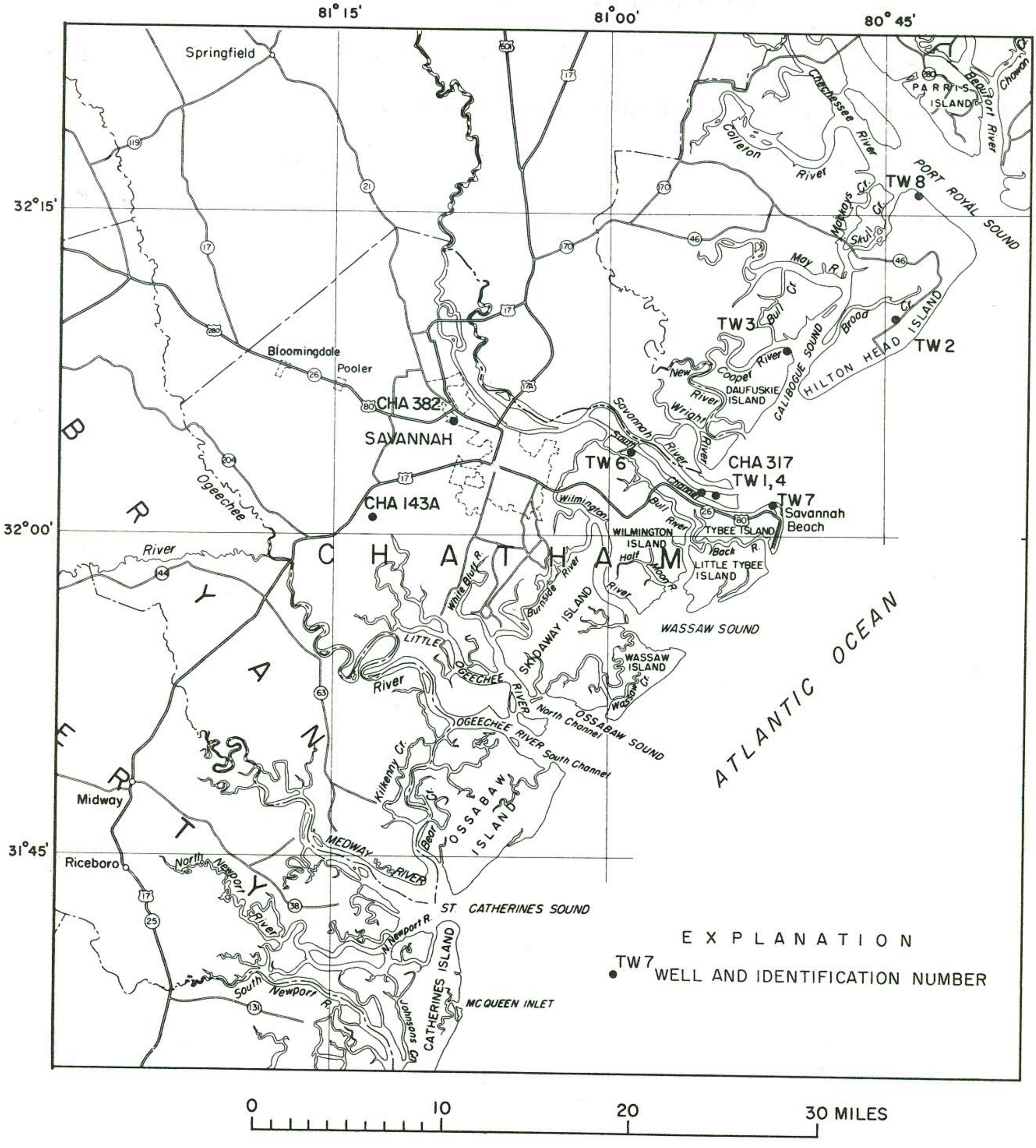
Water-quality samples are collected periodically throughout Georgia and analyzed as part of areal and regional ground-water studies. Wells in the water-level monitoring networks also are pumped and sampled periodically to note any changes in water quality that may occur in the various aquifers of Georgia.

Where water-quality problems are noted, or are considered likely to occur, samples are collected more frequently and analyzed for those 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 appear to be related to pumpage.

