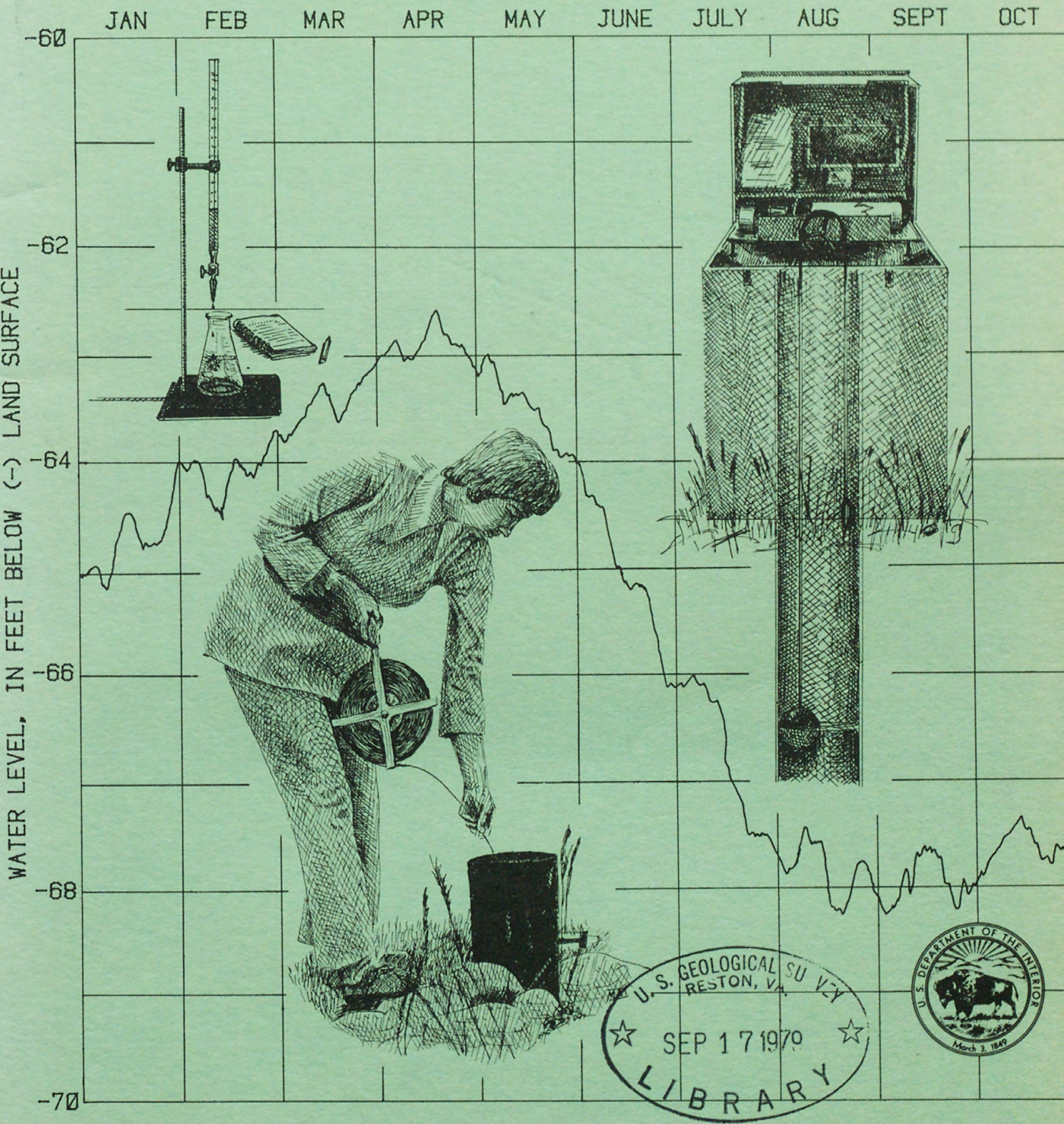
GROUND-WATER LEVELS AND QUALITY DATA FOR GEORGIA, 1978



OPEN-FILE REPORT 79-1290

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

Open-File Report 79-1290

For additional information write to:

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GROUND-WATER LEVELS AND QUALITY DATA

FOR GEORGIA, 1978

By J. S. Clarke, W. G. Hester, and M. P. O'Byrne

Open-File Report 79-1290

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

Doraville, Georgia

August 1979

PREFACE

This report was prepared 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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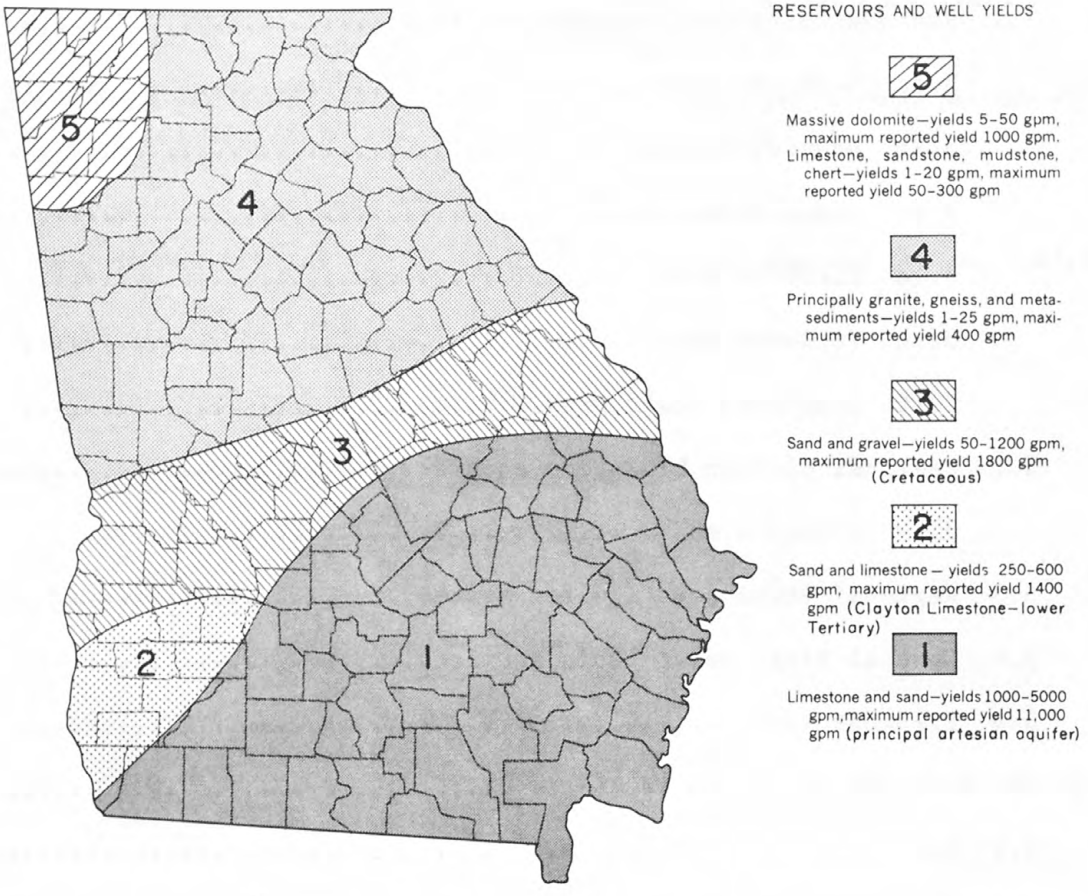


GROUND WATER RESERVOIRS

1.0 INTRODUCTION

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

This report continues 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 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 for the previous 10 years 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 ground-water levels is essential to the understanding of storage changes 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 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.

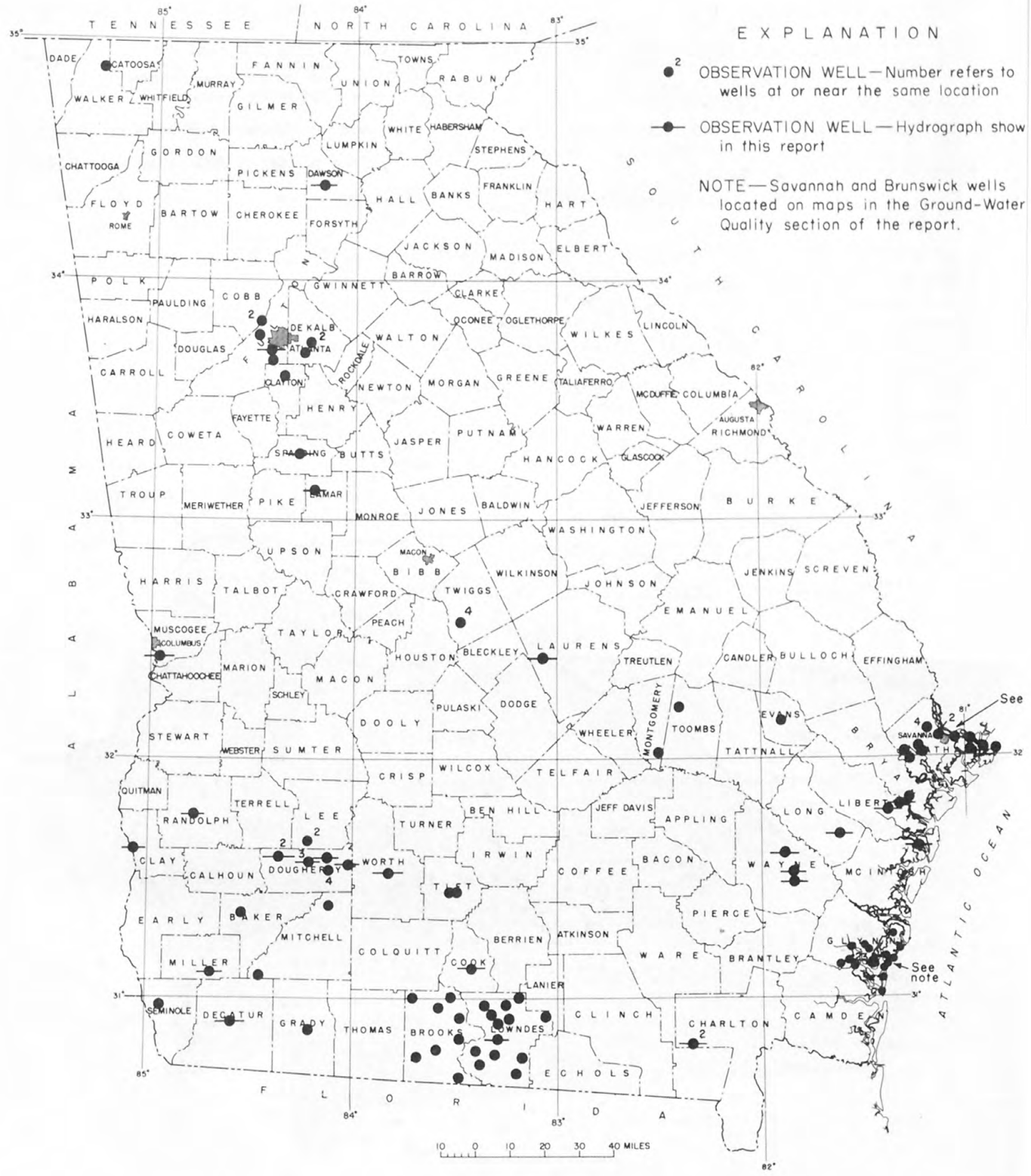
2.0 WATER-LEVEL MEASUREMENT PROGRAM, 1978

More than 2,000 water-level measurements made in Georgia in 1978 provided the basic data for this report.

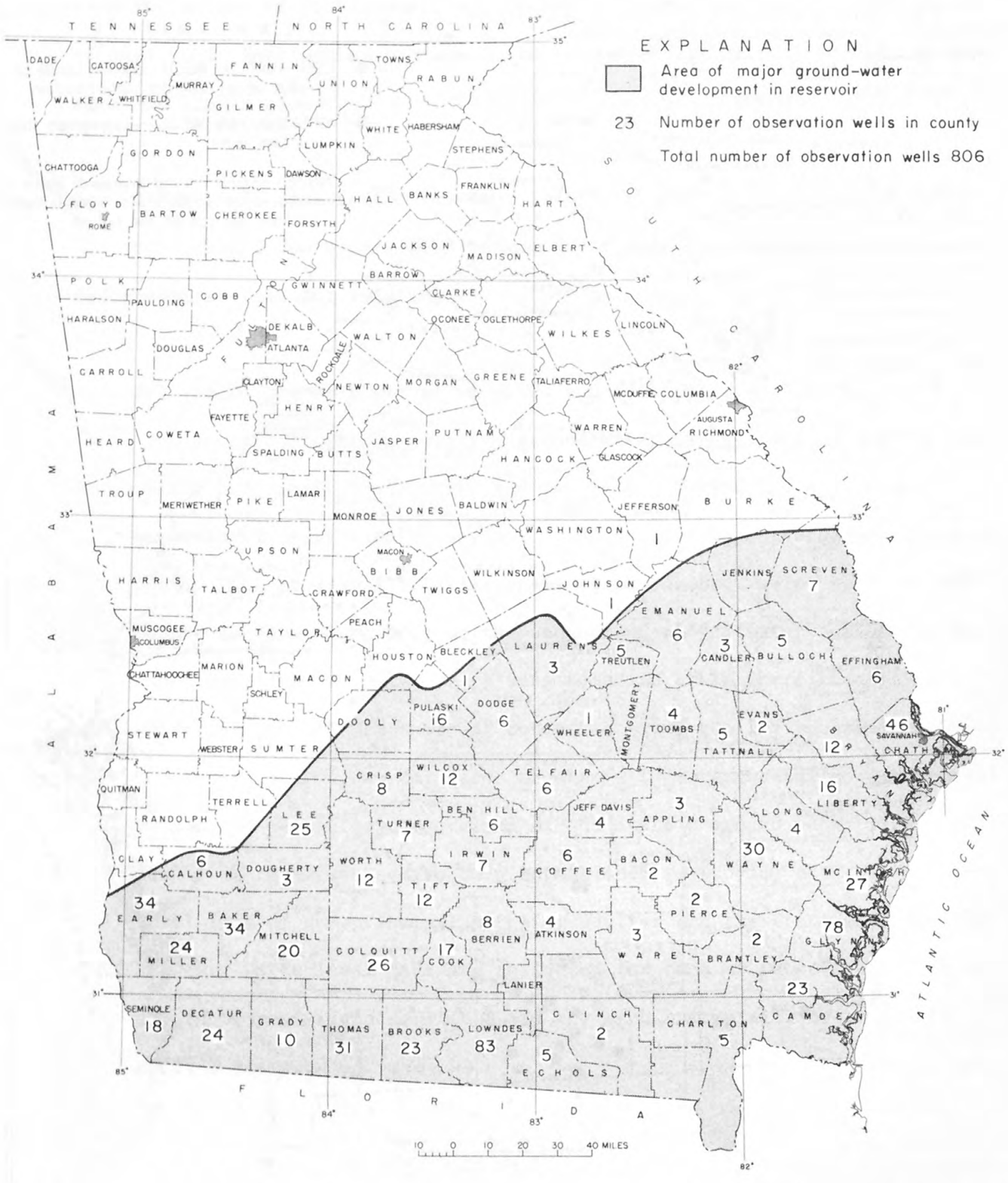
2.1 Locations of Observation Wells and Availability of Data

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.

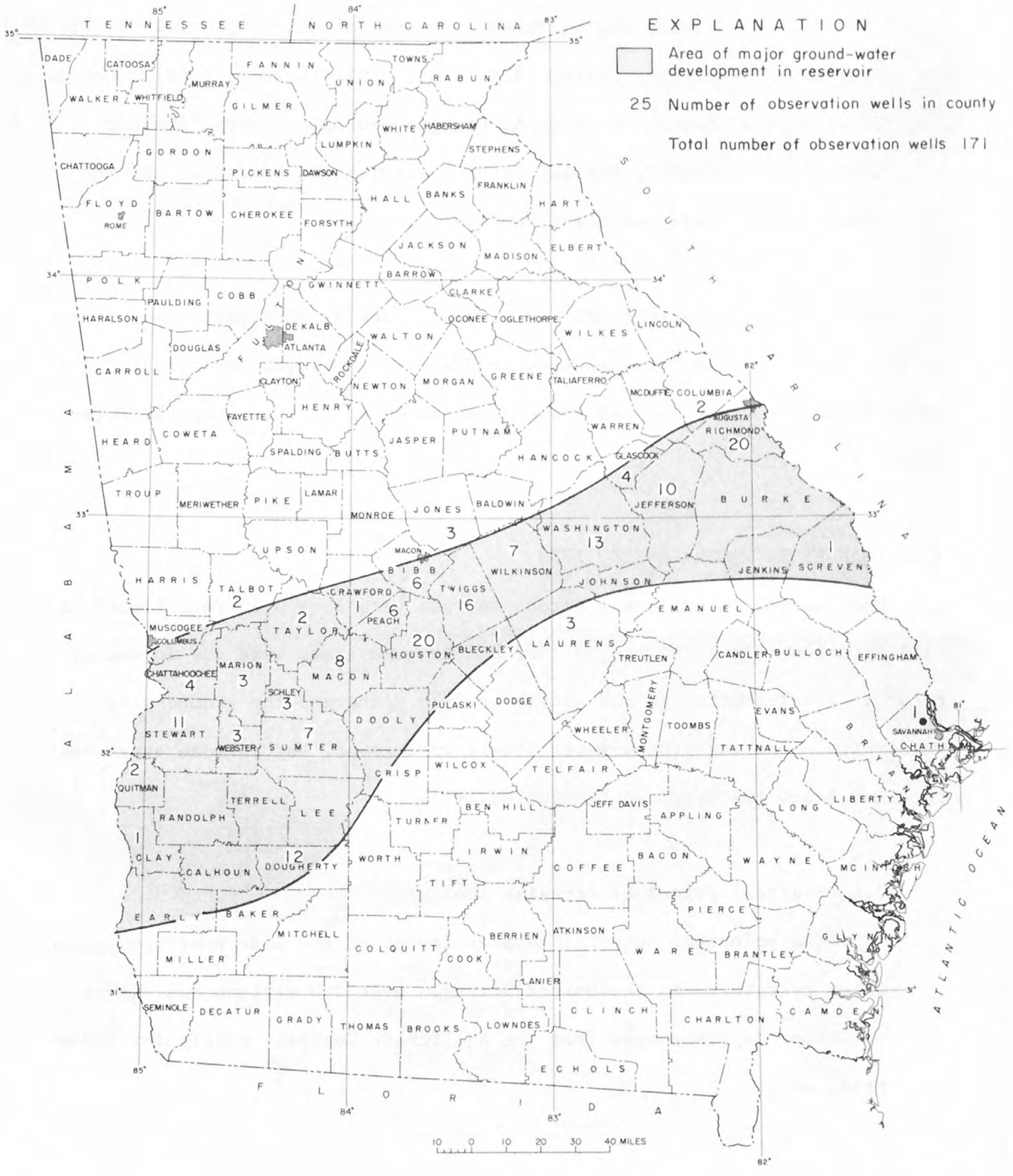
Additional networks became necessary to obtain detailed water-level data for a generalized appraisal of the State's ground-water resources. Two of these networks have been established to provide data for water-level maps of the principal artesian aquifer and the Cretaceous aquifer system. Water-level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



ROUND-WATER LEVEL NETWORK FOR RESERVOIR 1 (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 1978 is 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.

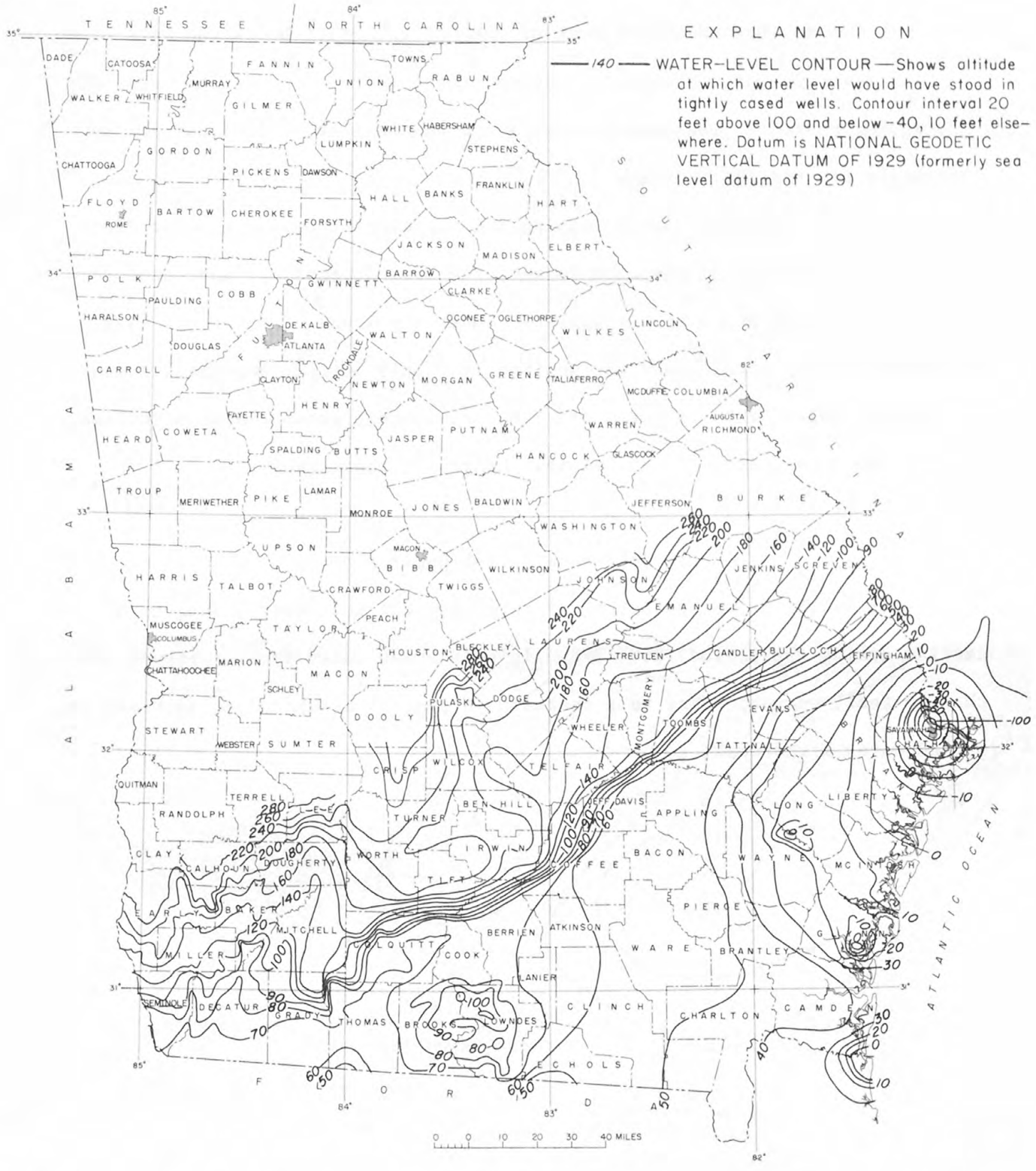
Records of all water-level measurements made in observation wells used in this report may be obtained upon request from the U.S. Geological Survey, Water Resources Division, 6481 Peachtree Industrial Blvd., Suite B, Doraville, GA 30360.

3.0 CHANGES IN WATER LEVELS, 1978

Mean annual water levels across Georgia were from 0.25 foot higher to 11.4 feet lower in 1978 than in 1977 and in some areas were the lowest of record. Precipitation in the winter of 1978 recharged the ground-water reservoirs, enabling ground-water levels to recover, but in some areas they remained below the level at the end of 1977.

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 is pumped from the aquifer in Georgia, mostly for industrial use.



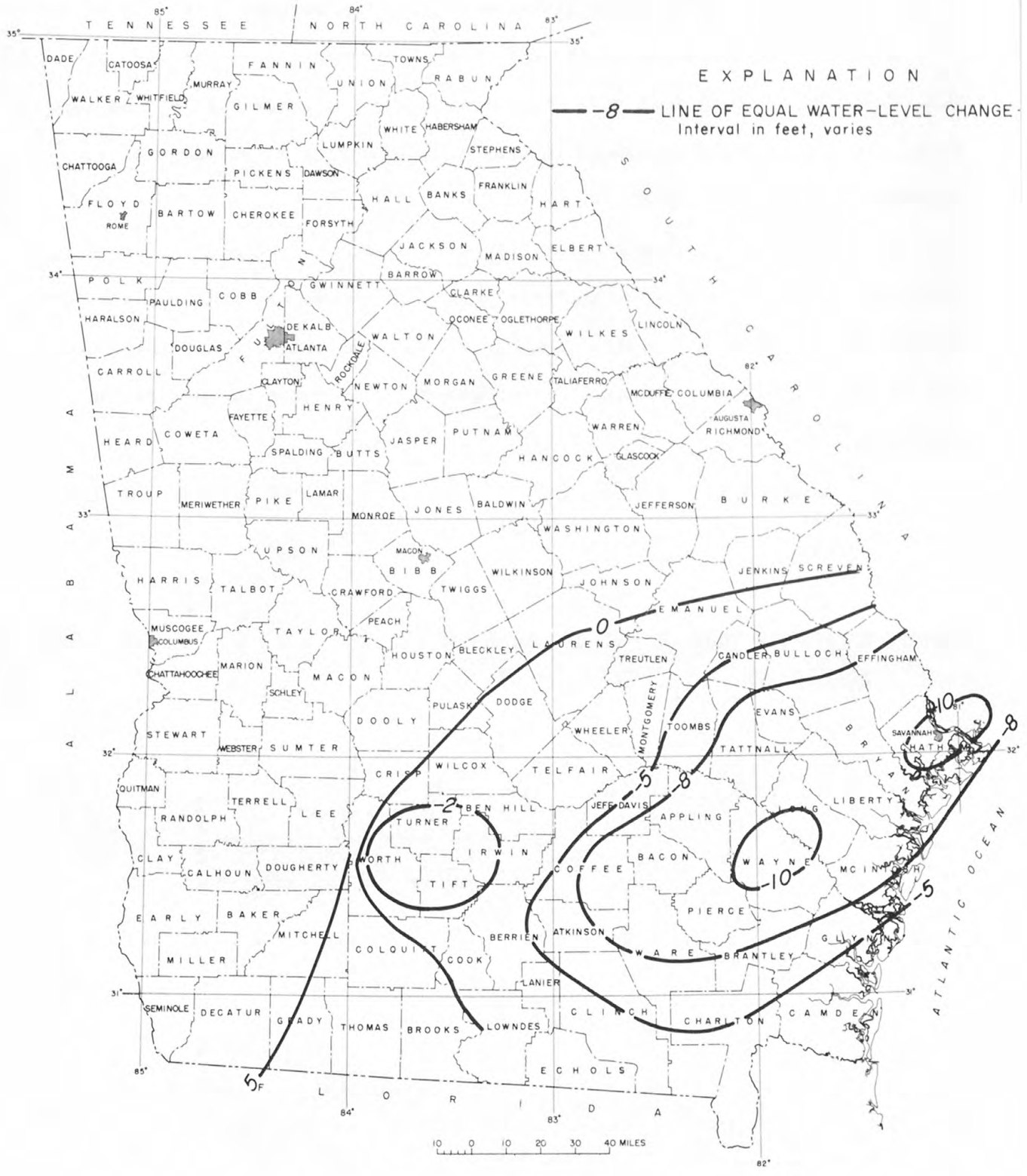
WATER-LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER) IN GEORGIA
NOVEMBER - DECEMBER 1978

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.

10-Year Water-Level Decline

Water levels in the principal artesian aquifer underwent a long-term decline during the period 1969-1978. In some areas water levels dropped more than 10 feet, corresponding to a decrease in precipitation and an increase in ground-water withdrawal.



WATER-LEVEL DECLINE, PRINCIPAL ARTESIAN AQUIFER, 1969-78.

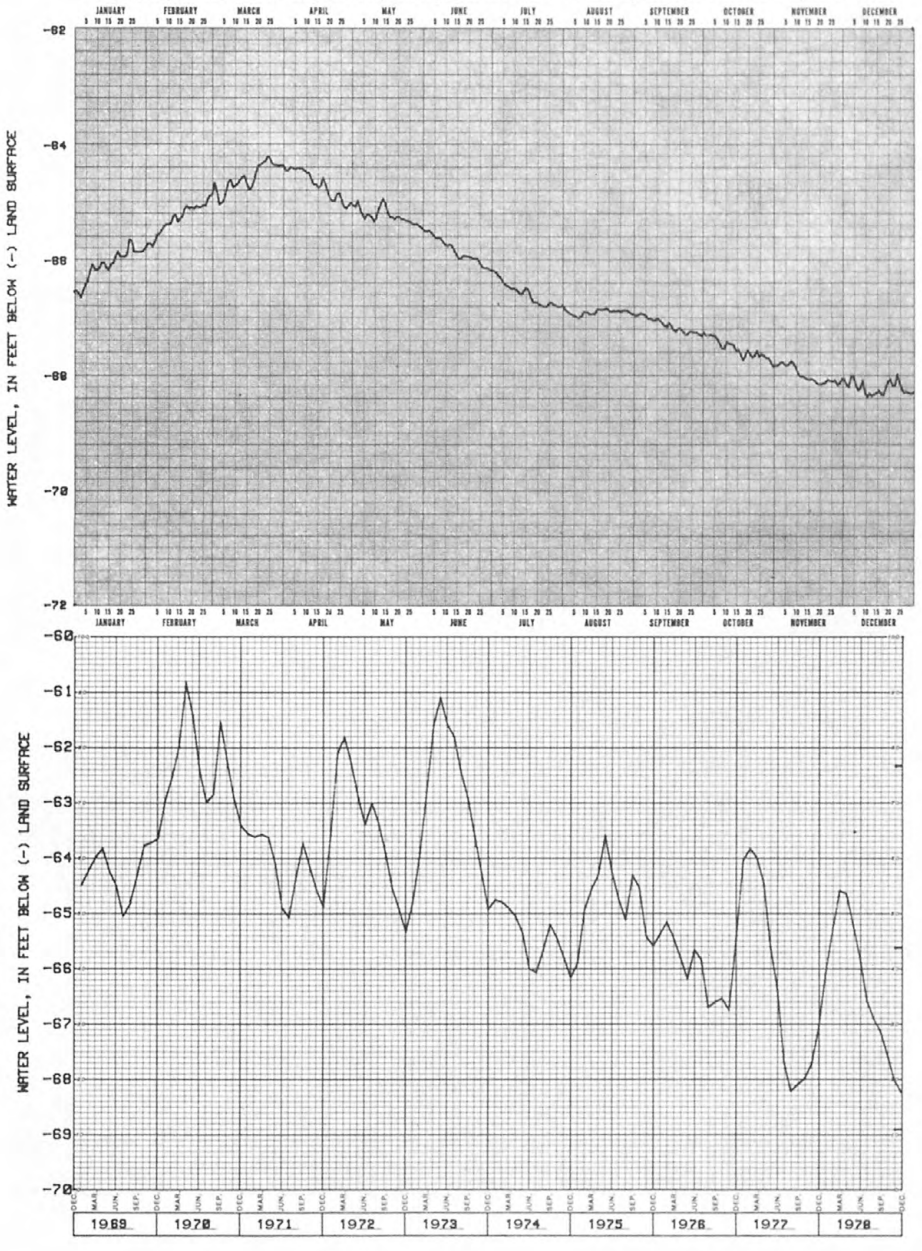
Record low water level established in December

A record low was established in December 1978 when the water level in U.S. Geological Survey test well OK 8 declined to 68.39 feet below land surface. The water level continued to drop, corresponding to an increase in regional pumpage since 1972.

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

304943082213701 Local number, 27E2.
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, 68.39 ft below land-surface datum, December 11, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN TEST WELL OK 8

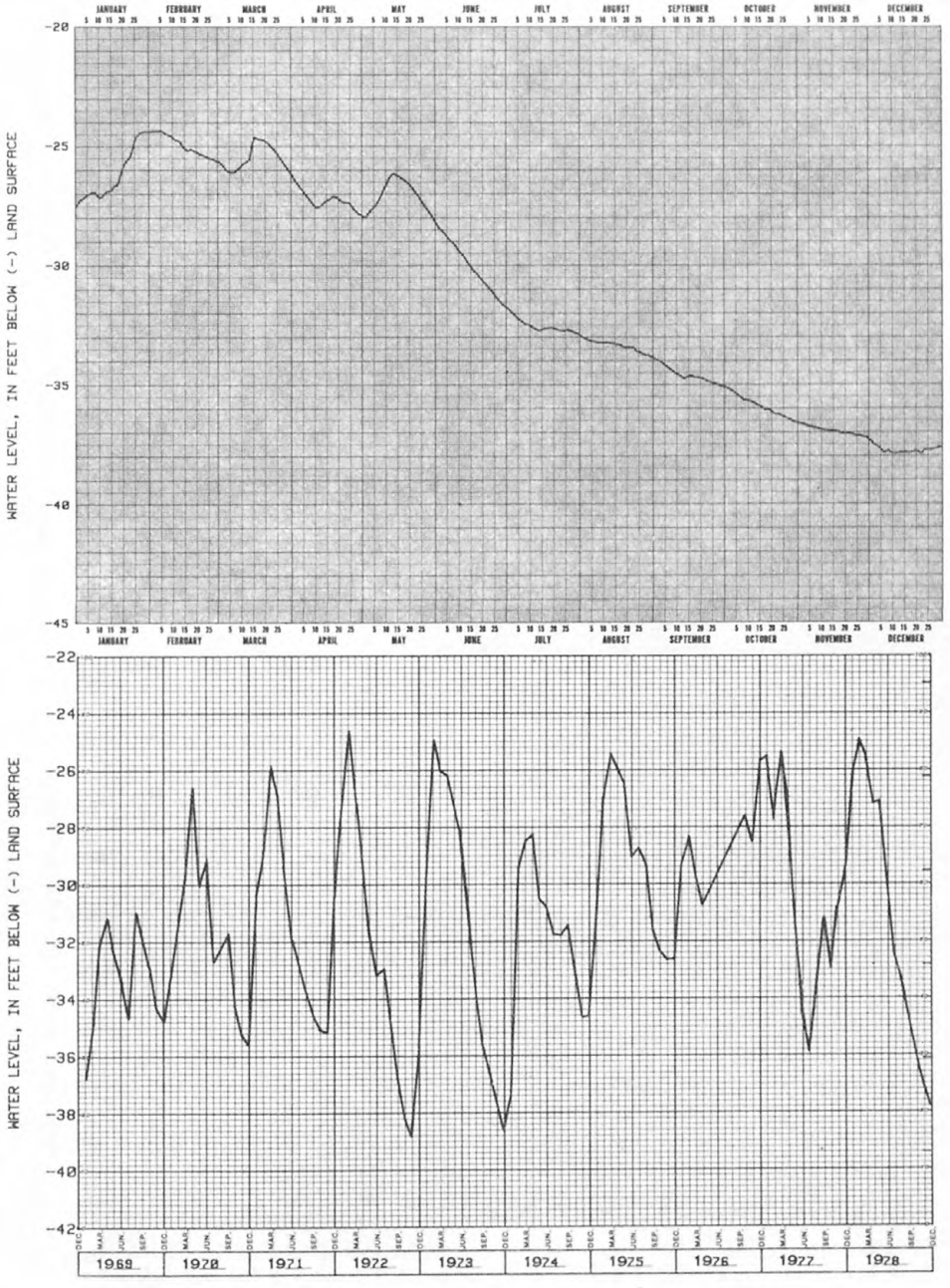
Water level shows long-term rise

The 1978 mean annual water level in the Laurens County well showed a decline of 0.6 foot from the 1977 value. The well is very near the area where the aquifer crops out and the water level responds chiefly to precipitation in the outcrop (recharge) area. The water level in the Dexter well declined from a high of 24.38 feet in January to a low of 37.93 feet in December, a period of little precipitation. Notable rises in the water level around January 10, March 14, and May 2 correspond to increases in precipitation.

The long-term trend in the Dexter well is a rise in water level, the greatest rise occurring from 1974 to early 1977, corresponding to an increase in precipitation.

322652083033001 Local number, 21T1.
LOCATION.--Lat 32°26'52", long 83°03'30", Hydrologic Unit 03070102, approximately 1.8 mi northeast of Dexter, Ga.
Owner: E. Beddingfield.
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 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE LAURENS COUNTY WELL

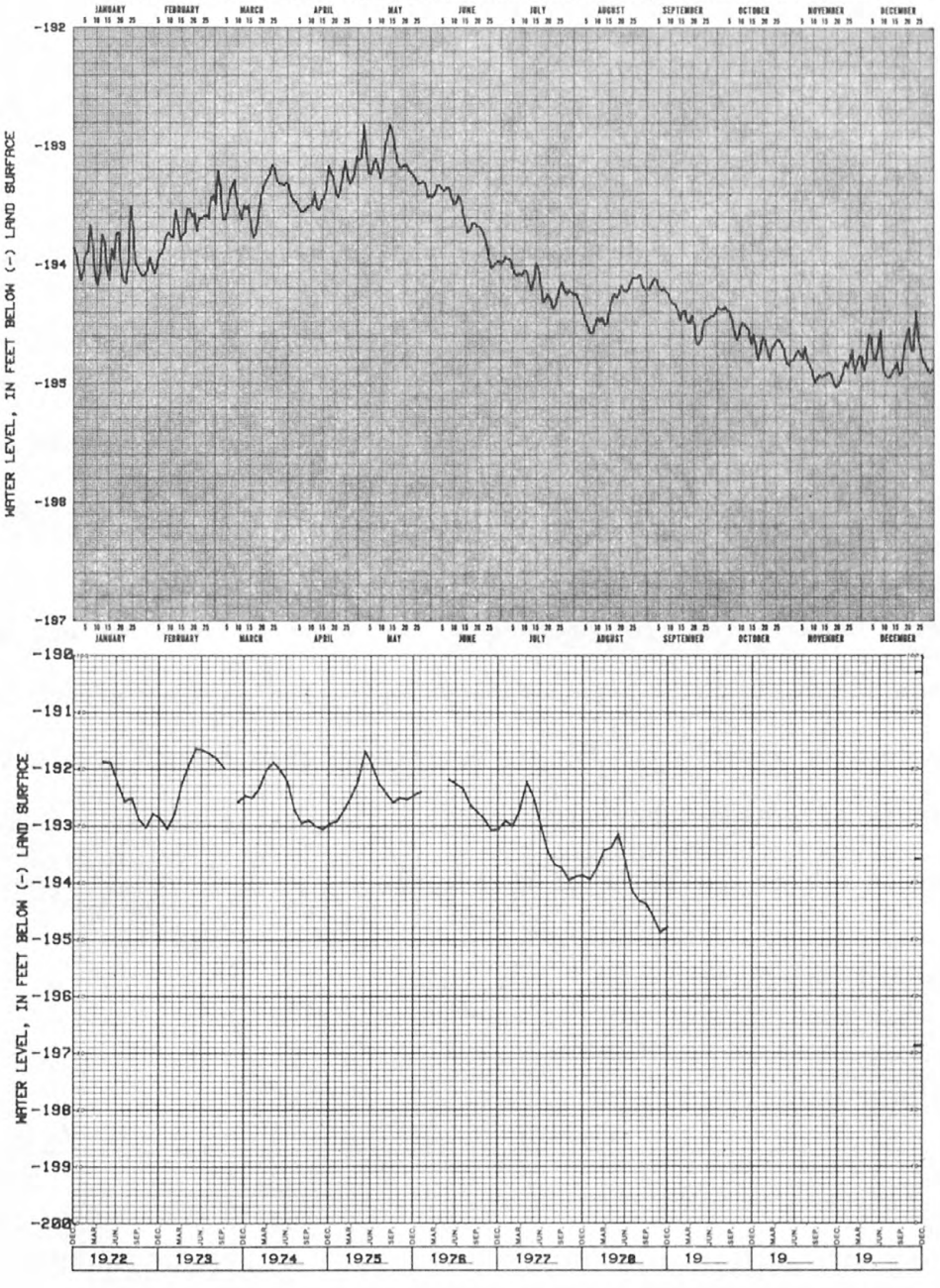
Water level reaches new low in November

The water level in the Sylvester well reached a new record low in November, 0.8 foot lower than the previous record set in December 1977. Fluctuations in the water level were slight, however, and the maximum change during 1978 was a decline of about 2.2 feet from May to November. The mean annual water level in 1978 was about 0.8 foot lower than in 1977.