4.1 Savannah Area

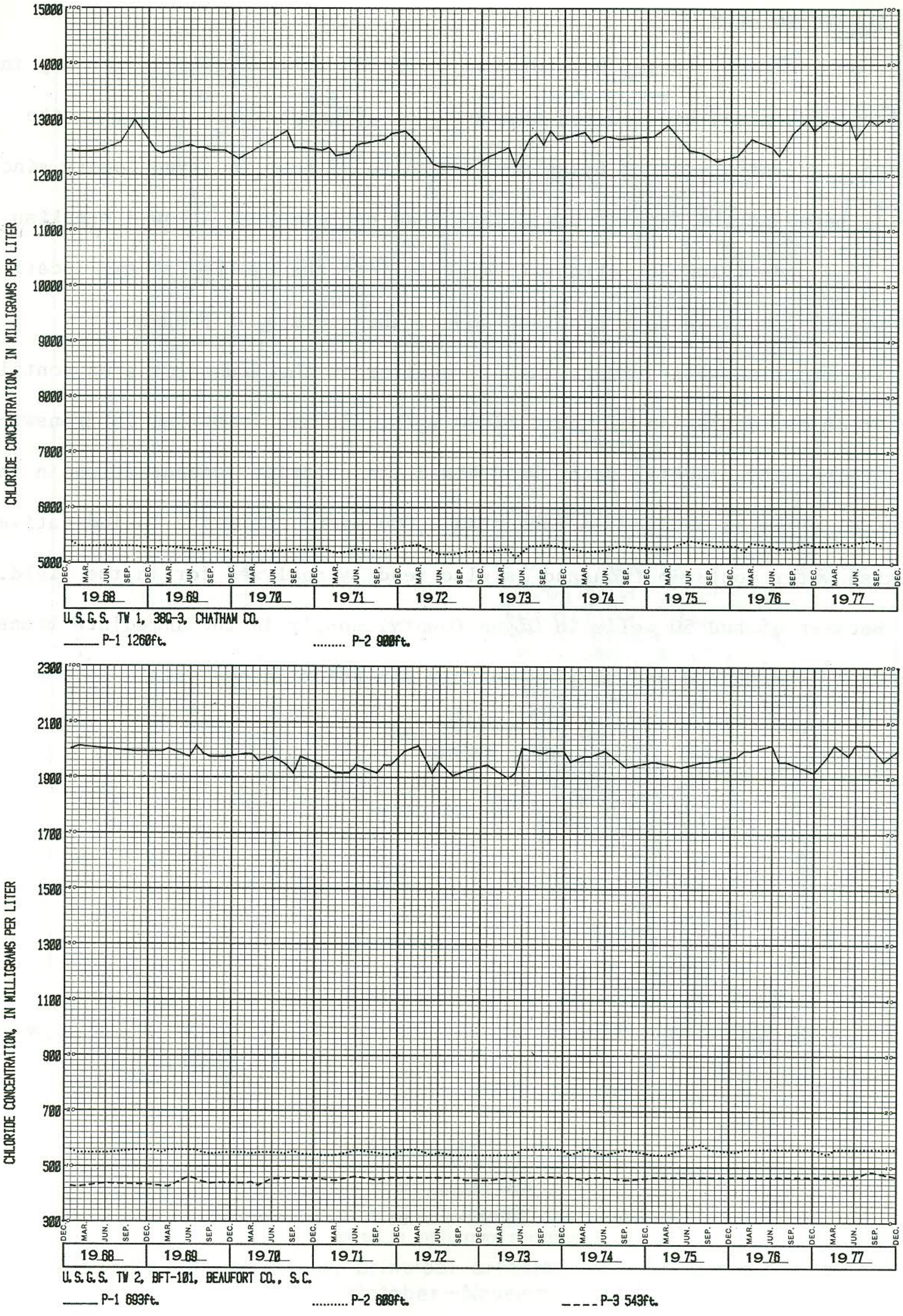
Ground-water pumpage, now totaling approximately 80 million gallons per day in the Savannah area, has lowered the head, or artesian water level, in the principal artesian aquifer by as much as 130 feet since pumping began in the late 1800's. This head decrease has caused no significant increase in chloride concentration in the principal artesian aquifer during the past 20 years. The brackish-water zones underlying the principal artesian aquifer have been monitored for chloride since the late 1950's. They contain water having a concentration of about 13,000 mg/L (milligrams per liter) of chloride. Approximately 10 wells in the Savannah area are pumped and sampled for chloride analysis.



Chloride-monitoring network in the Savannah area.

Chloride remains stable in the Savannah area

Test wells tapping the brackish-water zones beneath the principal artesian aquifer in the Savannah area have remained stable in choride concentration for the past 20 years. A slight increase was recorded in the deepest brackish-water zone (test well 1, zone P-1) in the last year and a half.



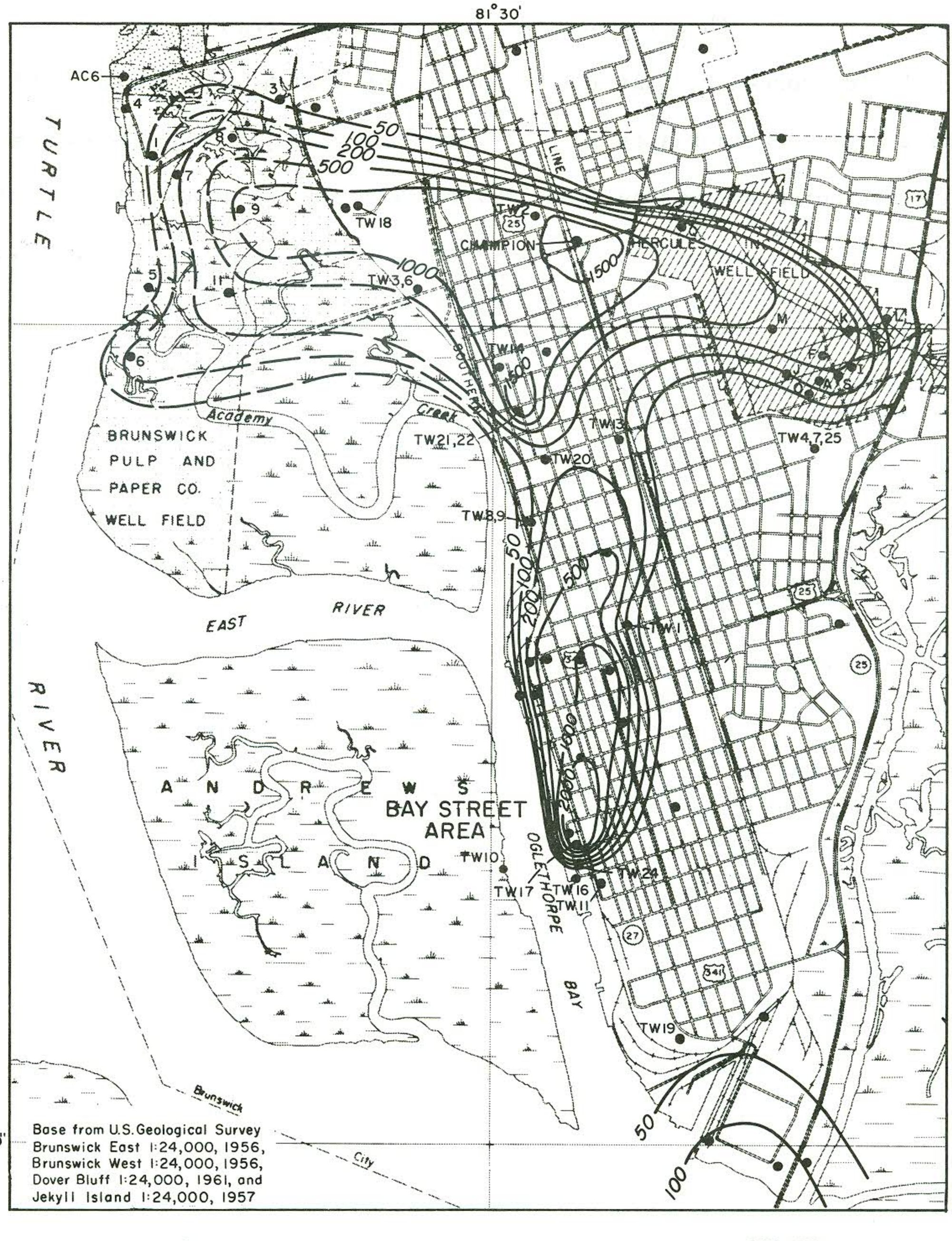
Chloride fluctuations in Chatham County test wells 1 and 2

4.2 Brunswick Area

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

The brackish water underlying the aquifer in the Brunswick area contains a chloride concentration of about 6,000 mg/L. At two locations in Brunswick, contamination by brackish water has raised the chloride concentration in the principal artesian aquifer to more than 2,000 mg/L. Chloride is indicative of brackish water contamination and is also readily analyzed for in the field.