The long-term decline was about 1.5 feet, occurring mostly during 1977-78.

313146083491601 Local number, 15L20.
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, 195.04 ft below land-surface datum, November 19, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE SYLVESTER OBSERVATION WELL

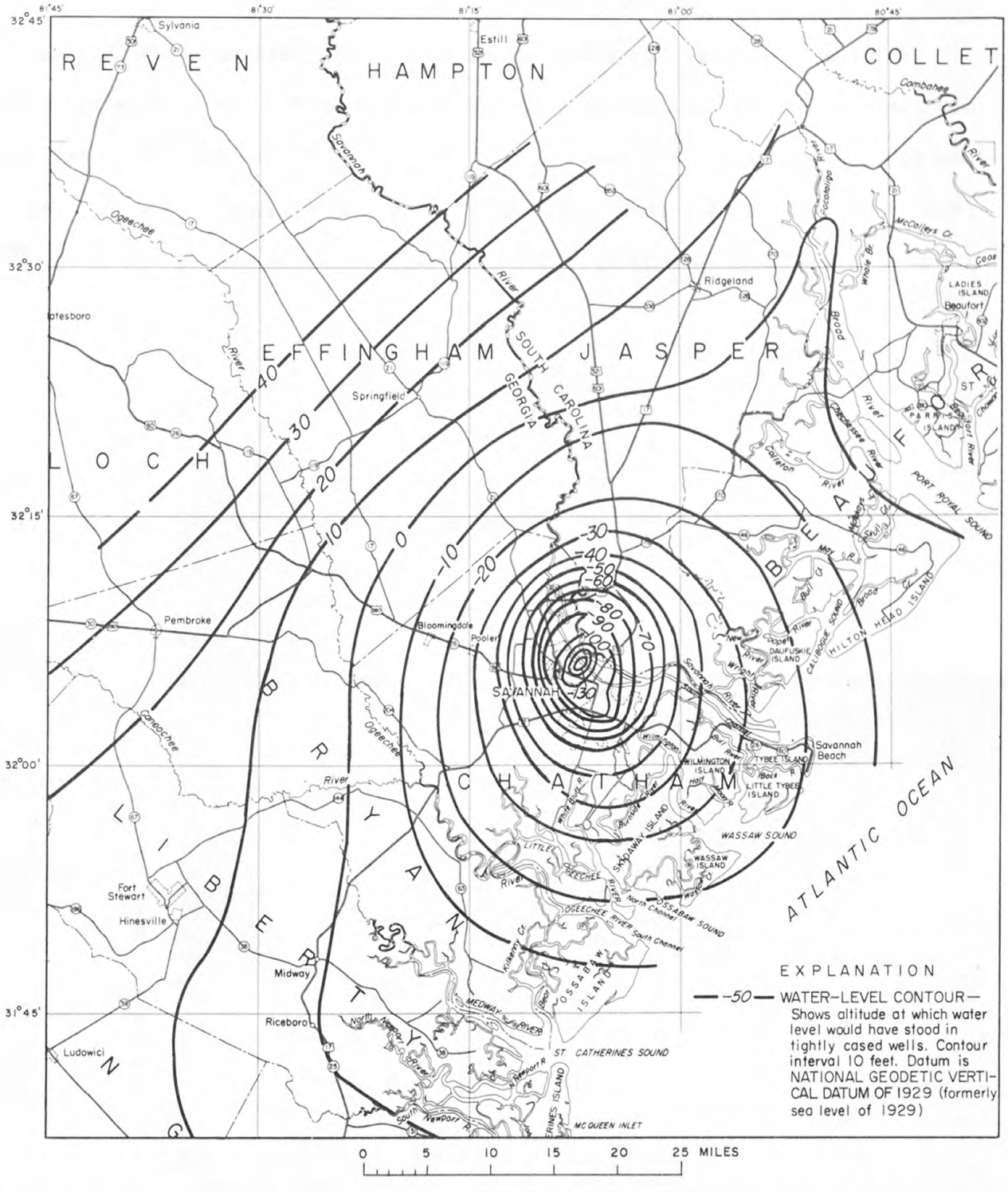
3.1a Savannah Area

Water levels in the Savannah area continued to decline and by 1978 had reached the lowest level in the period of record. 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 withdrawal of ground water in the Savannah area exceeds the rate of recharge to the ground-water reservoir, causing a long-term decline in water levels. Lower than normal precipitation in 1978 further depressed water levels by decreasing recharge and by creating greater demands for water throughout the summer and early autumn.

Mean water levels ranged from 0.7 to 1.2 feet lower in 1978 than in 1977. 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.



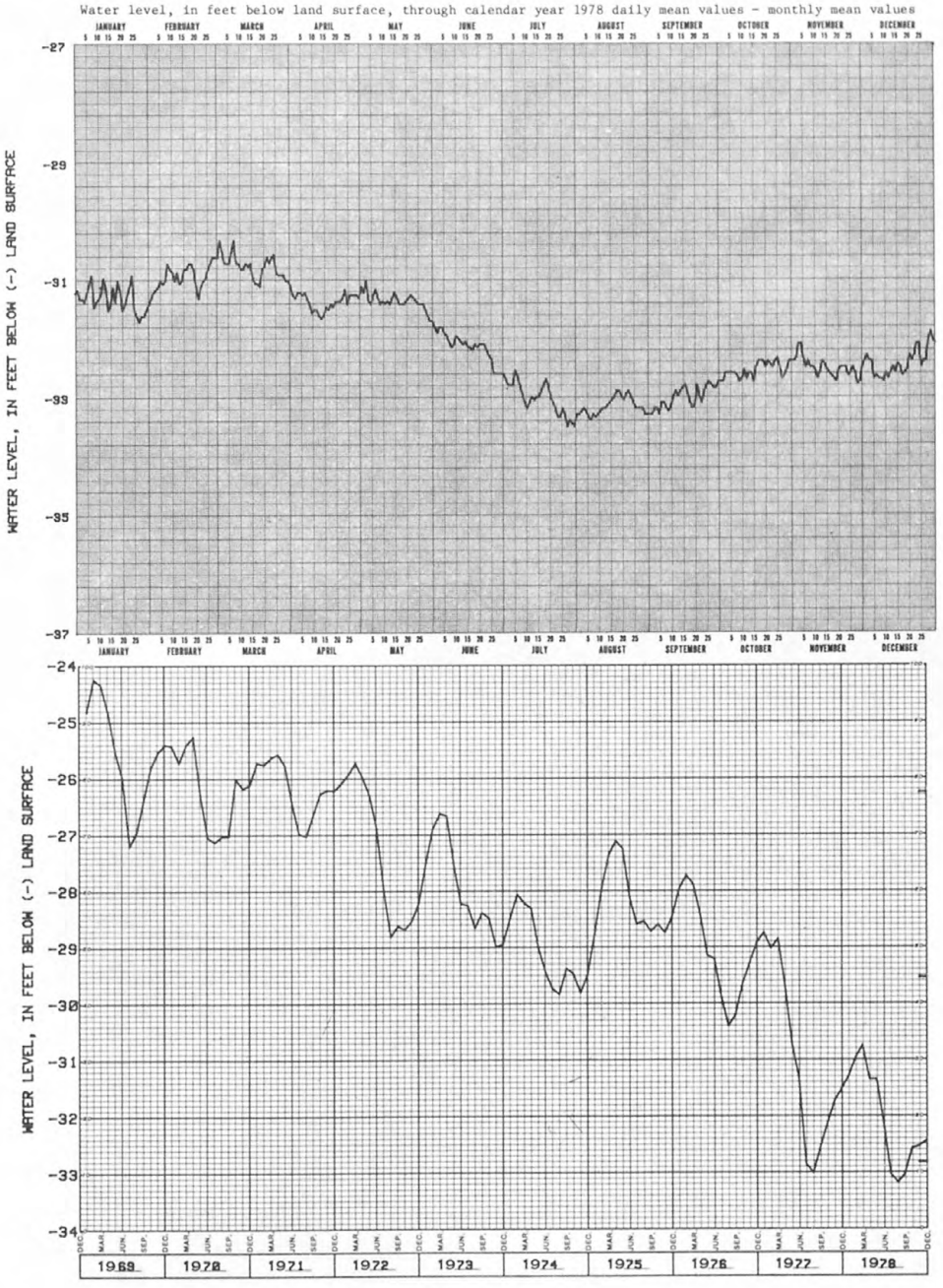
WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), SAVANNAH AREA NOVEMBER-DECEMBER 1978.

New water-level low in July

A record low water level was established in the National Park Service well when the level declined to 33.5 feet in July 1978. The mean water level was 0.8 foot lower in 1978 than in 1977. A decline of 6.5 feet from 1969 to 1978 indicates a long-term downward trend in the water level, corresponding to an increase in ground-water withdrawal in the Savannah area.

320202080541201 Local number, 38Q2.
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, 33.50 ft below land-surface datum, July 28, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE NATIONAL PARK SERVICE WELL

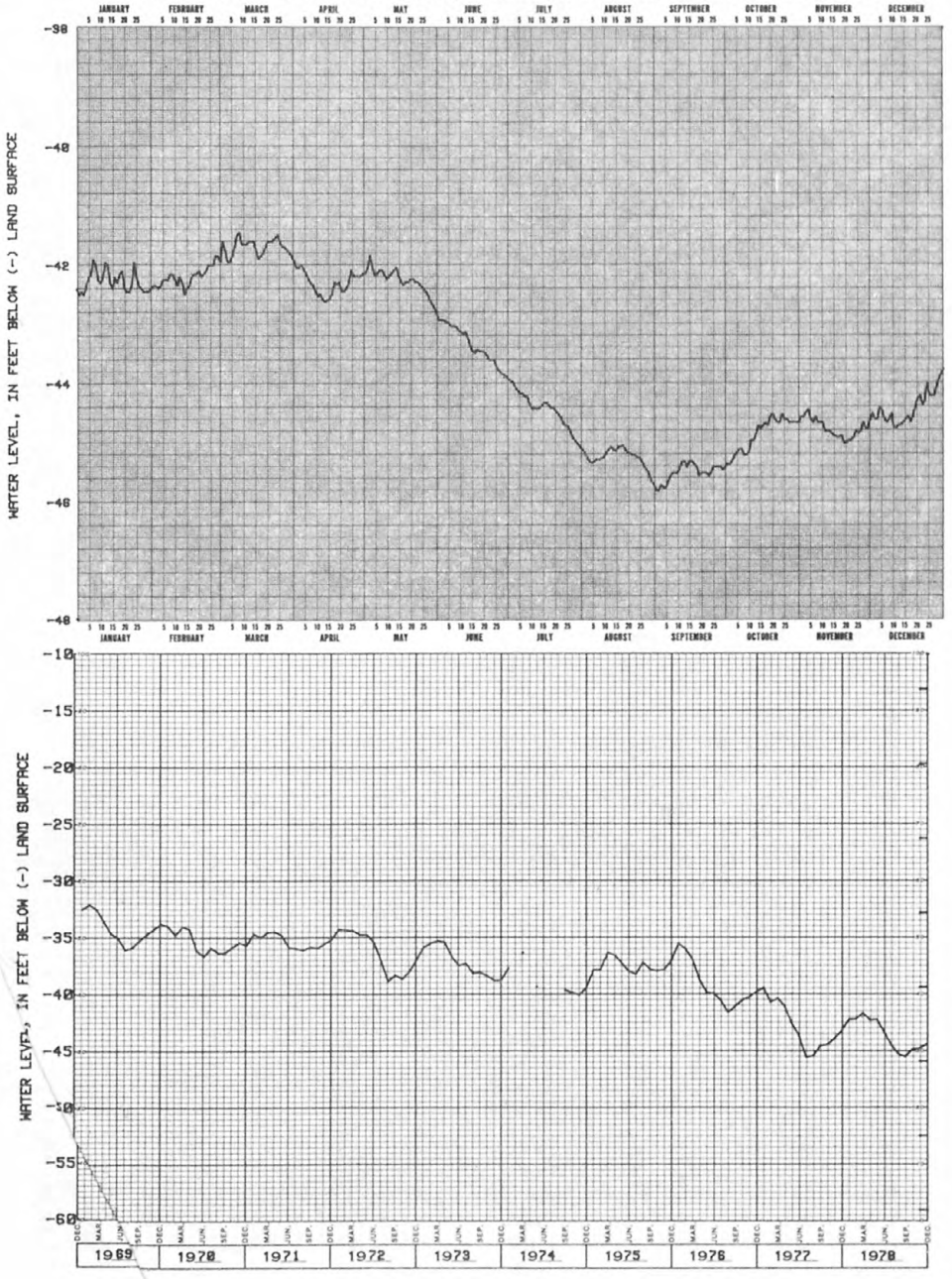
Water-level decline continues

In the Morrison well, the low water level reached in September was 0.3 foot above the record low of 46.2 feet experienced in July 1977. The 1978 mean water level was about 0.7 foot lower than in 1977.

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 9 years. The decline in the mean water level from 1969 to 1976 was 5.0 feet and from 1976-78 was 4.4 feet.

320021081124801 Local number, 36Q20.
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, 46.15 ft below land-surface datum, July 16, 1977.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



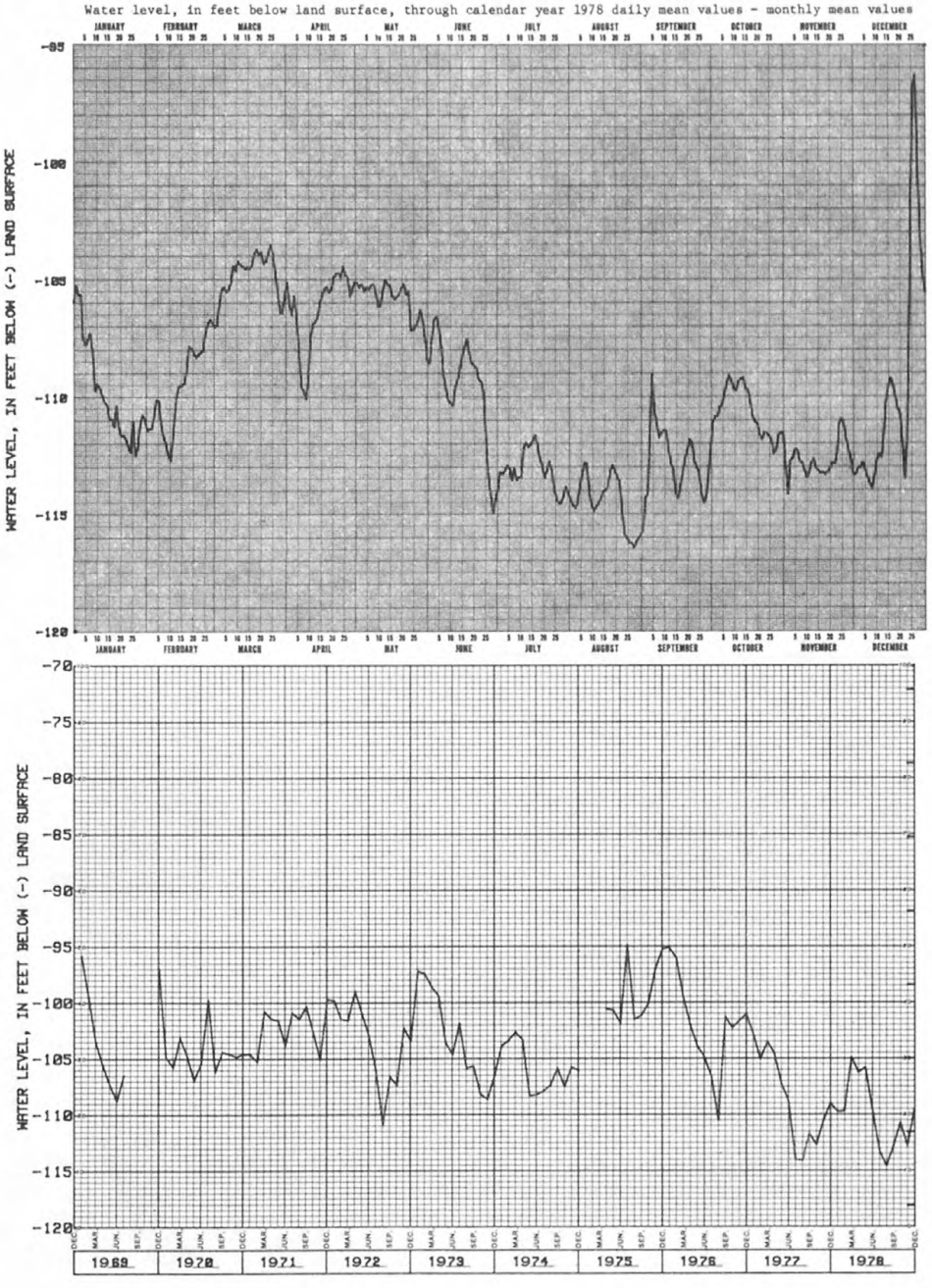
WATER-LEVEL FLUCTUATIONS IN THE MORRISON OBSERVATION WELL

Long-term decline continues

The low water level for 1978 in the Layne-Atlantic well reached in August was 0.1 foot above the record low set in July 1977. The mean water level was about 1.2 feet lower in 1978 than in 1977. The water level, after recovery during 1975, began a marked decline in 1976 that continued through 1978. The long-term decline is not as apparent in this well, especially for 1969-74. The decline in 1976, caused by increased ground-water withdrawal, contributed to the 10-year decline of about 7 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 17.7 feet in December 1978 were caused by the cessation and resumption of pumpage in a nearby well field.

320530081085001 Local number, 36Q8.
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, 116.5 ft below land-surface datum, August 28, 1978.