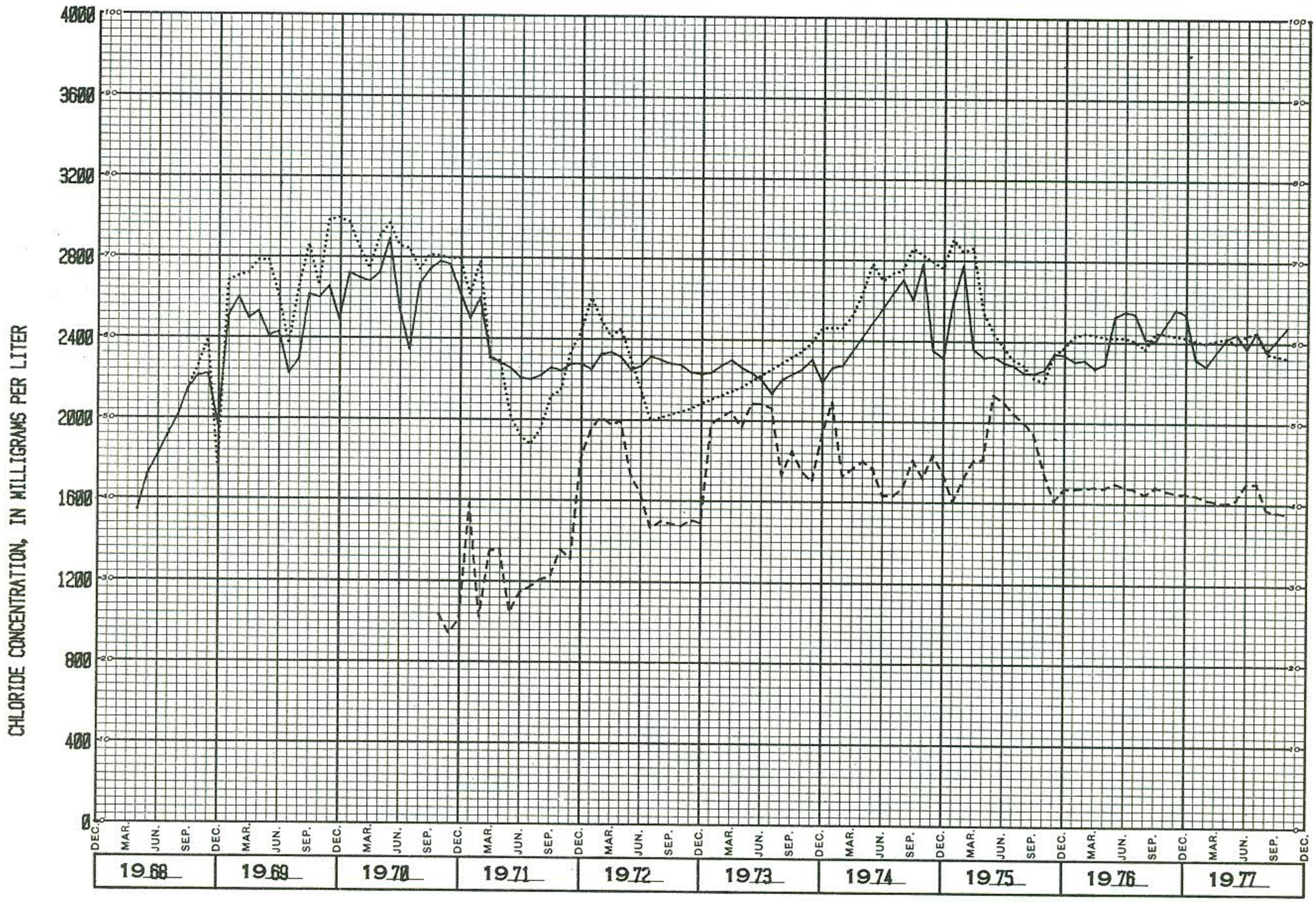
Between 45 and 50 wells in Glynn County, mostly in the immediate Brunswick area, are pumped and sampled monthly for chloride analysis.



Chloride concentration, principal artesian aquifer, Brunswick area, October—November 1977.

Chlorides concentrations remain stable

Chloride concentrations in the Bay Street area have remained stable for the past 2 years. Increases in past years have been in response to temporary periods of increased pumping from 1969 to 1970 and again from 1974 to 1975.



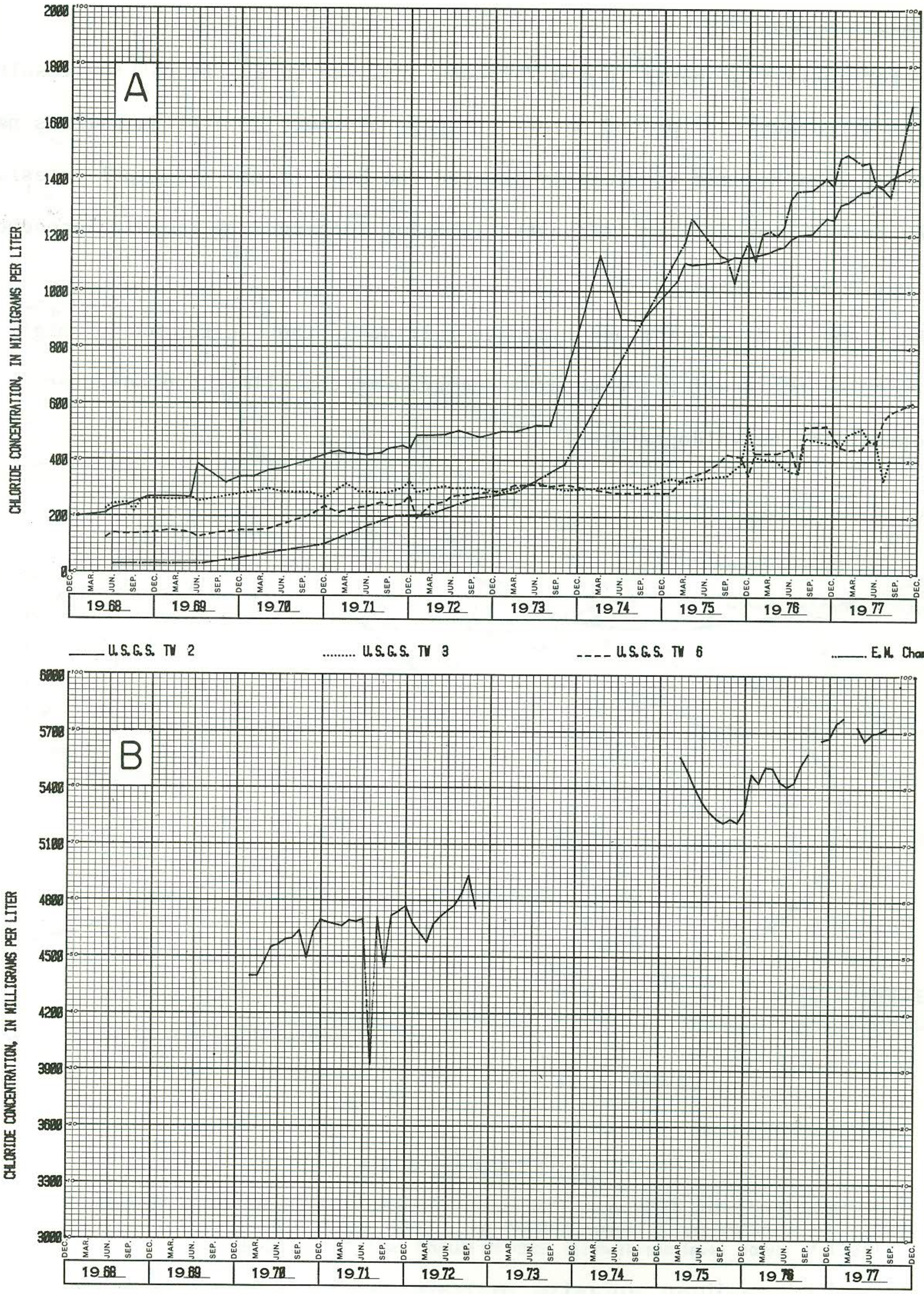
Chloride fluctuations in wells 16, 17, and 24 in the Bay Street area

Chloride continues to rise in north Brunswick

Chloride concentrations continue to rise in the north Brunswick area. Since 1973 there has been a sharp increase in chloride concentration in the vicinity of test well 2. This increase may indicate a new point of brackish-water leakage into the principal artesian aquifer.

Chloride in test well 19 continues to rise

Test well 19 taps a brackish-water zone beneath the principal artesian aquifer. The chloride concentration in this well continues to increase. This indicates that saltwater is invading the aquifer from a deeper source in the cavernous limestone.