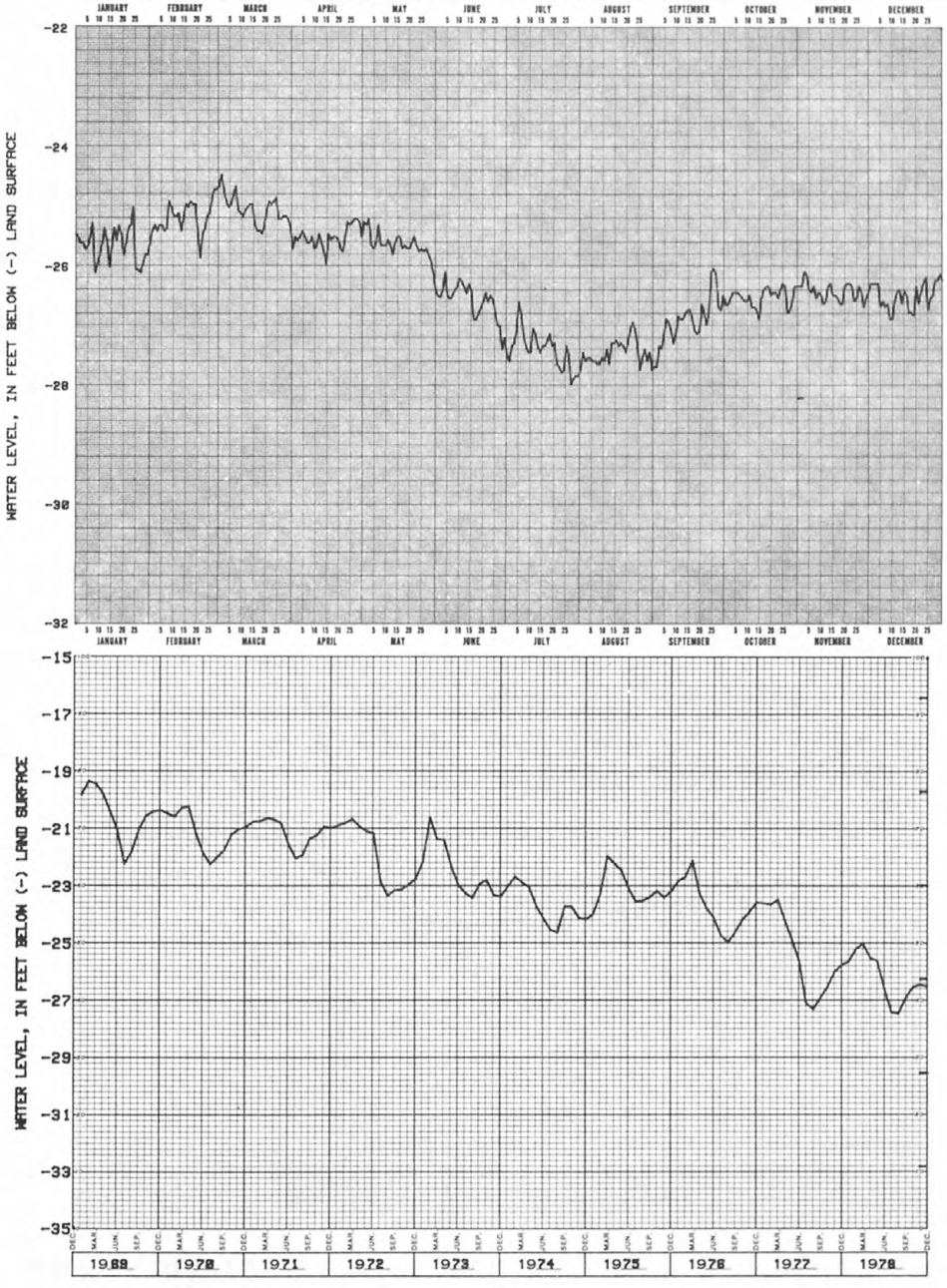
WATER-LEVEL FLUCTUATIONS IN THE LAYNE-ATLANTIC OBSERVATION WELL

Long-term water-level decline

A record low was established in Chatham County test well 7 as the water level dropped to 28.0 feet in July, 0.4 foot below the previous low set in July 1977. The mean water level was 0.8 foot lower in 1978 than in 1977. The long-term trend in the water level indicates a decline of 5.7 feet from 1969 to 1978. Ground-water withdrawal that exceeds recharge is responsible for this decline.

320122080510201 Local number, 39Q3.
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, 28.00 ft below land-surface datum, July 28, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values

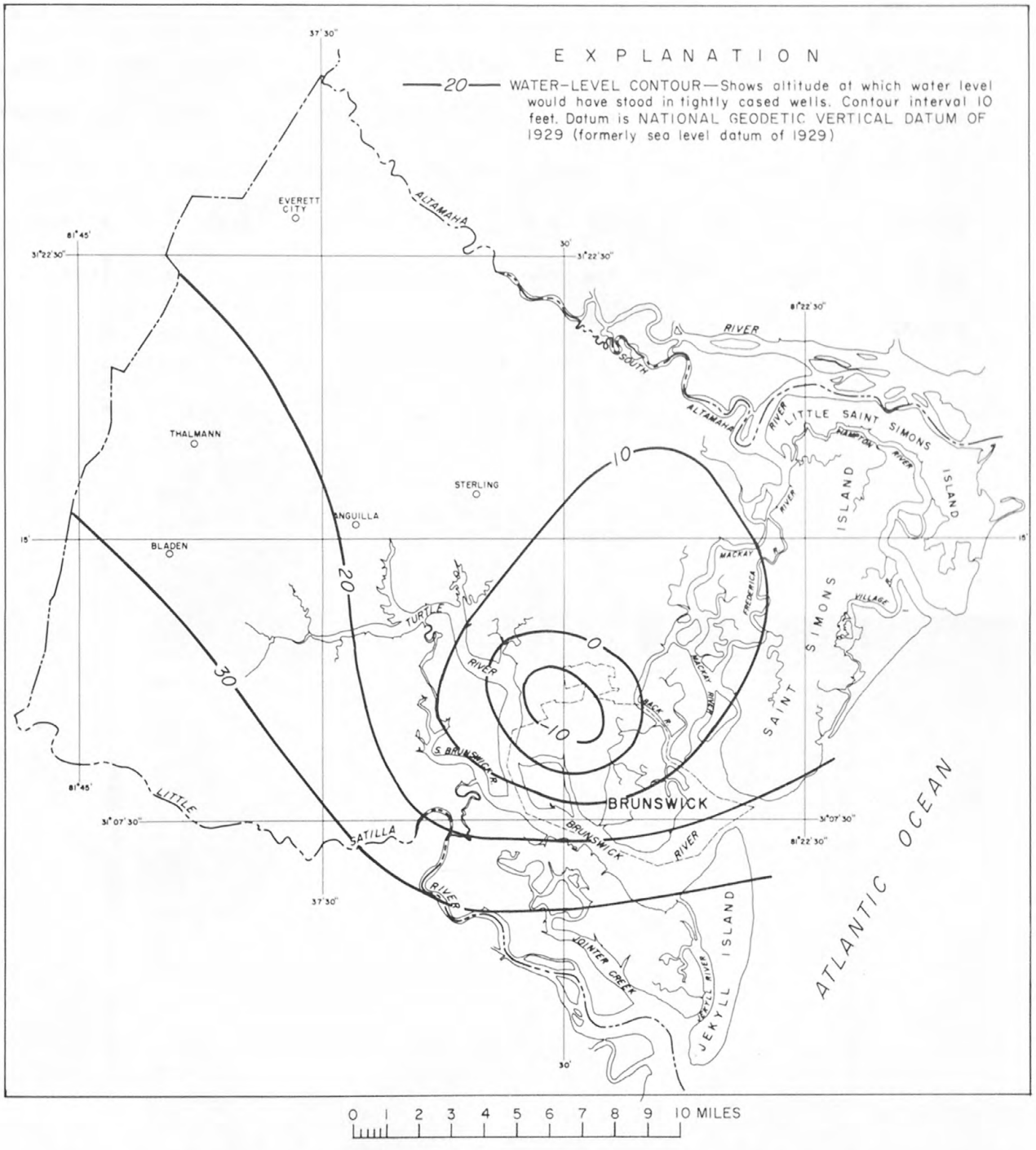


WATER-LEVEL FLUCTUATIONS IN CHATHAM COUNTY TEST WELL 7

3.1b Brunswick Area

Annual mean water levels in the Brunswick area during 1978 were from 0.2 foot higher to 1 foot lower than in 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. 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. Long-term declines ranged from about 1 to 5 feet for the period 1969-78.

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



WATER LEVEL IN RESERVOIR 1 (PRINCIPAL ARTESIAN AQUIFER), BRUNSWICK AREA OCTOBER-NOVEMBER 1978.

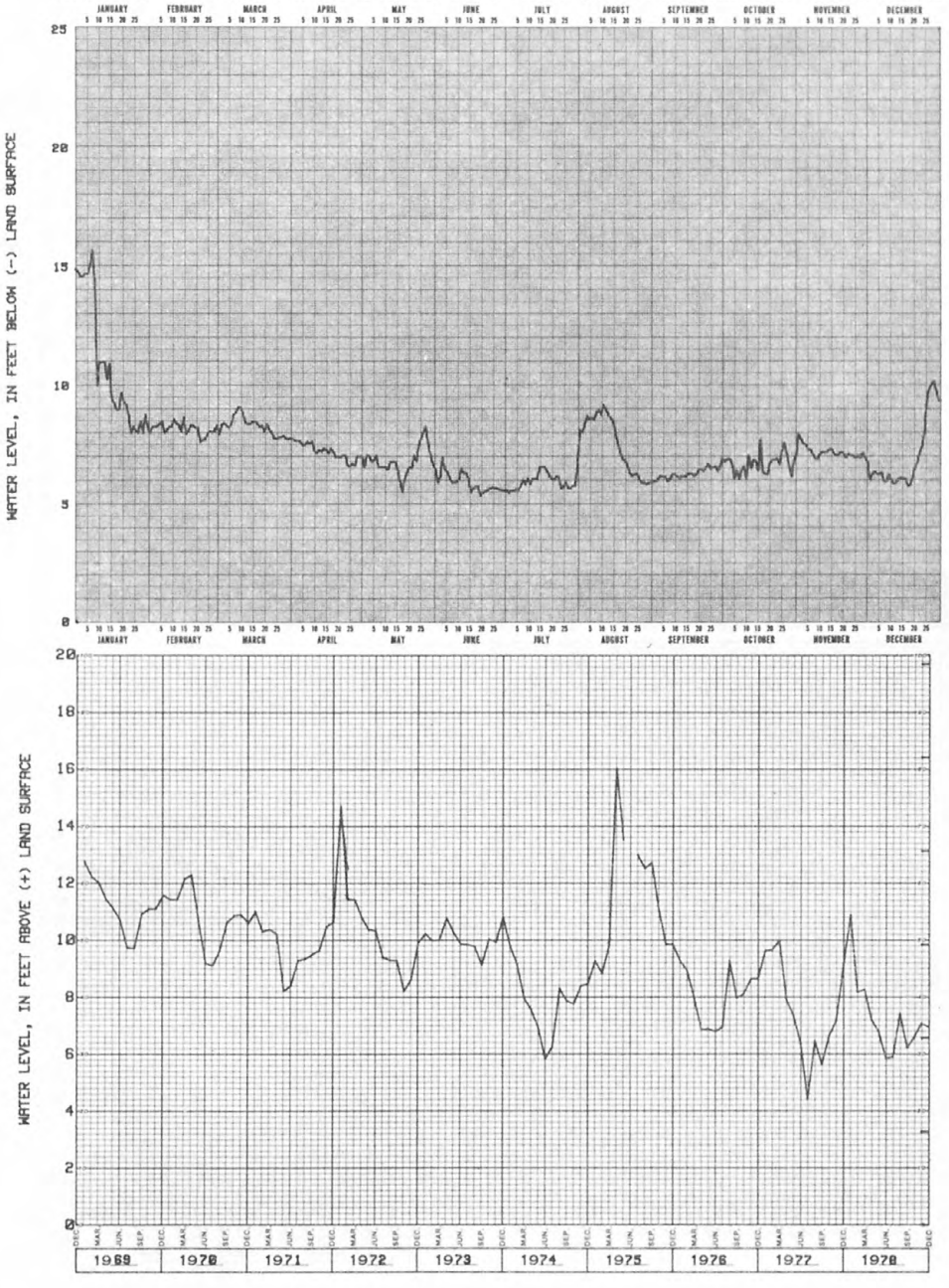
Long-term water-level decline continues

The mean water level in the Babcock and Wilcox Co. well was about 0.2 foot higher in 1978 than in 1977. Notable rises in the water level in May, August, and December corresponded to partial shutdowns of industrial pumpage.

The long-term trend in water level was a decline of about 4 feet for the period 1969-78. 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.

310726081285801 Local number, 34G1.
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 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE BABCOCK AND WILCOX CO. WELL

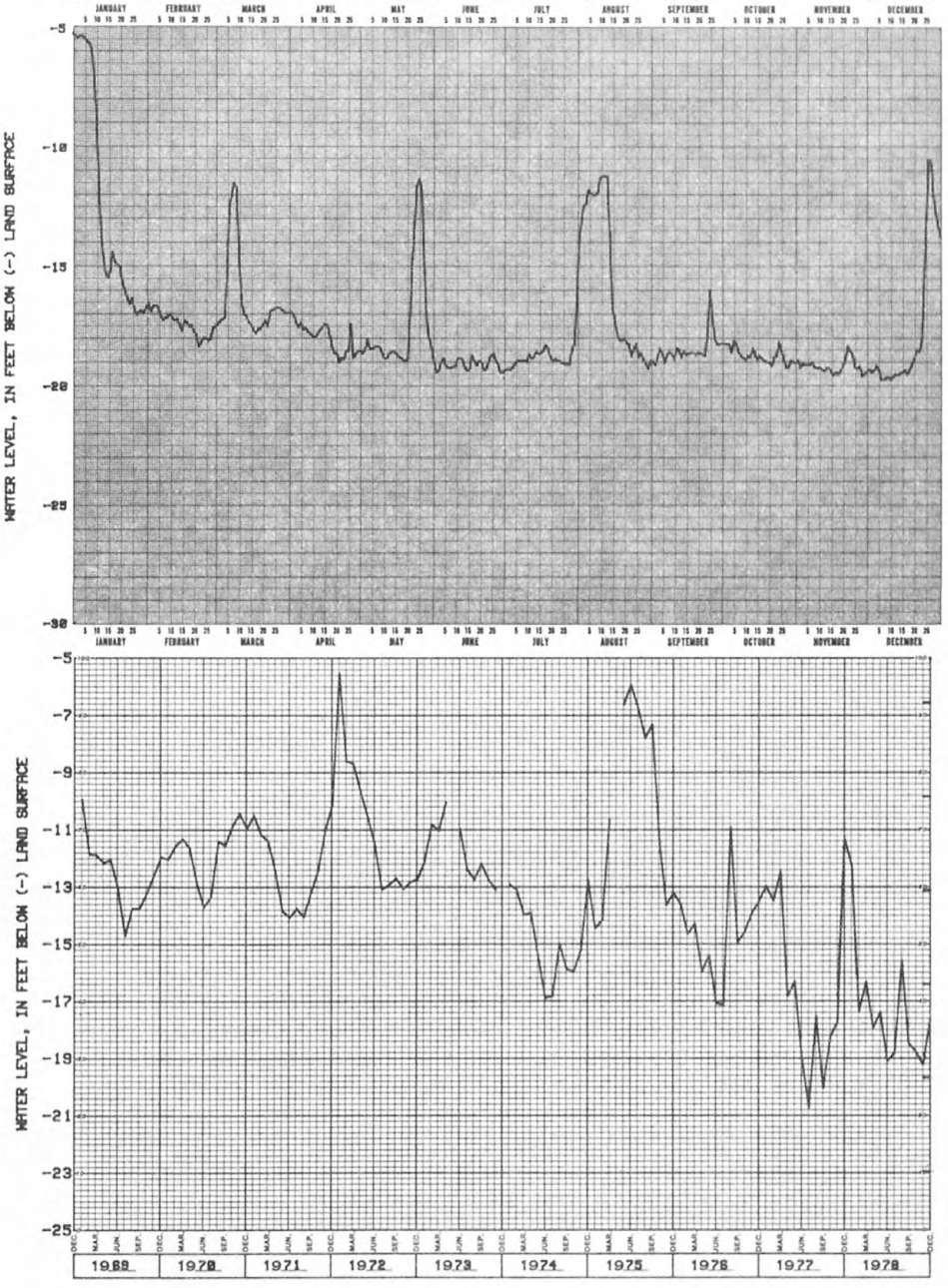
Water-level recoveries correspond to pumpage reductions

The 1978 low water level in Glynn County test well 6 was 2.1 feet higher than the record-setting low of July 1977. However, the mean water level for 1978 was about 1 foot lower than in 1977. Rises in the water level in March, May, August, September, and December 1978 corresponded to partial shutdowns of industrial pumpage.

The water-level decline for the period 1969-78 was about 4.7 feet, most of which occurred during the period 1975-77. The water-level rise in 1975 was due to decreased industrial pumpage, and the subsequent decline corresponded to an increase in industrial pumpage.

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.
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.

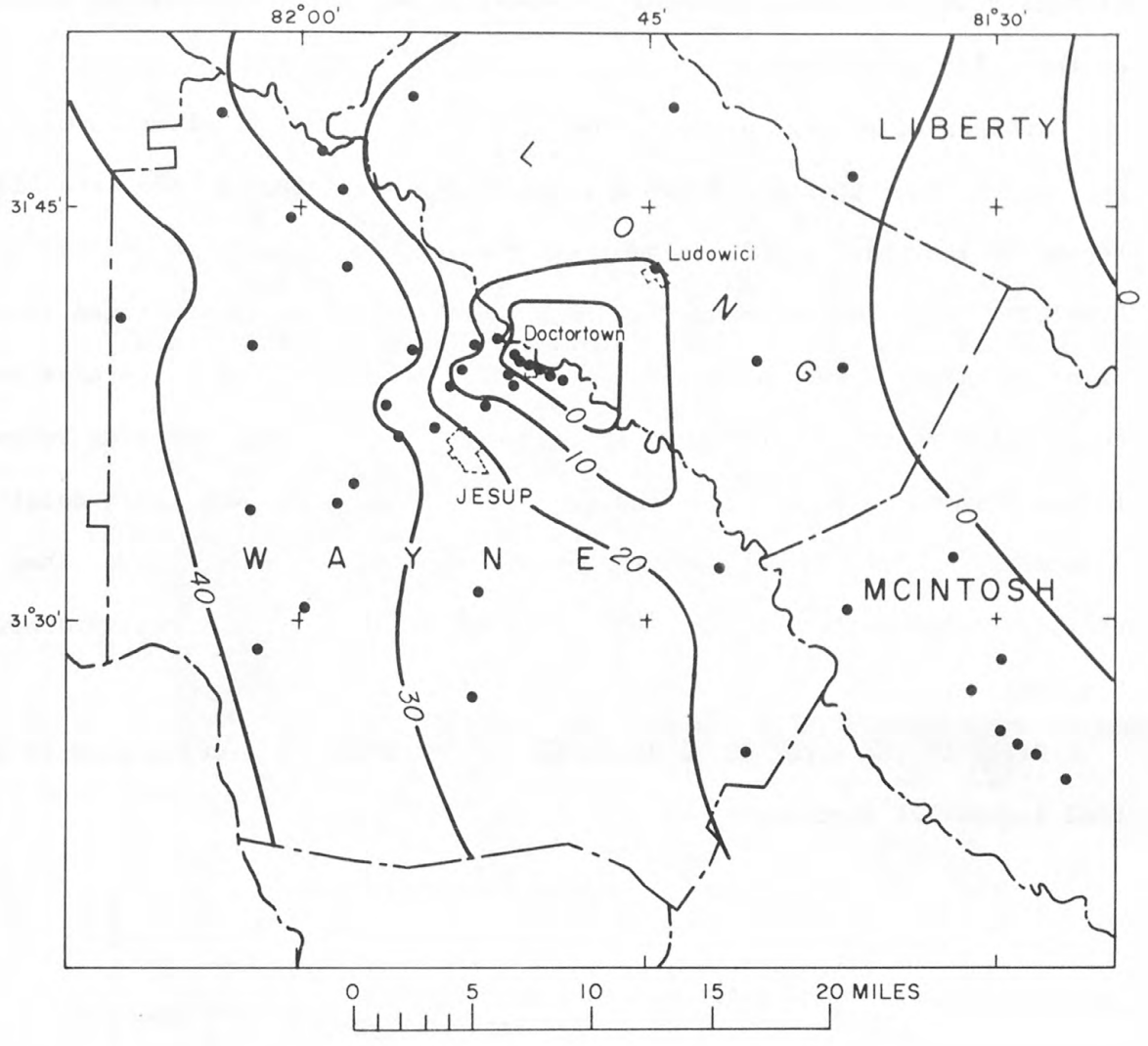
Water level, in feet above or below land surface, through calendar year 1978 daily mean values - monthly mean values



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, DECEMBER 11-12, 1978.