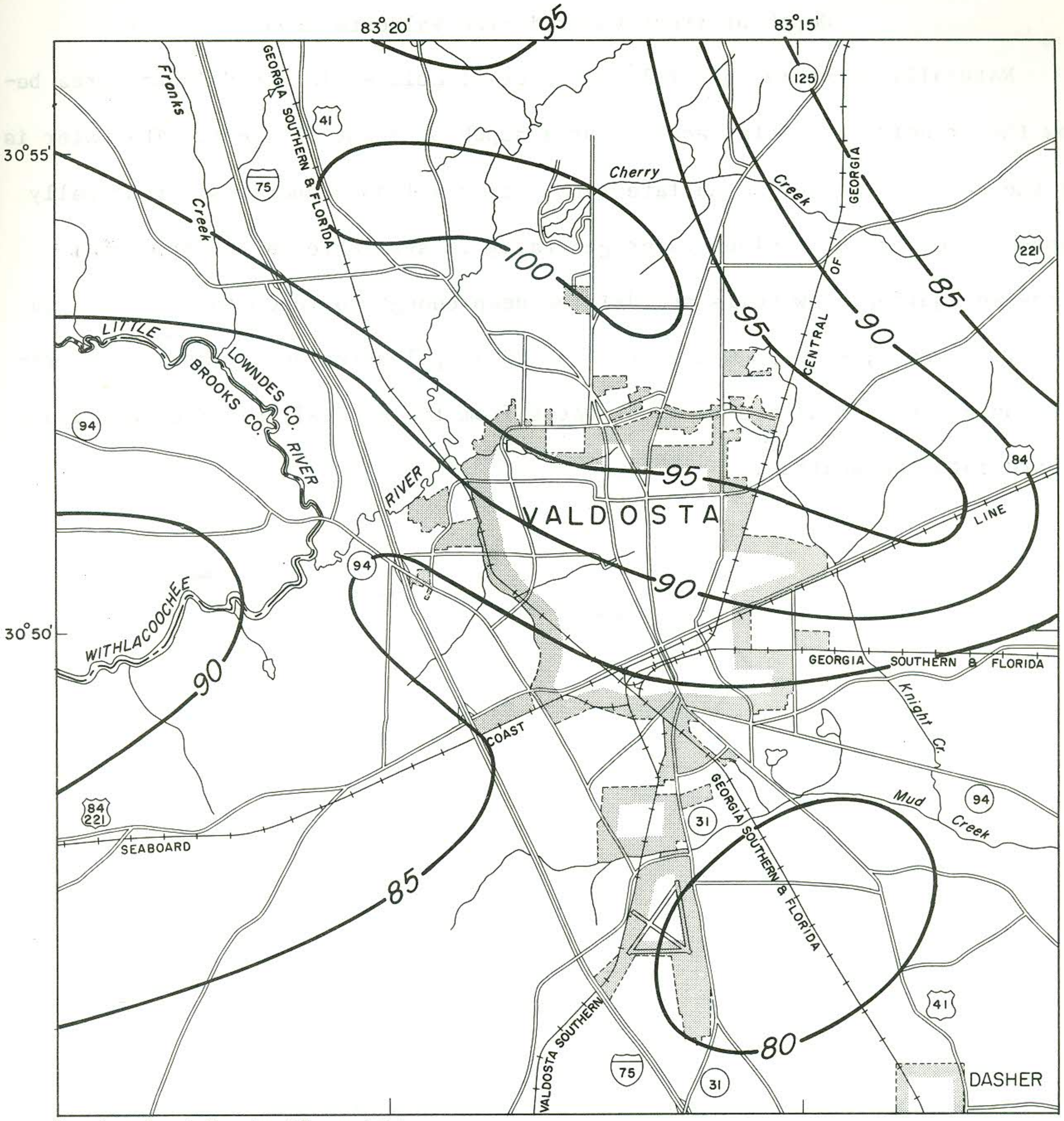


Chloride fluctuations in the North Brunswick area (A) and in test well 19 (B)

4.3 Valdosta Area

Water-quality problems in the Valdosta area are generally not the result of large withdrawals of ground water. Pumpage of about 22 million gallons per day in the area has not appreciably lowered the head in the principal artesian aquifer because the aquifer is constantly being recharged by the Withlacoochee River north of Valdosta.

Problems of high color and hydrogen sulfide in the aquifer and of high sulfate below the aquifer are natural occurrences that limit ground-water development in the Valdosta area.



Base from Georgia Department Transportation
county highway maps 1:63,360

0 1 2 3 4 MILES

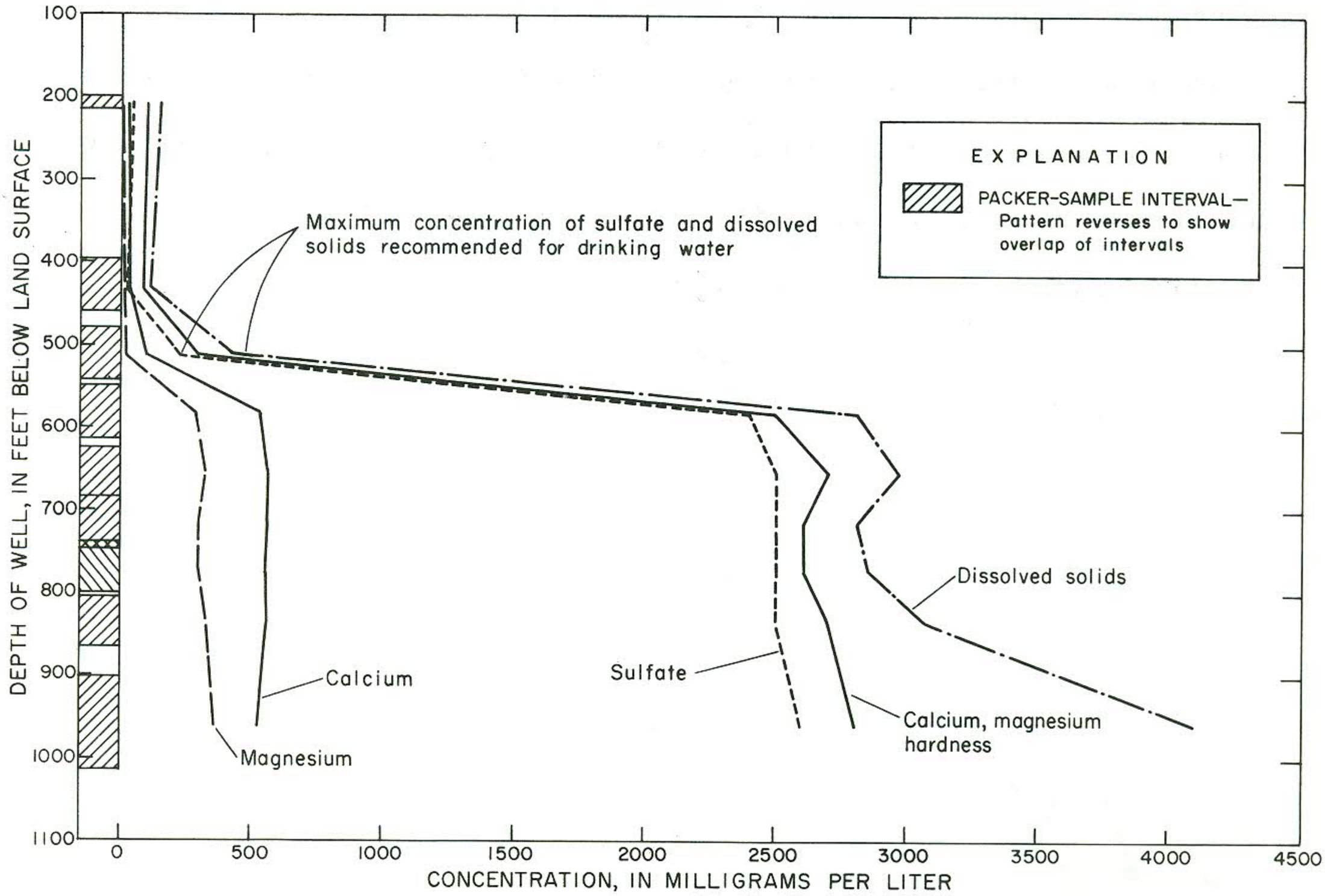
EXPLANATION

—85— WATER–LEVEL CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Contour interval 5 feet. Datum is NATIONAL GEODETIC VERTICAL DATUM OF 1929 (formerly sea level datum of 1929).

Water–level surface of the principal artesian aquifer, Valdosta area, November 1977 (from Krause, 1978).

Depth of fresh water in the Valdosta area

Naturally occurring mineralized water circulates in the Valdosta area below the principal artesian aquifer at a depth of about 550 feet. The water is of the calcium, magnesium sulfate type, derived from evaporites, principally gypsum. Because sufficient water generally is available in the principal artesian aquifer, few wells are drilled deep enough to reach the mineralized water. However, heavy pumpage from the principal artesian aquifer could create enough head imbalance to allow water from the mineralized zone to migrate upward into the aquifer.