Water-level decline continues

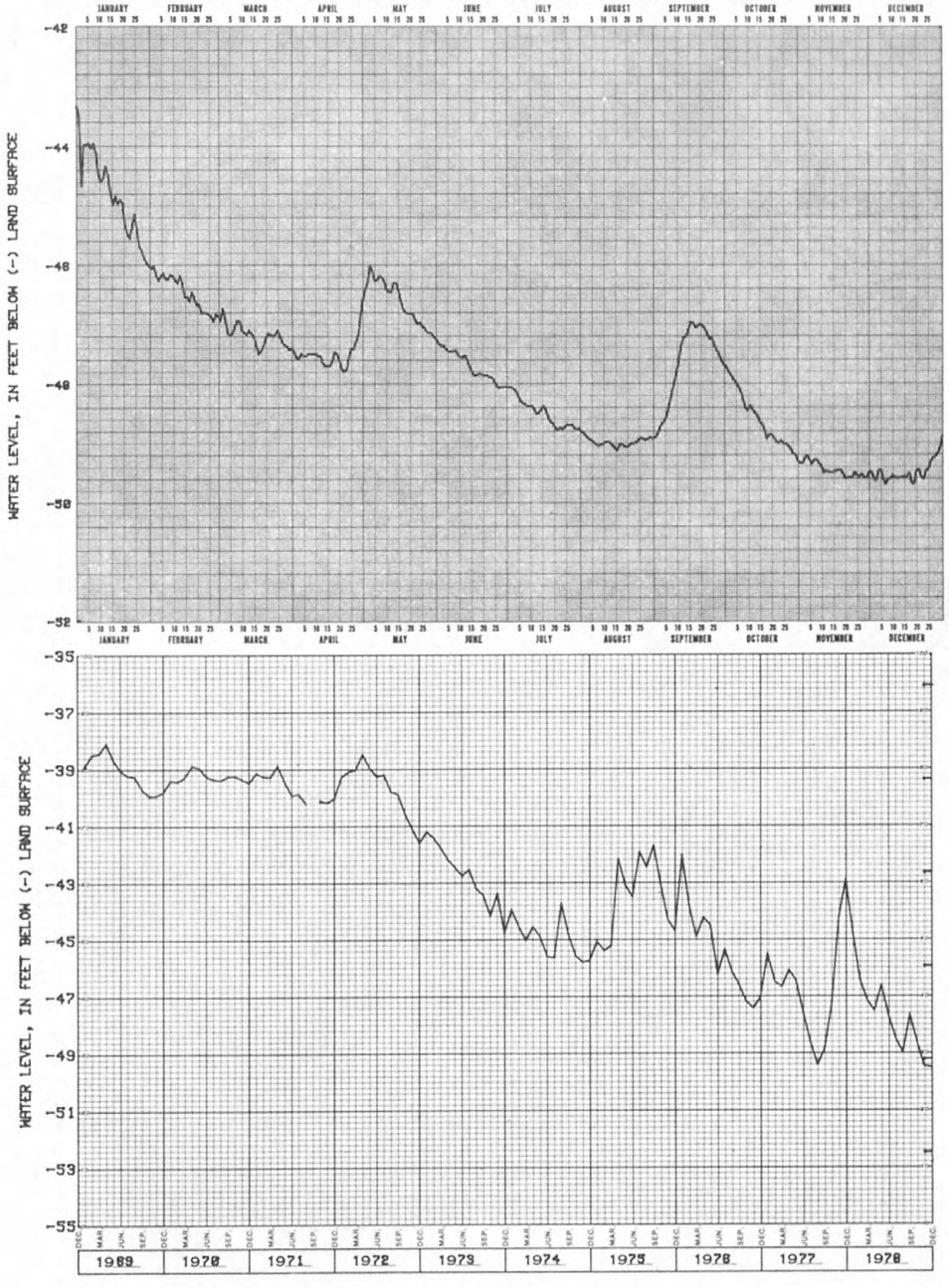
U.S. Geological Survey test well 3 in Long County, about 13 miles east of Doctortown and about 13 miles southwest of Riceboro, responds to pumpage at those two locations.

Industrial pumpage 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, causing water levels to rise sharply. Pumping resumed in the Jesup area during 1978 and the water levels continued their decline. A record low of 49.73 feet was reached in December, 0.08 foot lower than the previous record set in August 1977. The water level in test well 3 dropped 8.6 feet during the period 1969-78.

Rises in the water level in April and September 1978 correspond to partial industrial shutdowns.

31384408 1361401 Local number, 33M4.
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, 49.73 ft below land-surface datum, December 7, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN LONG COUNTY TEST WELL 3

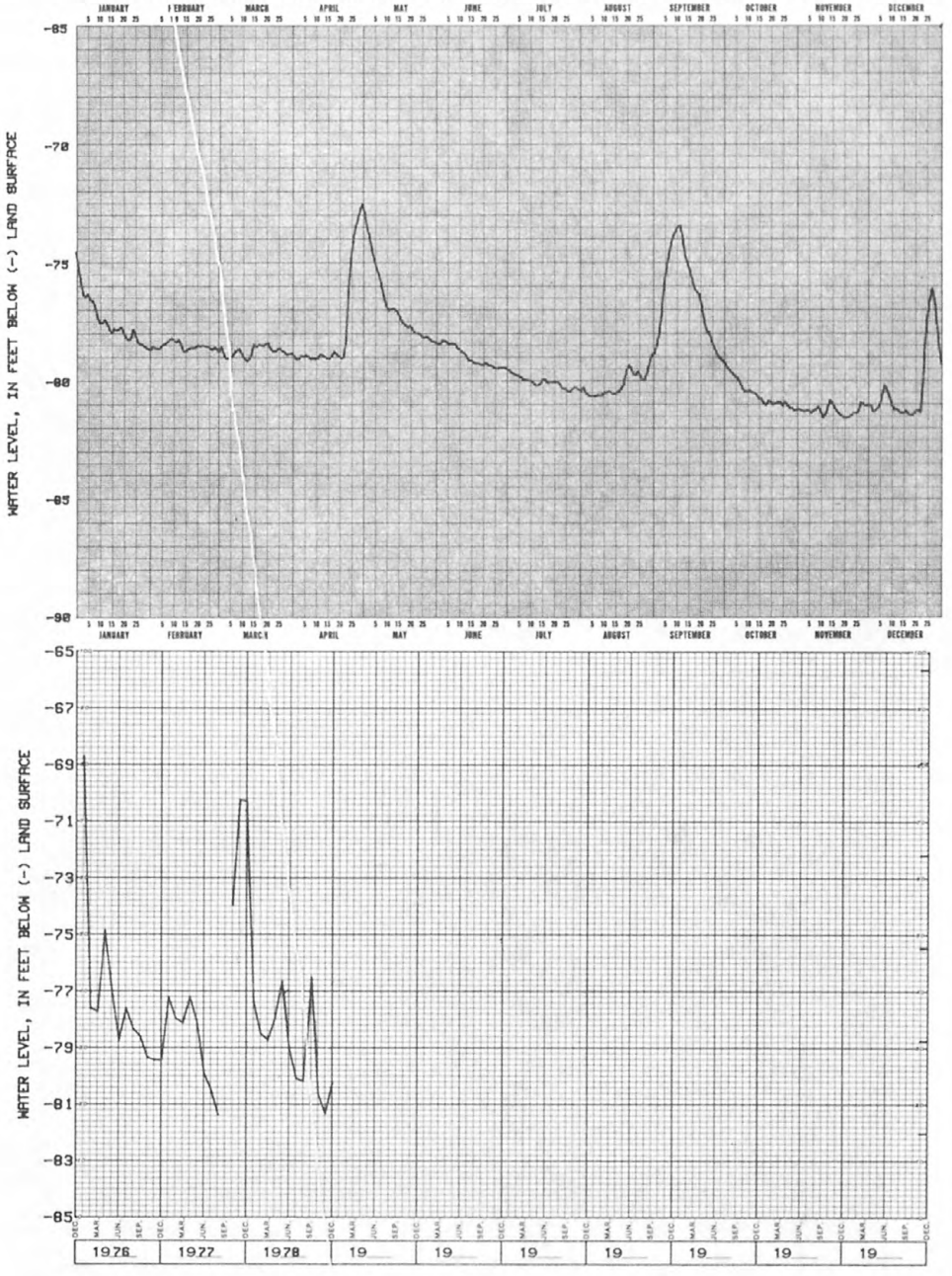
Water levels reflect changes in industrial pumpage

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

The 1978 mean water level was 2.5 feet lower than the 1977 mean. Over the 3-year period from 1976-78, water levels declined about 0.6 foot. The sharp rise in water level from August to December 1977 resulted from an almost total shutdown of industrial pumpage.

313701081543501 Local number, 30L3.
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 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE JOHNSON OBSERVATION WELL

Well shows similar response to pumpage

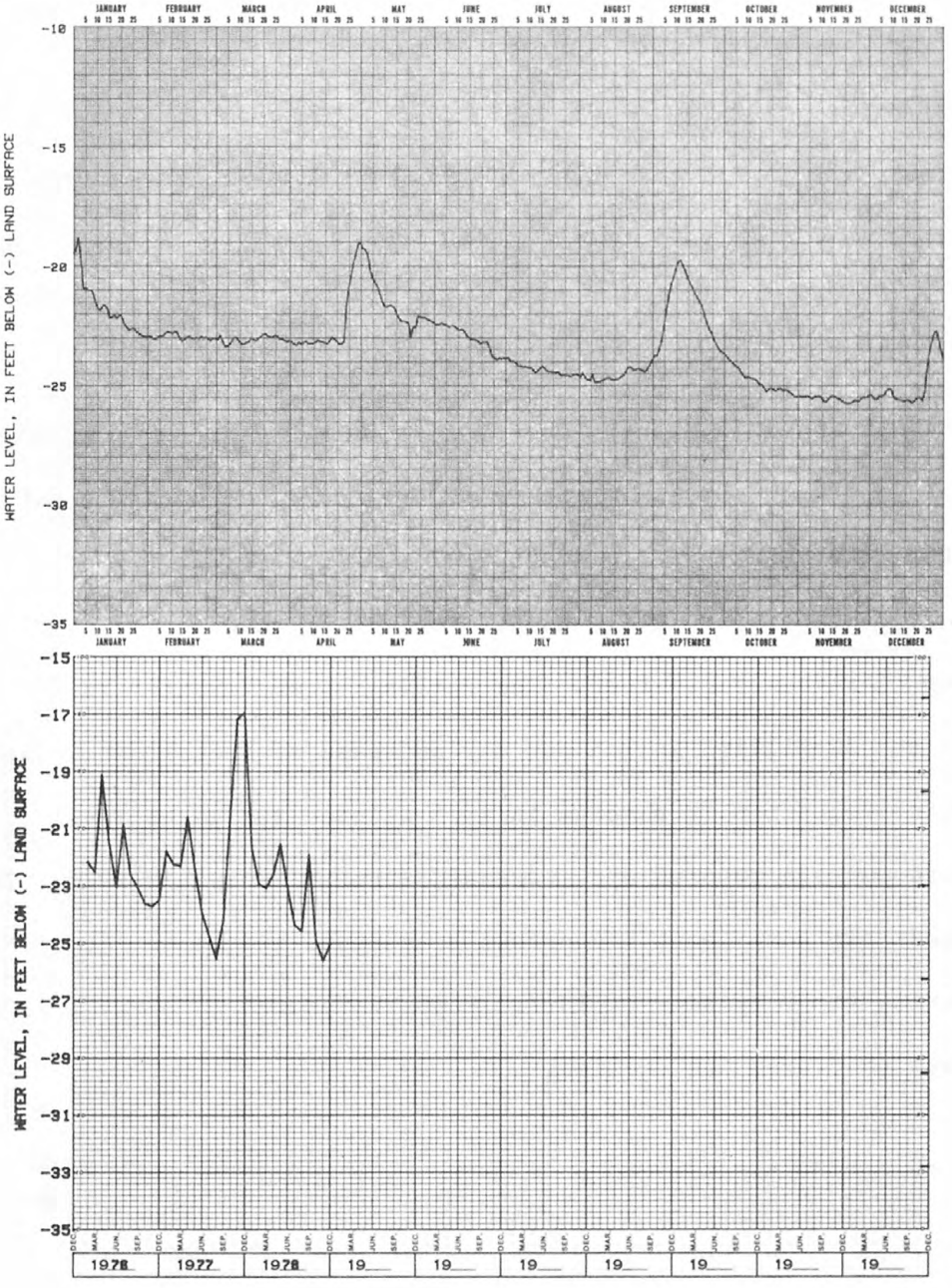
The Mears well, located about 10 miles from the center of pumpage in Doctortown, shows a similarity with the Johnson well in response to pumpage. The Mears well, like the Johnson well, showed rises in water level in April, September, and December, which corresponded to partial shutdowns of industrial pumpage. However, the rises in water level in the Mears well were not as sharp as those in the Johnson well. This is probably because the Mears well is further away from the center of pumpage in Doctortown.

The 1978 annual mean water level was 1.6 feet lower than in 1977 and over the period 1976-78 showed a decline of 1.1 feet.

The sharp rise in water level from August to December 1977 resulted from an almost total shutdown of industrial pumpage.

313055081521901 Local number, 31L1.
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, 25.80 ft below land-surface datum, November 20, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE JUSTICE MEARS 2 OBSERVATION WELL

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.

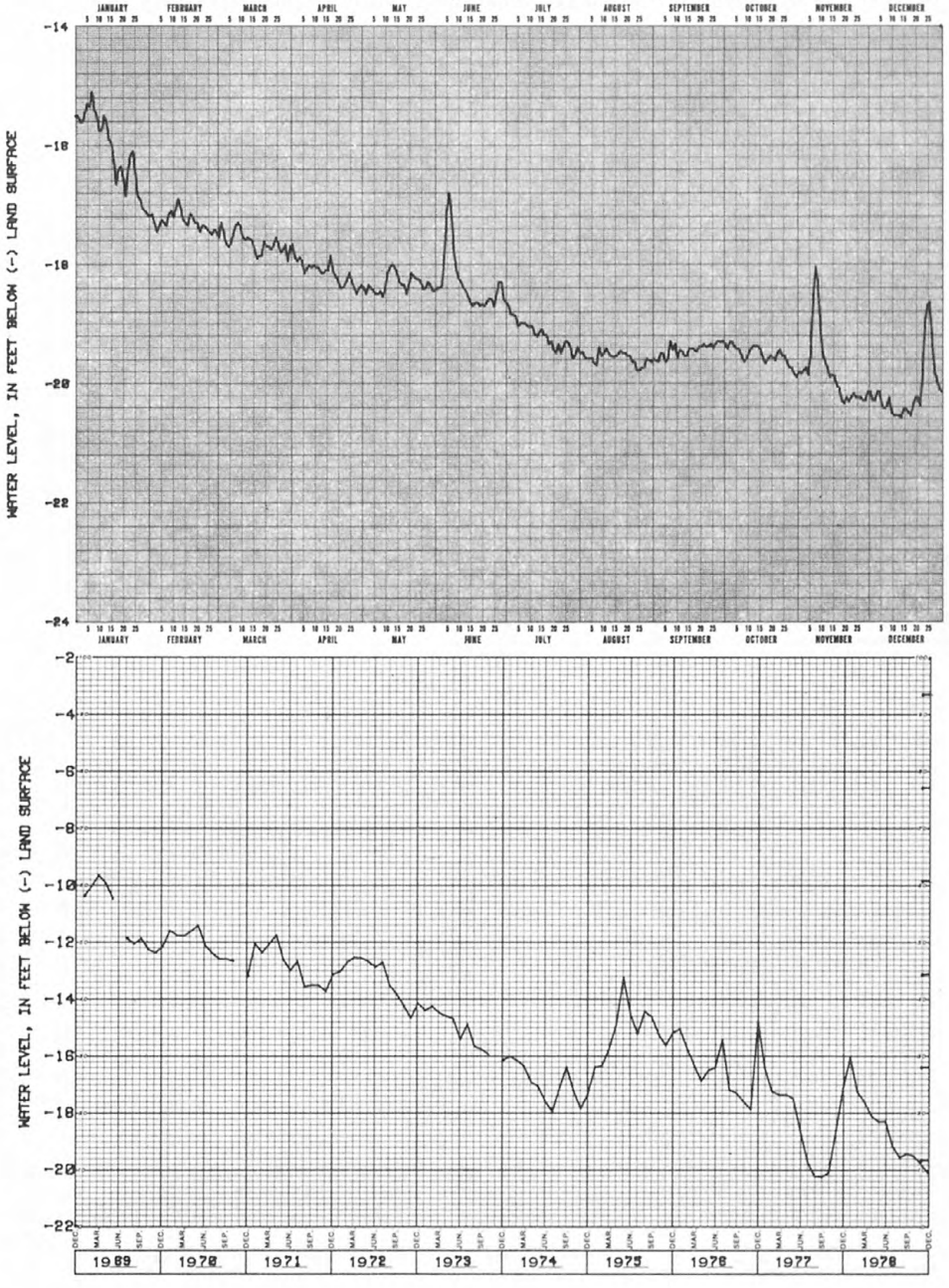
Water level responds to pumpage

The water level in Liberty County test well 2 responds to changes in pumpage at Riceboro. Rises in water level in June, November, and December represent partial shutdowns in industrial pumpage.

The 1978 mean water level was 0.2 foot lower than in 1977 and the decline from 1969-78 was 7.6 feet. 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. Pumpage resumed in early 1978 and the water level continued its decline.

314343081251901 Local number, 34M54.
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 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN LIBERTY COUNTY TEST WELL 2

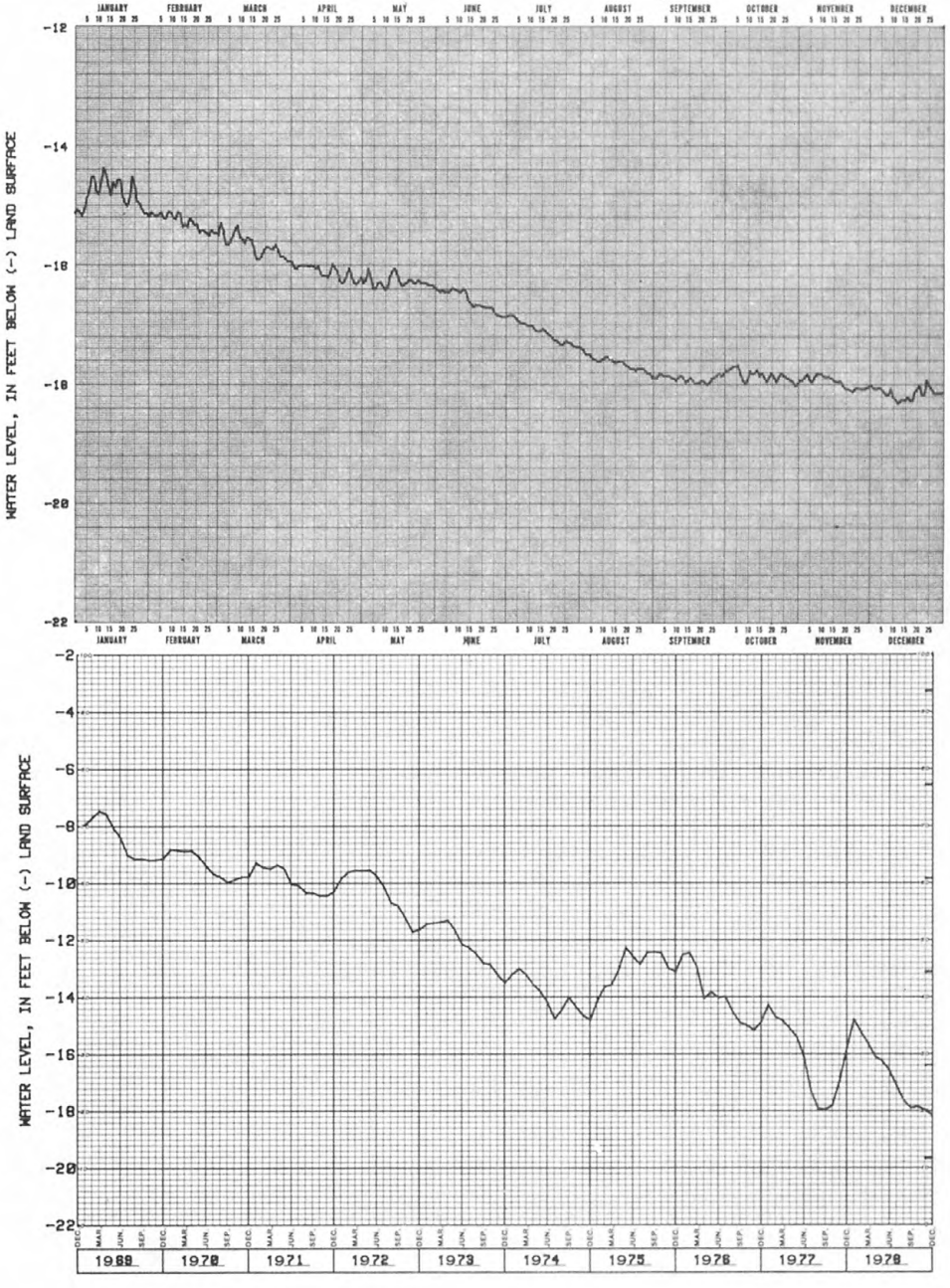
December water level sets new low

A record low water level of 18.4 feet below land surface was reached in test well 1 in December 1978, 0.2 foot lower than the previous record set in August 1977. Liberty County 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.

The mean water level during 1978 was 0.6 foot lower than in 1977 and the long-term decline was 8.2 feet from 1969-78.

315214081235301 Local number, 34M89.
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, 18.35 ft below land-surface datum, December 12, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



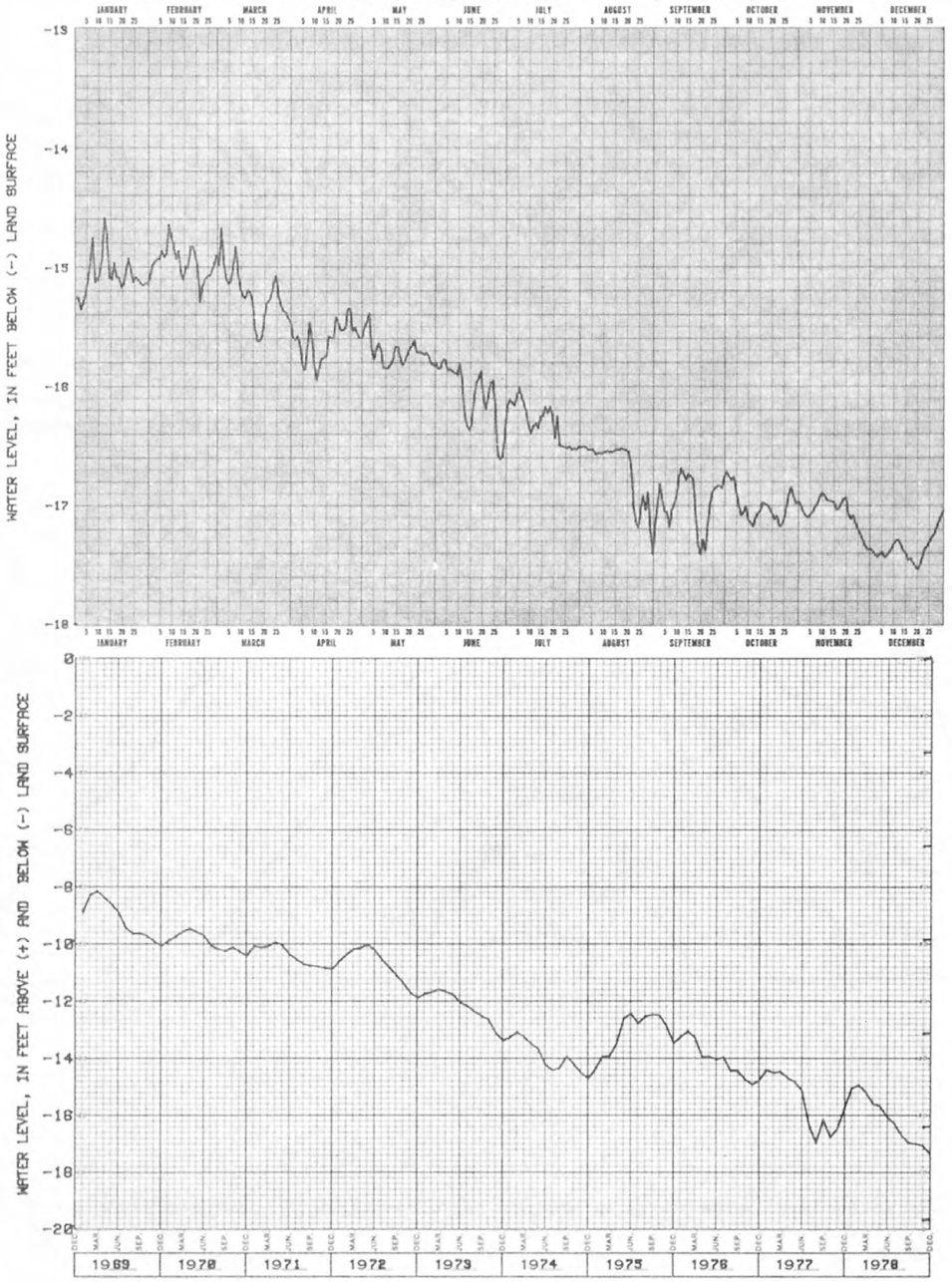
WATER-LEVEL FLUCTUATIONS IN LIBERTY COUNTY TEST WELL 1

Water-level decline continues

The water level in the McIntosh County well responds to pumpage in the same manner as Liberty County test wells 1 and 2. The low water level for 1978 was 0.05 foot higher than the record low of August 1977. The 1978 mean water level was 0.6 foot lower than in 1977 and the long-term decline was about 6.7 feet for the period 1969-78.

313826081152601 Local number, 35M13.
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 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 1978 daily mean values monthly mean values.

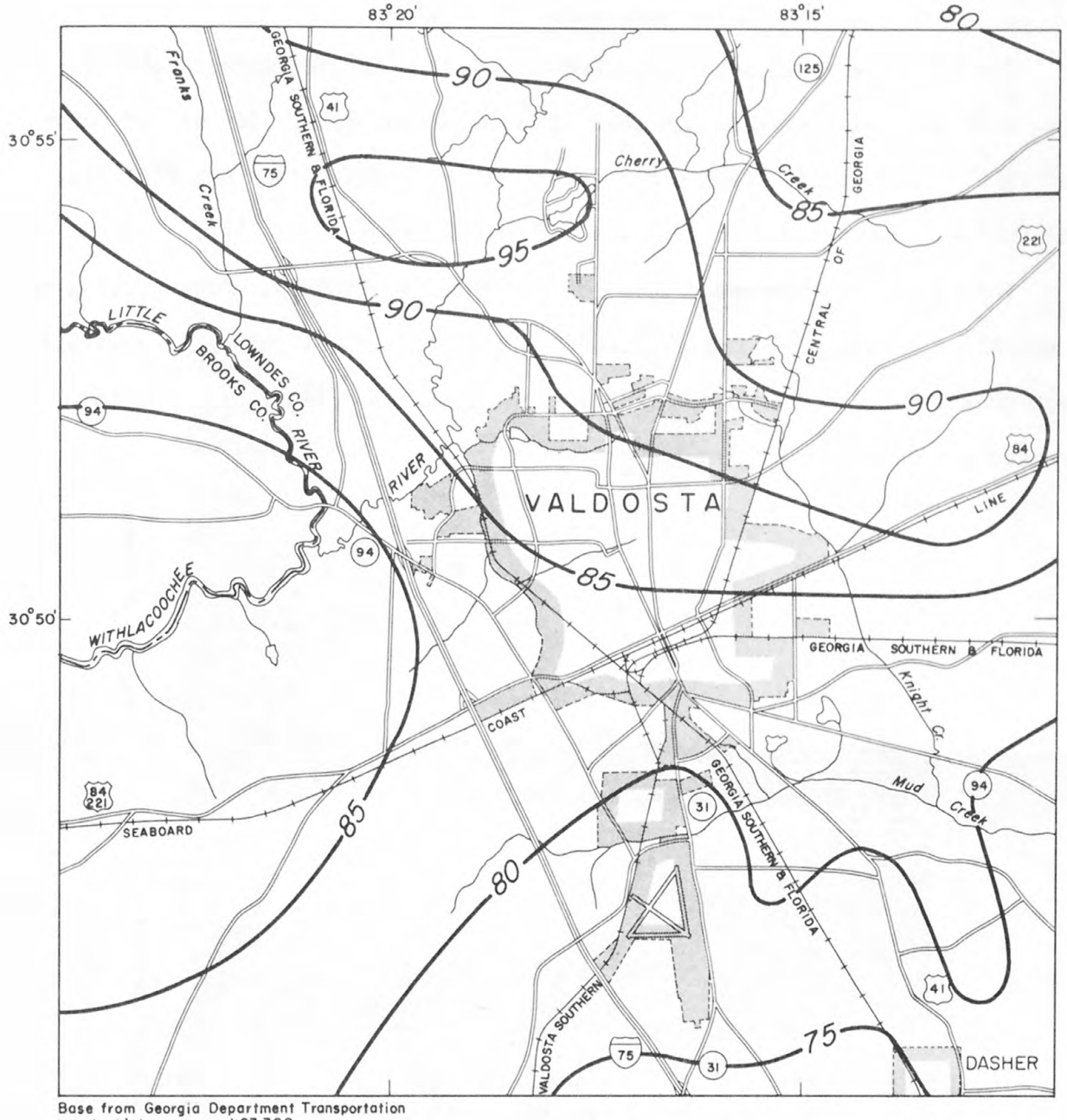


WATER-LEVEL FLUCTUATIONS IN MCINTOSH COUNTY TEST WELL

3.1e Valdosta Area

Ground-water levels in the immediate Valdosta area are mainly controlled by local recharge. The highest water levels in the Valdosta area are to the north of town where the principal artesian aquifer receives maximum 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 create high ground-water levels. Decreased precipitation and increased evapotranspiration create low streamflow and ground-water levels in summer and autumn.

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



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 1978.

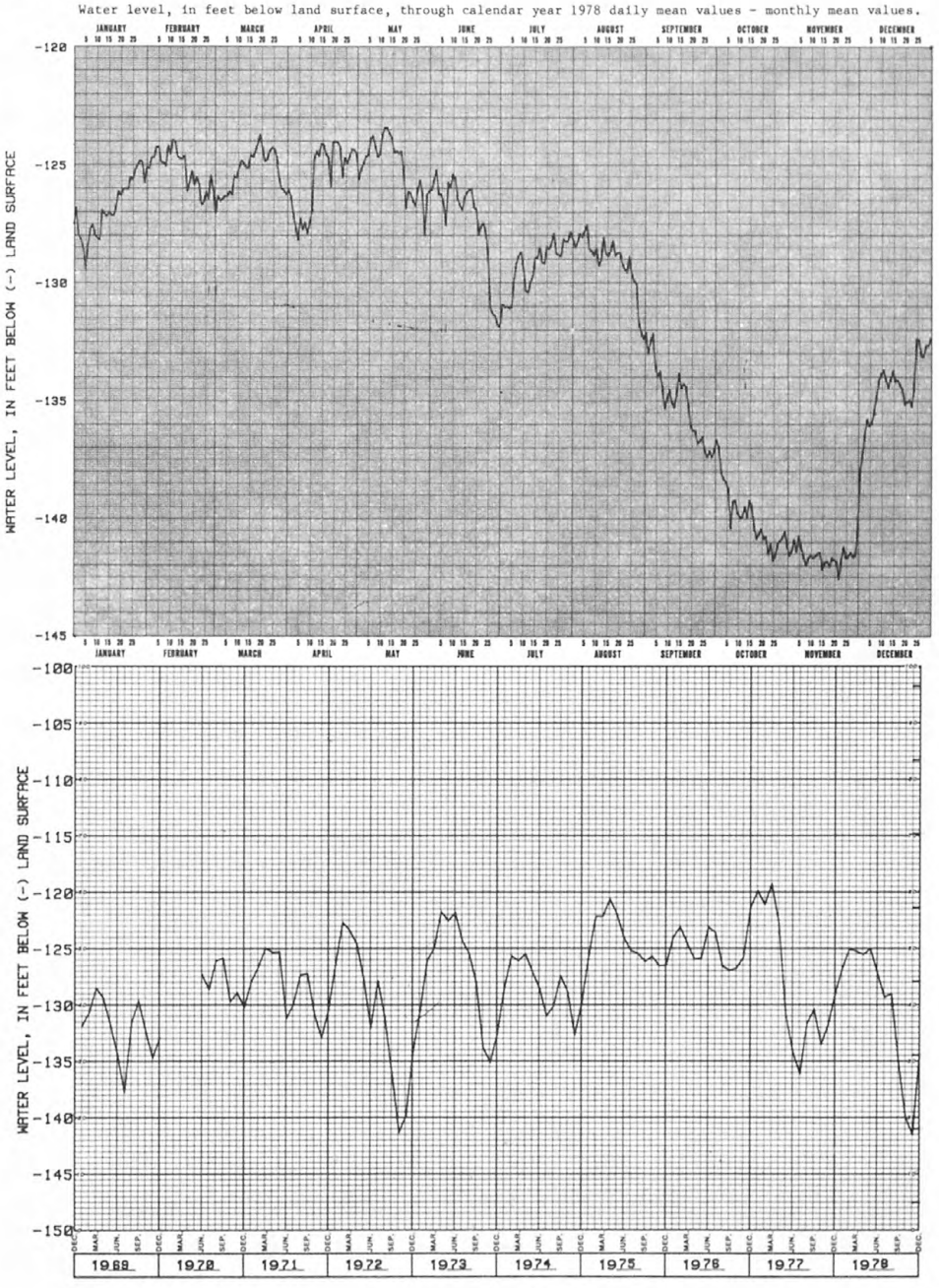
Long-term water level rise

The 1978 low water level occurred in November in the Valdosta observation well and was less than 0.8 foot higher than the record low set in October 1968. The November mean water level was the lowest since October 1972, and the mean water level in 1978 was 2.0 feet lower than in 1977.

The water level showed a rise of 7.2 feet from 1969-76, corresponding to a period of greater than normal precipitation; the subsequent decline of 5.6 feet from 1976-78 corresponded to lower than normal precipitation and increased ground-water withdrawal.

304949083165301 Local number, 19E9.
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 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN VALDOSTA OBSERVATION WELL

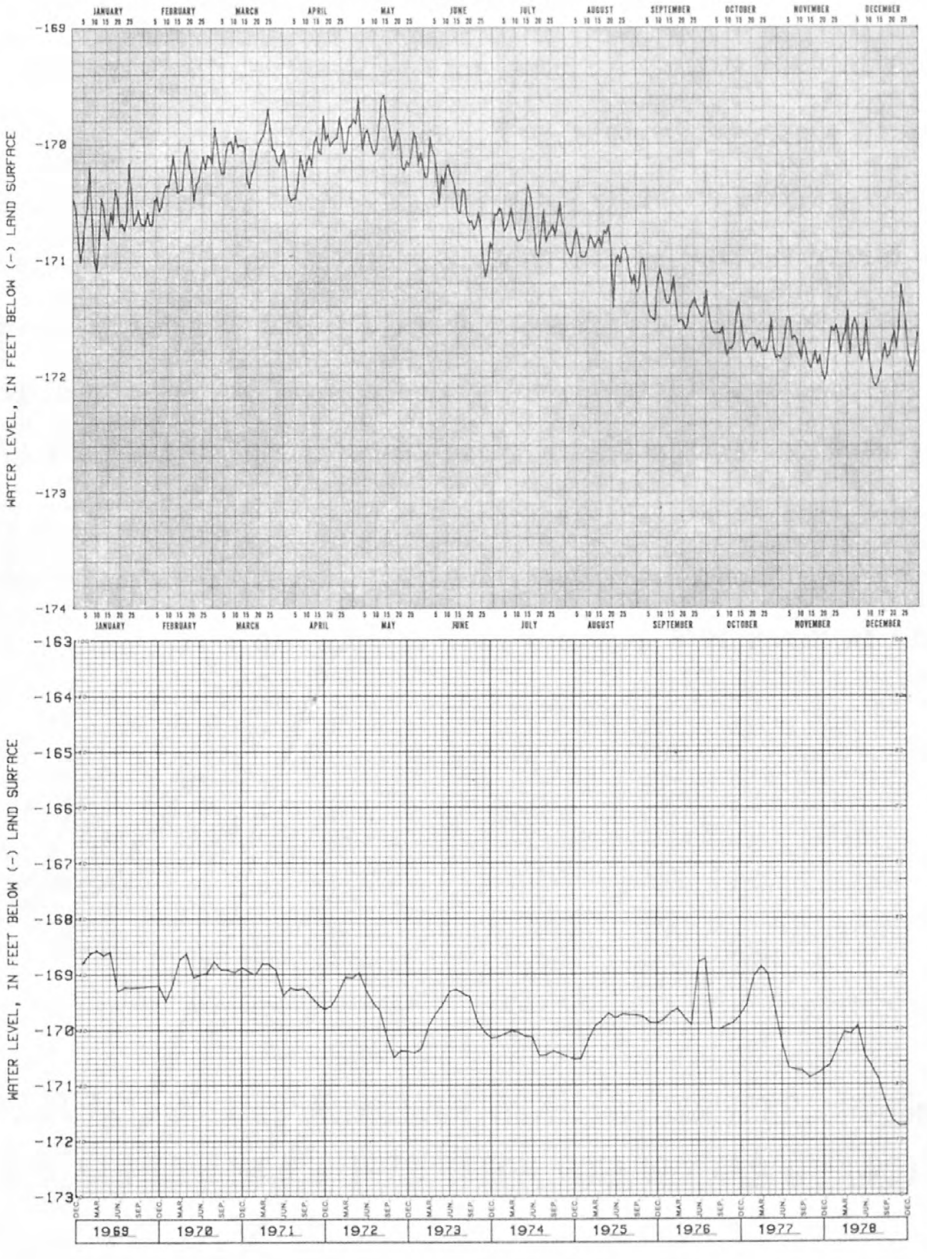
Record low water level in December

A record low water level of 172.1 feet was attained in the Adel test well on December 12, 1978, 0.5 foot lower than the previous low set in October 1977. The mean water level dropped from 169.9 feet in May to 171.9 feet in November and December.

The mean water level was about 0.7 foot lower in 1978 than in 1977 and the long-term trend was a decline of 1.9 feet for the period 1969-78. Declines in 1972, 1977, and 1978 were due to periods of little precipitation.