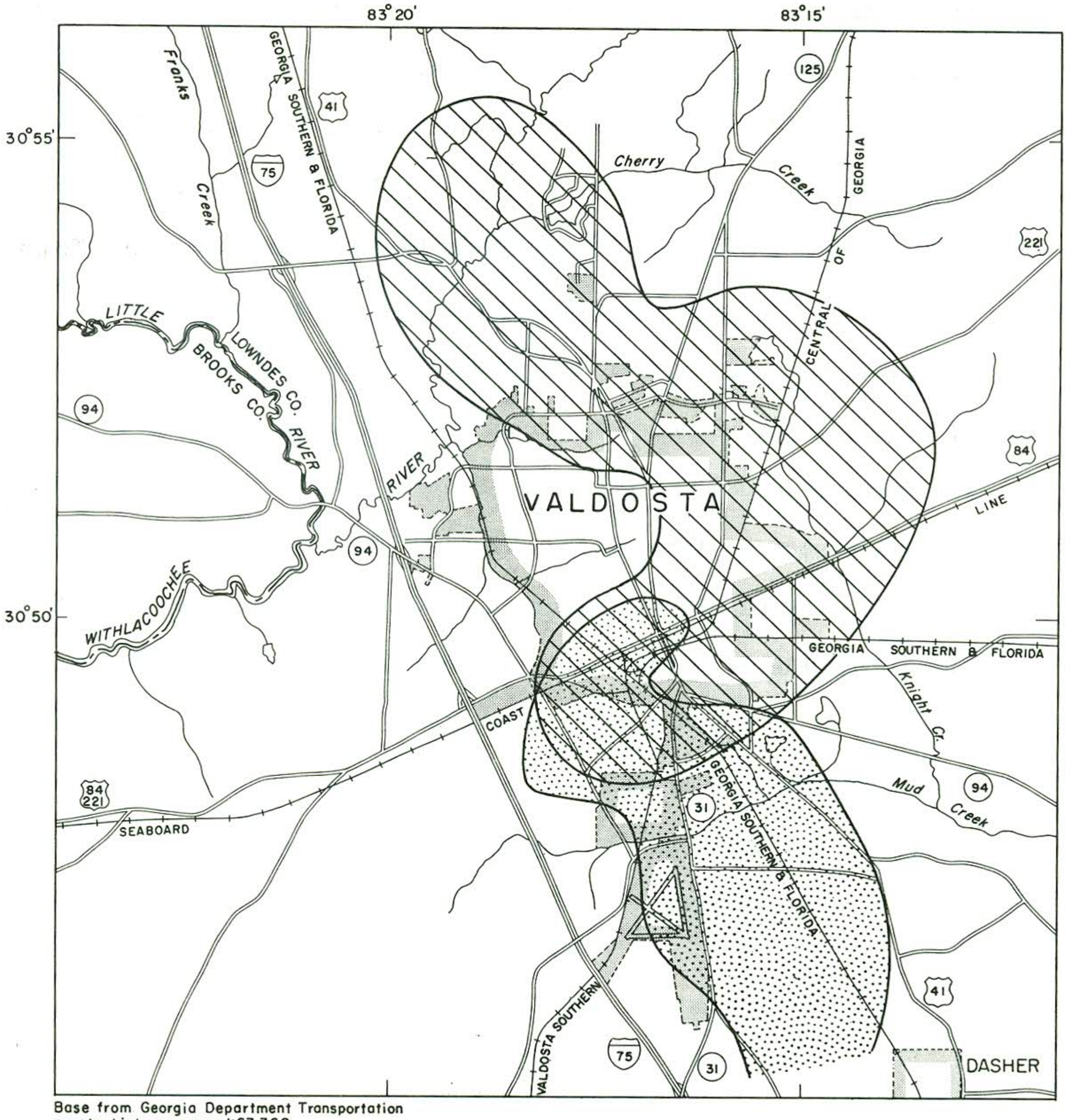


Relation of magnesium, calcium, sulfate, dissolved solids, and calcium magnesium hardness with depth, test well 1, Valdosta (from Krause 1978).

Water-quality problems in the Valdosta area

Color in water from the principal artesian aquifer locally is a problem in the Valdosta area. The color results from the aquifer being recharged by water from the Withlacoochee River north of Valdosta. The highly colored recharge water moves downgradient through the permeable limestone and is withdrawn by wells before much quality improvement occurs.

Hydrogen sulfide gas is present in water from the principal artesian aquifer as a result of the reduction of naturally occurring sulfate to sulfide. In the Valdosta area, a direct correlation exists between the concentrations of hydrogen sulfide and sulfate.



Base from Georgia Department Transportation county highway maps 1:63,360

EXPLANATION

AREA WHERE HYDROGEN SULFIDE IS GREATER THAN 1.0 MILLIGRAM PER LITER

AREA WHERE COLOR IS GREATER THAN 15 PLATINUM-COBALT UNITS

Areas where wells tapping the upper part of the principal artesian aquifer in the Valdosta area yield water high in hydrogen sulfide and color, 1975 (from Krause, 1978).

5.0 SELECTED REFERENCES

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Krause, R. E., 1972, Effects of ground-water pumping in parts of Liberty and McIntosh Counties, Georgia, 1966-70: Georgia Department of Natural Resources Information Circular 45, 15 p.

_____1976, Occurrence and distribution of color and hydrogen sulfide in water from the principal artesian aquifer in the Valdosta area, Georgia: U.S. Geological Survey Open-File Report 76-378, 11 p.

_____1978, Geohydrology of Brooks, Lowndes, and western Echols Counties, Georgia: U.S. Geological Survey Water-Resources Investigations 78-117, 82 p. [in press].

☆ U.S. GOVERNMENT PRINTING OFFICE: 1979—641-682/6261