310813083260301 Local number, 18H16.
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.
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, 172.10 ft below land-surface datum, December 12, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



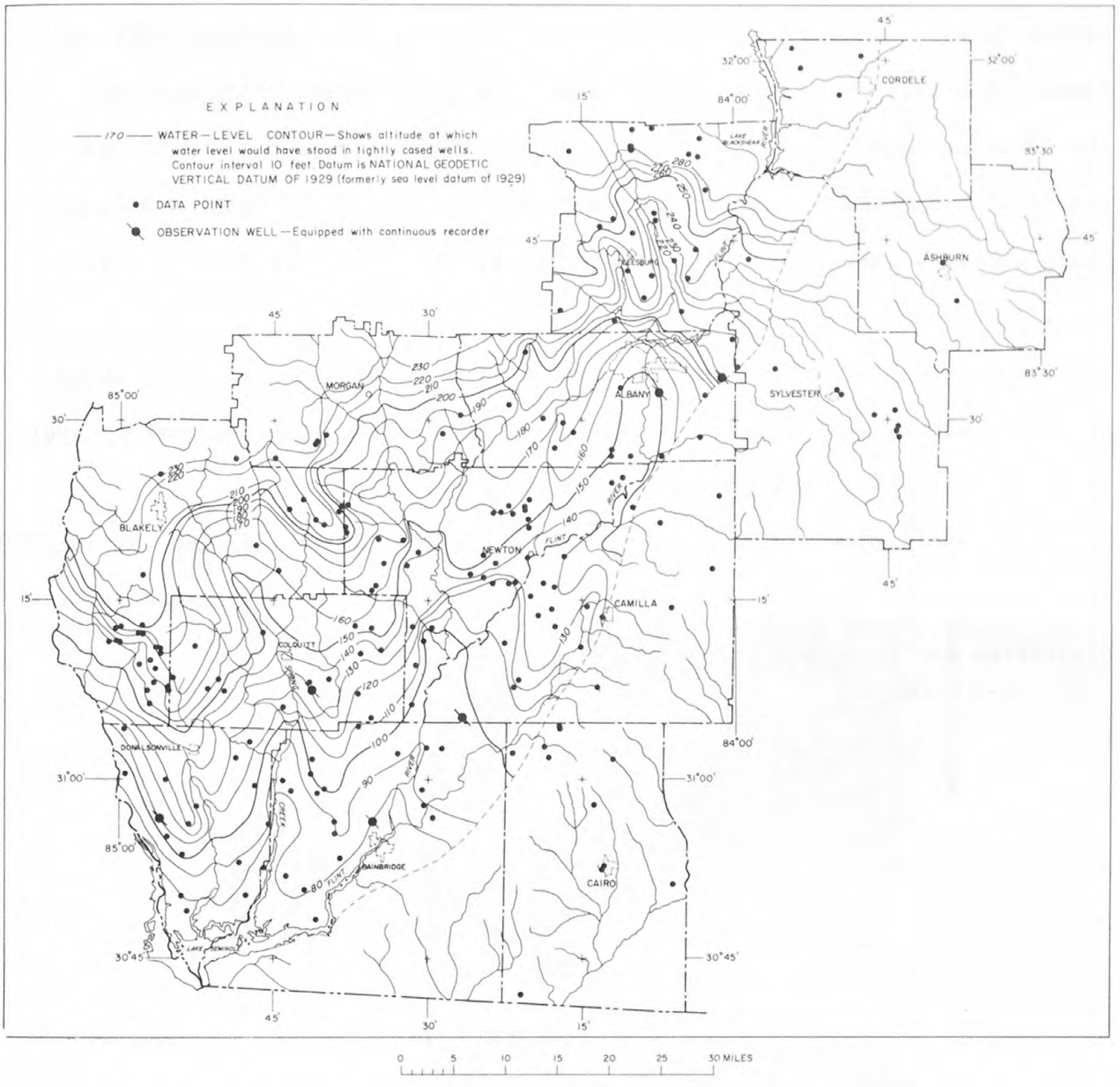
WATER-LEVEL FLUCTUATIONS IN ADEL TEST WELL

3.1f Dougherty Plain Area

Ground-water levels in the Dougherty Plain respond chiefly to fluctuations in streamflow, and hence, to precipitation and evapotranspiration. The Flint River recharges the aquifer north of Albany, so ground-water levels fluctuate correspondingly. The general trend for the past 5 years has been a period of surplus precipitation; however, during this period, the water levels in some wells have continued to decline. This decline may be due, in part, to increased pumpage in southwest Georgia.

During the 1977 growing season, about 92 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 1977 growing season was more than 42 billion gallons.

A comparison of low water levels in November-December 1977 to high water levels in March 1978 showed a rise of about 10 feet throughout the area.



WATER-LEVEL SURFACE OF THE PRINCIPLE ARTESIAN AQUIFER, DOUGHERTY PLAIN DISTRICT, MARCH 1978 (FROM POLLARD AND OTHERS).

December mean sets new record low

The December 1978 mean water level of 49.9 feet in the Bolton well was the lowest on record. The water level in the well responds to seasonal variations in rainfall and pumpage. The rises in water level in March 1977 and January-February 1978 corresponded to periods of increased precipitation. The subsequent declines in April to August 1977 and May to August 1978 correlate with the growing season and were, in part, due to irrigation pumpage. Sharp declines and recoveries were the result of a nearby irrigation system being turned on and off.

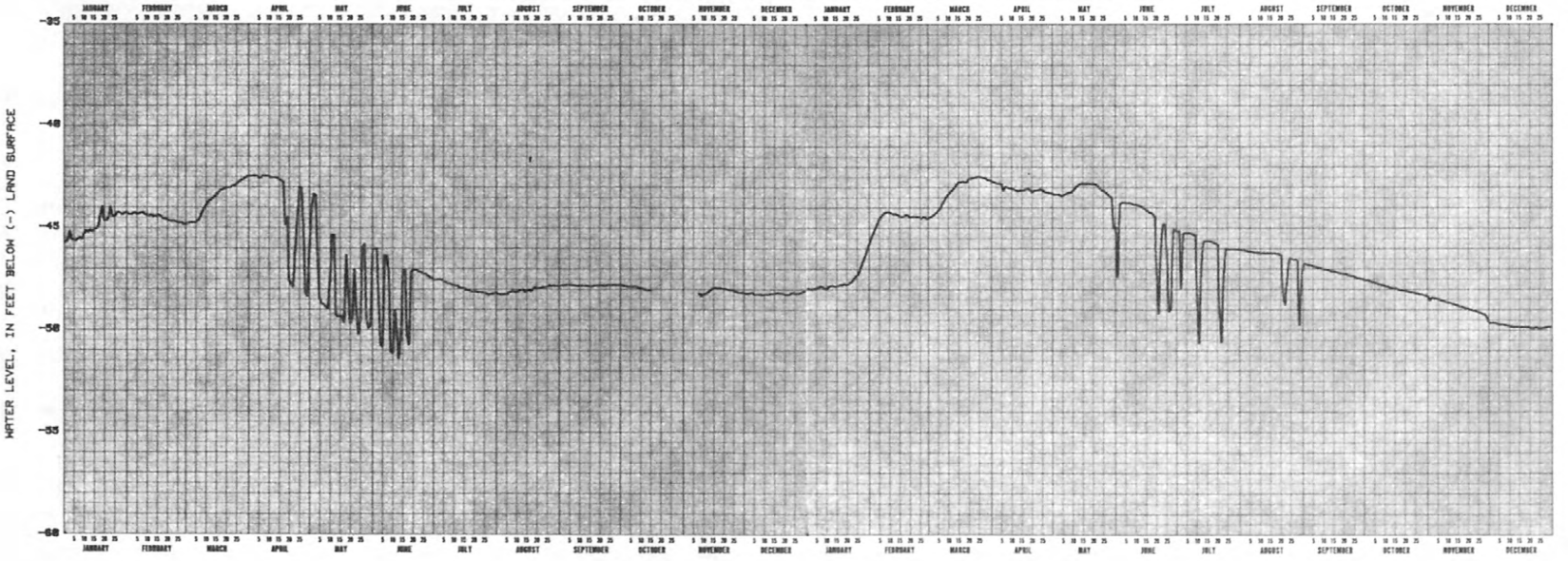
The decline from September to November 1978 corresponded to a period of decreased precipitation, and the difference between the high mean water level in April to the low mean water level in December was 6.7 feet.

The 1978 mean water level was 0.6 foot higher than in 1977 and the long-term trend was a rise of about 2.1 feet, corresponding to an increase in precipitation for the period 1969-78.

DECATUR COUNTY

305736084355801 Local number, 9F520.
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.—None.
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, 51.42 ft below land-surface datum, June 14, 1977.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE BOLTON OBSERVATION WELL, 1977-78

Water level responds to seasonal rainfall and pumpage

The water level in the Fleet well, like the Bolton well, responds to seasonal variations in rainfall and pumpage. Rises in water level in March 1977 and January, March, and November 1978 corresponded to periods of increased precipitation. The rapid declines in April and May 1977 and April to June 1978 corresponded to periods of little rainfall and increased irrigation pumpage. The decline in February 1978 of 8.1 feet was due to a decrease in rainfall.

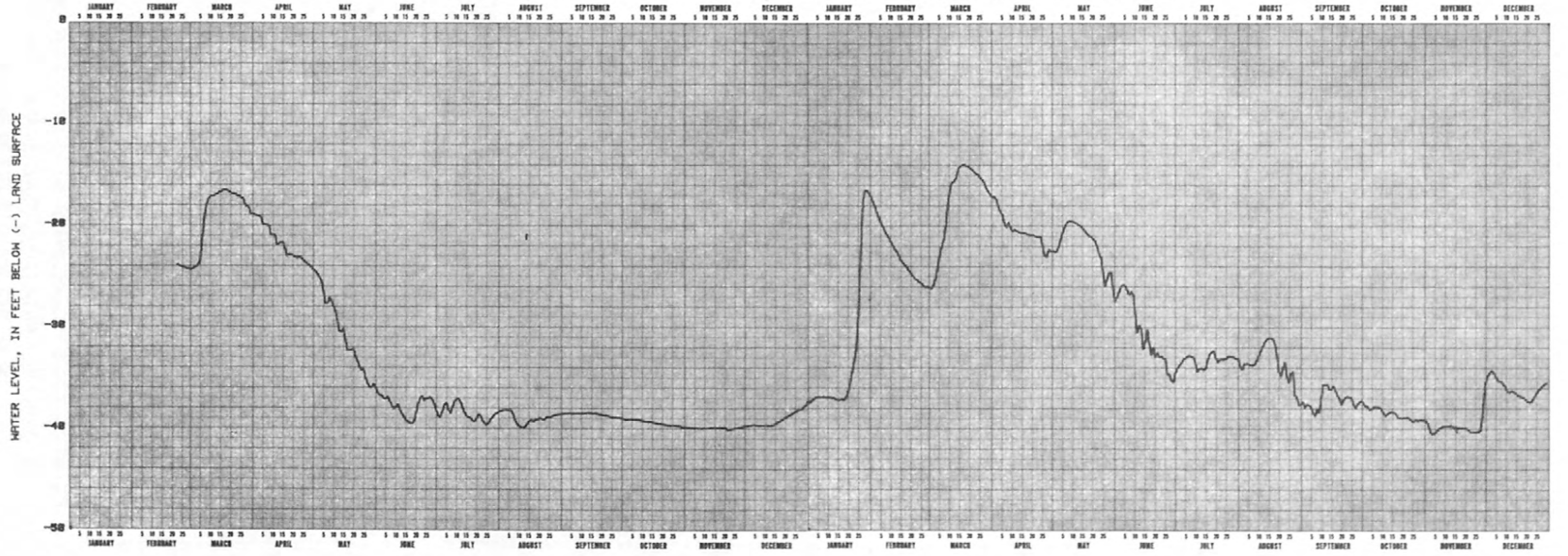
The water level during 1977 showed a steady decline, with minor fluctuations, from April to June and then rapidly leveled off. A similar stabilizing of the water level occurred in November 1978 after a steady decline from April through October. The probable cause of stabilization was the cessation of ground-water loss to surface water, which occurred when pumping and natural spring flow lowered the ground-water level to that of nearby Spring Creek and thus reduced or eliminated any flow gradient.

The 1978 mean water level was 3.8 feet higher than in 1977, corresponding to an increase in precipitation.

MILLER COUNTY

310651084404501 Local number, 8G1.
LOCATION.--Lat 31°06'51", long 84°40'45", Hydrologic Unit 03130010, 1 mi northeast of Boykin, Ga.
Owner: Jack Fleet.
AQUIFER.--Principal artesian aquifer.
WELL CHARACTERISTICS.--Drilled unused irrigation well, diameter 12 in., depth 255 ft, cased to 130 ft, open hole.
DATUM.--Altitude of land-surface datum is 150 ft.
Measuring point: Top front edge of recorder shelter, 3.0 ft above land-surface datum.
REMARKS.--None.
PERIOD OF RECORD.--February 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 14.20 ft below land-surface datum, March 17, 1978; lowest, 40.28 ft below land-surface datum, November 5, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values



WATER-LEVEL FLUCTUATIONS IN THE FLEET OBSERVATION WELL, 1977-78

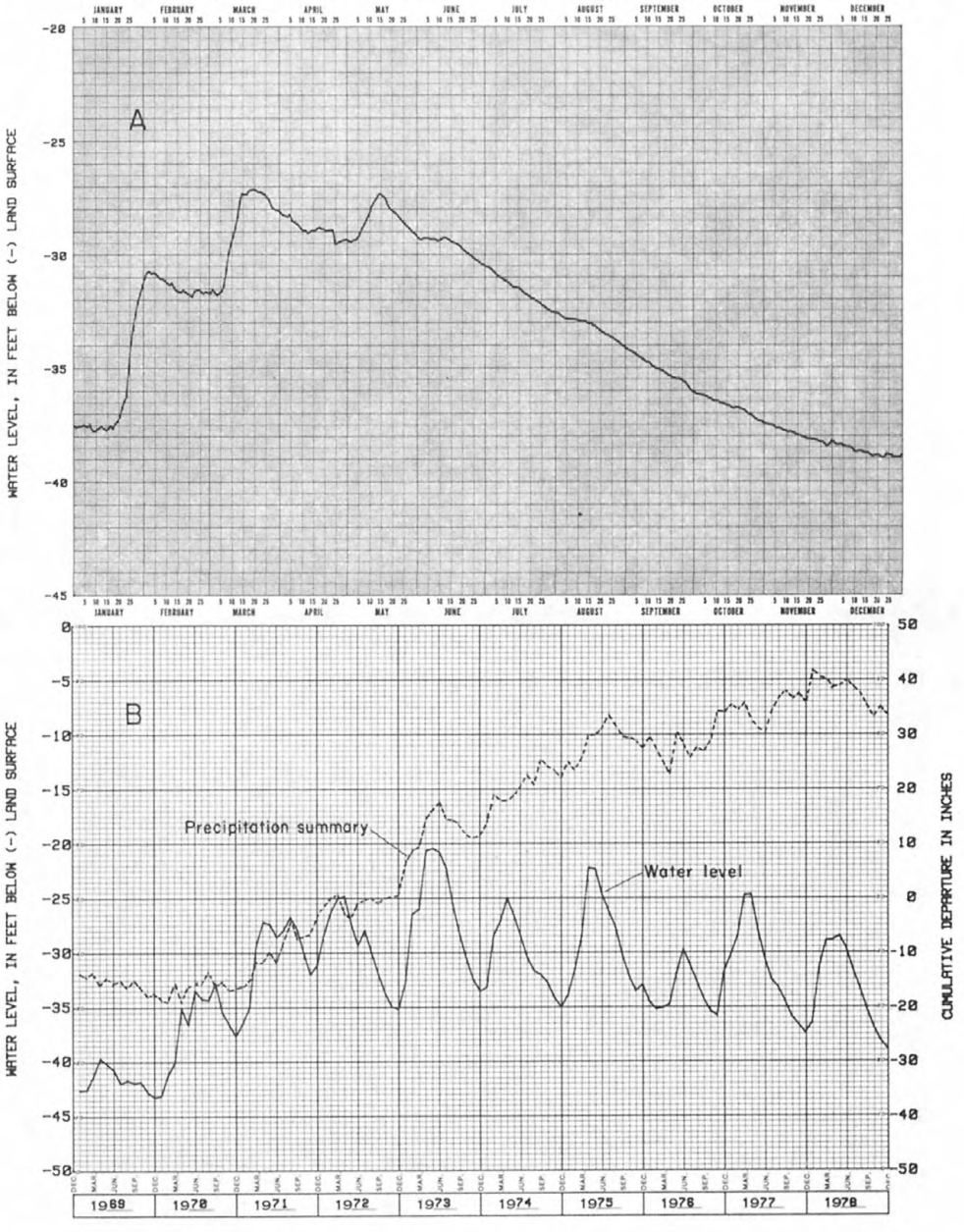
Water level lowest since 1970

The mean water level during December 1978 in the Albany-Dougherty County well dropped to the lowest level since 1970. The well shows a seasonal response, and the water-level rises that occurred in January, March, and May corresponded to periods of increased precipitation.

The 1978 mean water level was 1.7 feet lower than in 1977 and the long-term trend was a rise of 8.8 feet over the period 1969-78. Although the general trend for the past 5 years has been an increase in precipitation, the water level has declined 2.6 feet. This decline may be due, in part, to increased pumpage in southwest Georgia.

313748084002901 Local number, 13L3.
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, 43.80 ft below land-surface datum, January 1, 1963.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE ALBANY-DOUGHERTY COUNTY OBSERVATION WELL (A) AND 10-YEAR WATER-LEVEL FLUCTUATION WITH CUMULATIVE DEPARTURE OF PRECIPITATION, 1969-78 (B)

3.2 Regional Clayton Limestone Aquifer

The Clayton Limestone 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. Where large quantities of ground water are needed, water is withdrawn from the Clayton Limestone and from an underlying or overlying aquifer.

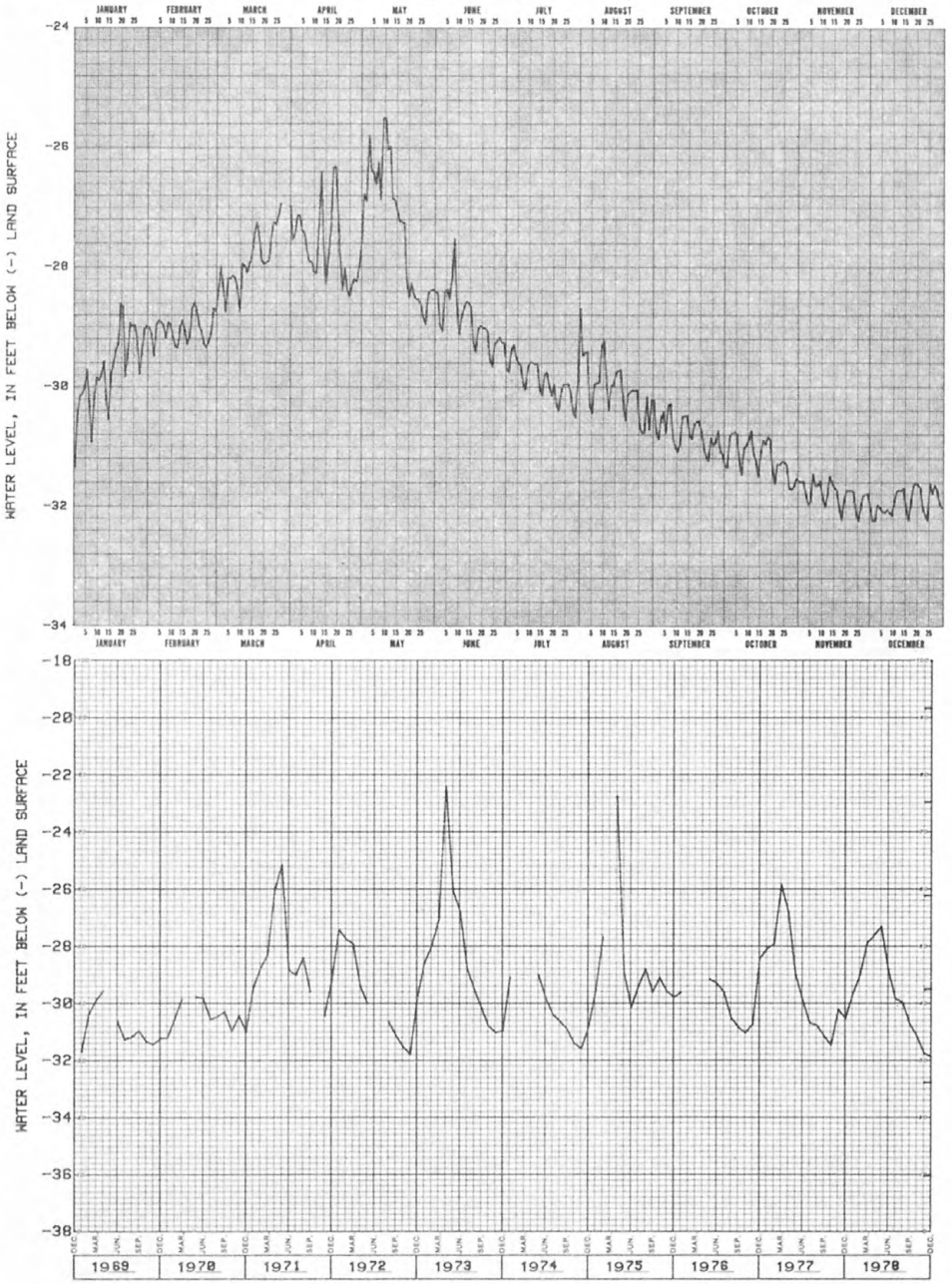
Water level controlled by reservoir and river stages

Annual water-level fluctuations of as much as 8 feet in the U.S. Army Corps of Engineers 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 1978 low water level was 0.3 foot lower than the 1977 low, but remained 3.6 feet above the record low of 1963. Average water levels during the past 10 years do not indicate a long-term trend.

313637085032601 Local number, 15L1.
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 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE CLAY COUNTY OBSERVATION WELL

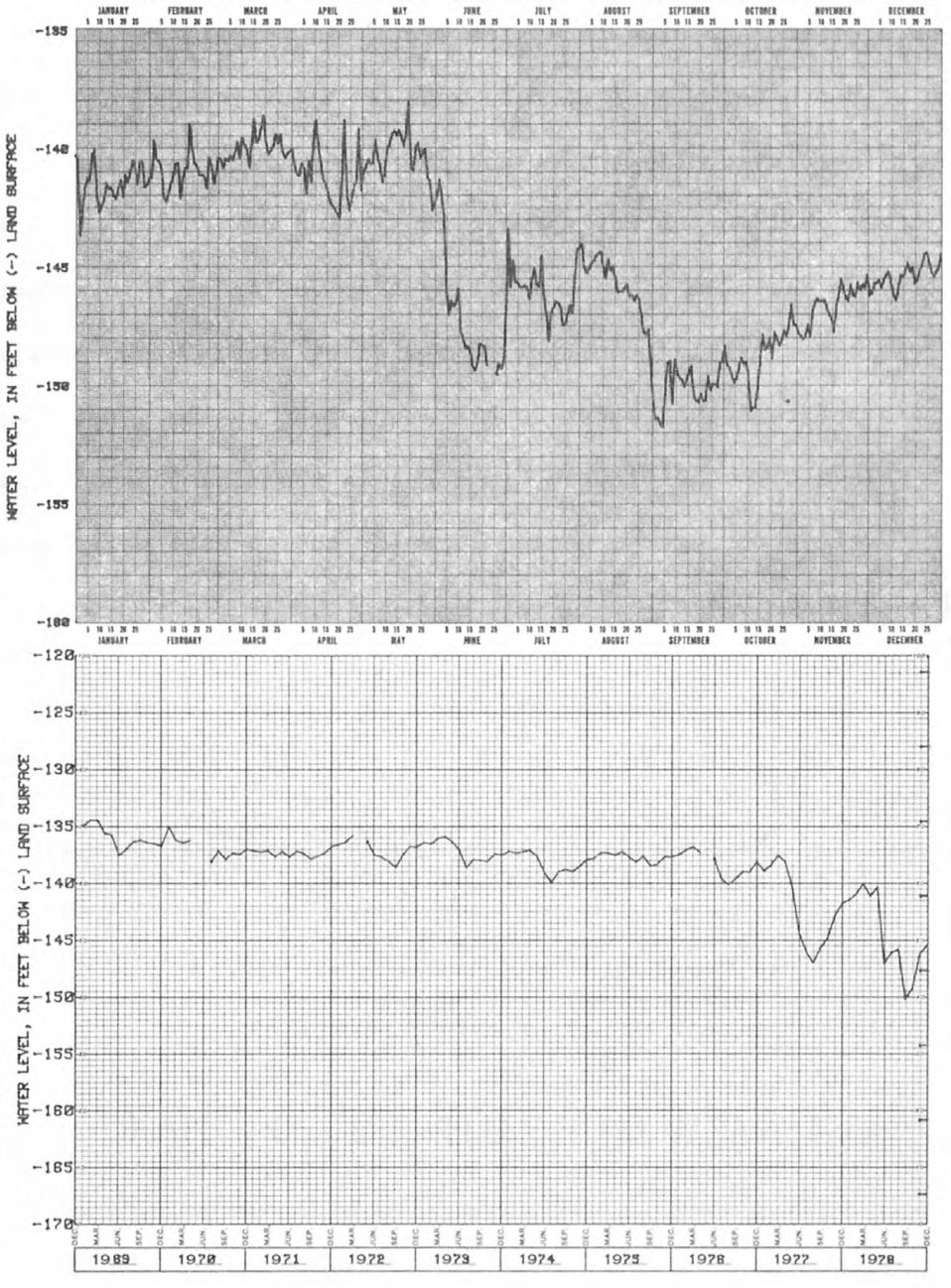
Water level shows long-term decline

The combination of regional pumpage and deficient rainfall reduced the water level in the Cuthbert city well to a new low in September, 3.3 feet below the previous record set in August 1977.

The water level ranged from a high of 138.0 feet in May to a low of 151.8 feet in September, a decline of 13.8 feet. By year end the level had recovered 7.3 feet, but remained 3.0 feet below the level at the end of 1977. The 1978 mean water level was 2.3 feet lower than in 1977 and the trend from 1969-78 was a decline of 8.3 feet, most of which occurred during 1977-78.

314602084473701 Local number, 7N1.
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, 151.83 ft below land-surface datum, September 5, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE CUTHBERT OBSERVATION WELL

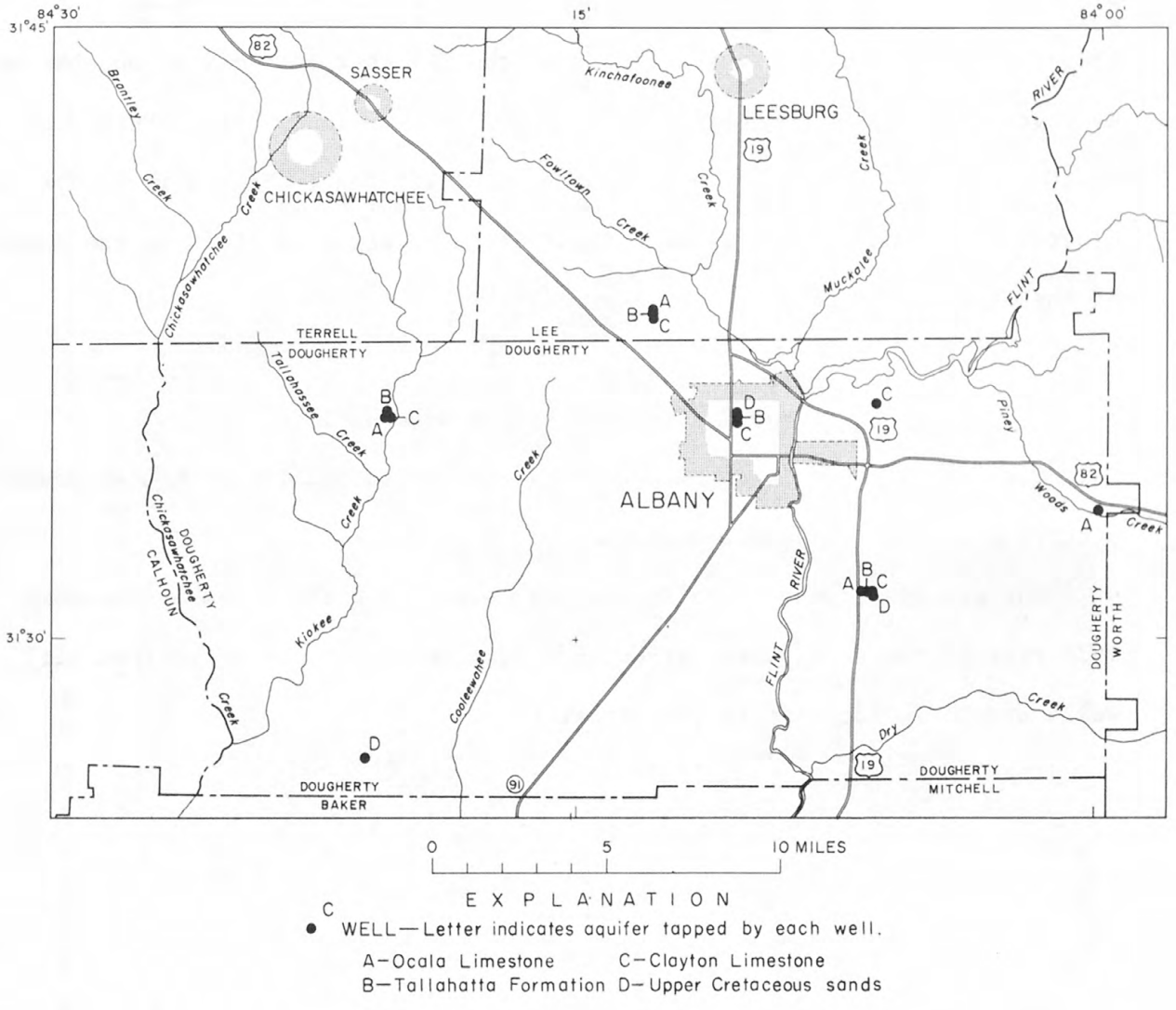
3.2a Albany Area

The city of Albany has a water system of 20 multi-aquifer wells which yielded from 10 to 22 million gallons per day in 1978. Municipal, industrial, agricultural, and domestic ground-water use in the Albany area has a peak demand during the summer months.

Four aquifers are used for water supply in the Albany area. They are, in order of depth below land surface, the Ocala Limestone, the Tallahatta Formation, the Clayton Limestone, and the Upper Cretaceous sands.

A water-level monitoring network consisting of 13 test wells and 3 existing wells was established in the Albany area during 1977-78. Each of the network wells was drilled to tap 1 of the 4 aquifers. Measurements made during 1978 indicate that water levels are lowest in the Clayton Limestone.

Water levels in the Clayton Limestone in the Albany area underwent a long-term decline during the period 1969-78, and in some wells water levels dropped more than 20 feet.



LOCATION OF TEST WELLS IN THE ALBANY AREA.

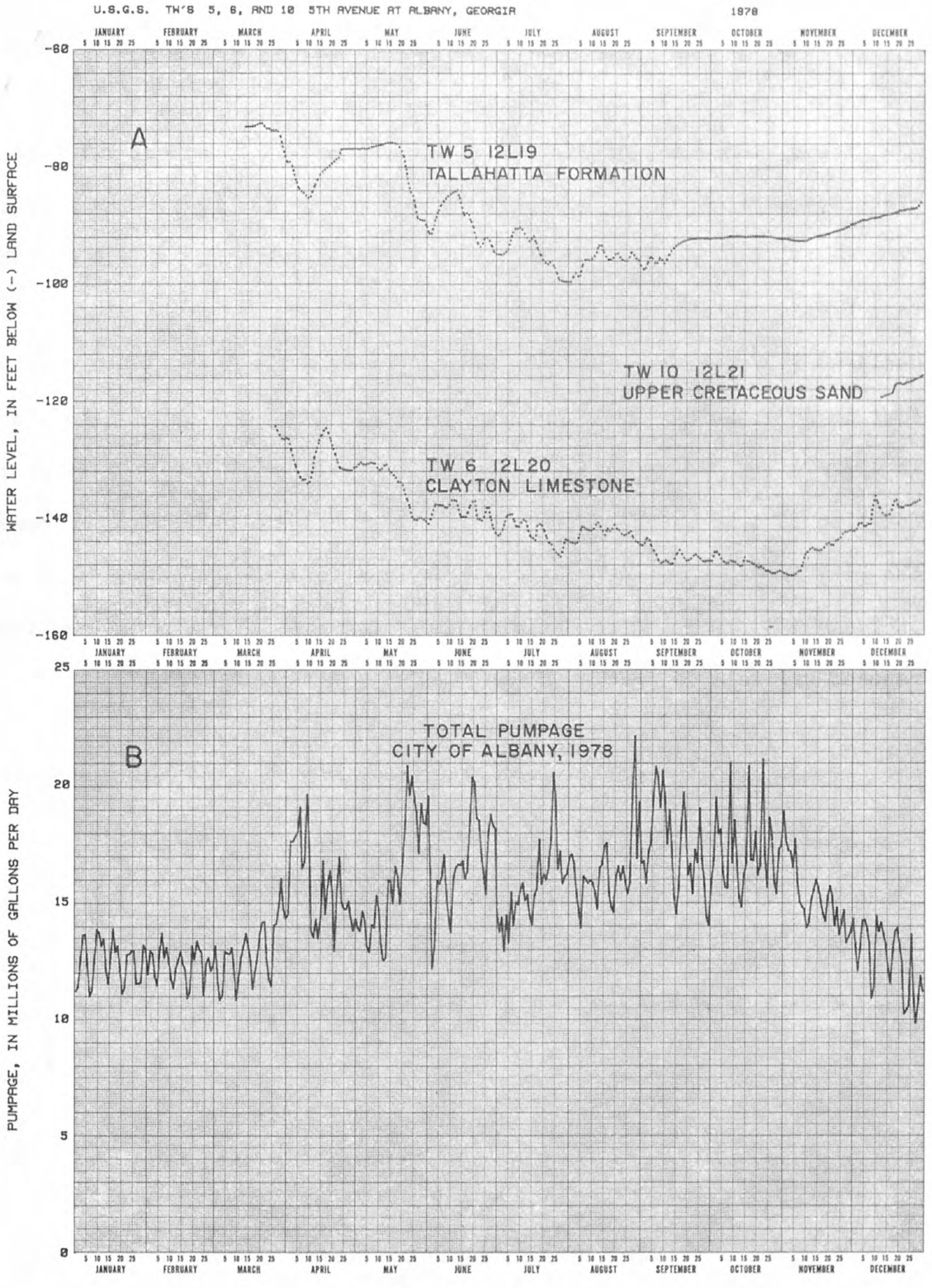
Clayton Limestone water levels lowest in area

U.S. Geological Survey test wells 5, 6, and 10, located at 5th Avenue and Slappey Boulevard in Albany, illustrate the range of water levels in the area's aquifers. Water-level measurements made at 5th Avenue indicate that, with the exception of the Clayton Limestone, the deeper the aquifer, the lower the water level. Test well 5 taps the Tallahatta Formation and has an average water level of about 90 feet. Test well 10 is in Upper Cretaceous sands and has an average water level of about 115 feet. Test well 6 taps the Clayton Limestone and its average water level of about 150 feet is the lowest of the aquifers tapped.

Ground-water use varies seasonally

Ground-water use in the Albany area varies seasonally, with peak demand occurring during the summer months.

Changes in pumpage may affect water levels, and the November-December 1978 rise in the test wells corresponds to a decrease in pumpage from city wells and to an increase in precipitation.



WATER-LEVEL FLUCTUATION IN TEST WELLS 5, 6, AND 10 IN THE ALBANY AREA (A) AND TOTAL CITY OF ALBANY PUMPAGE, 1978 (B)

Record low reached in November

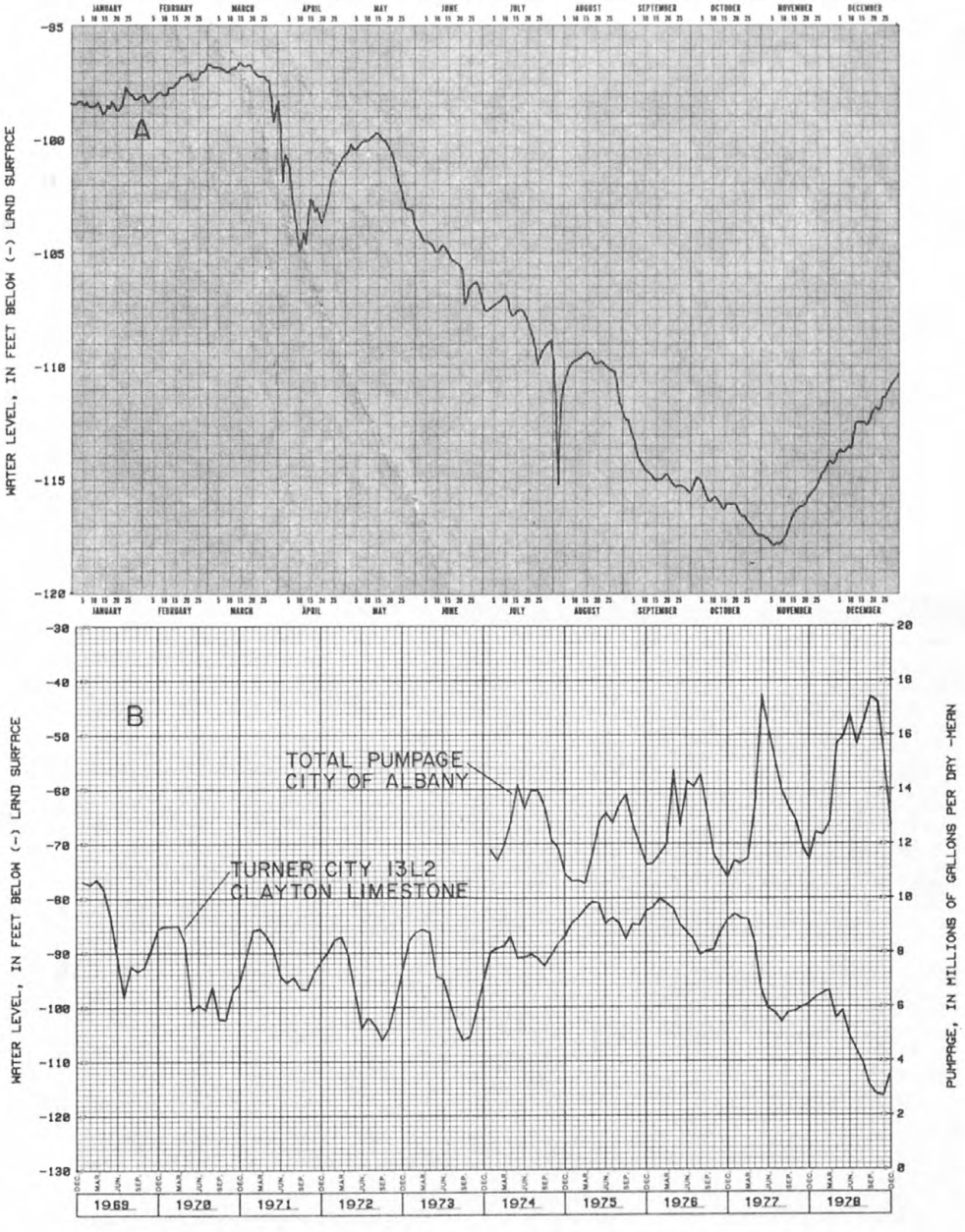
Ground-water withdrawal and precipitation are the main factors affecting the water level in the Turner City well.

A new record low of 118.0 feet was reached in November, 9.7 feet below the previous record set in September 1973 and 14 feet below the 1977 low.

The 1978 mean water level was 11.4 feet lower than in 1977 and the long-term trend from 1969-78 shows a cyclic fluctuation. The mean water level declined 9.3 feet from 1969-73. This decline was followed by a rise of 5.8 feet in 1974, which leveled off in 1975-76. The water level began to decline in 1977-78 and has dropped 21.3 feet since 1976, and 20.4 feet since 1969. The rise in water level during 1974 corresponded to a decrease in pumpage by the city of Albany. The subsequent decline in 1977-78 corresponded to an increase in pumpage by the city and to a decrease in recharge resulting from reduced rainfall in 1978.

313554084062601 Local number, 13L2.
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, 117.98 ft below land-surface datum, November 6, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE TURNER CITY OBSERVATION WELL (A) AND 1969-78 WATER-LEVEL FLUCTUATIONS WITH TOTAL CITY OF ALBANY PUMPAGE, 1974-78 (B)

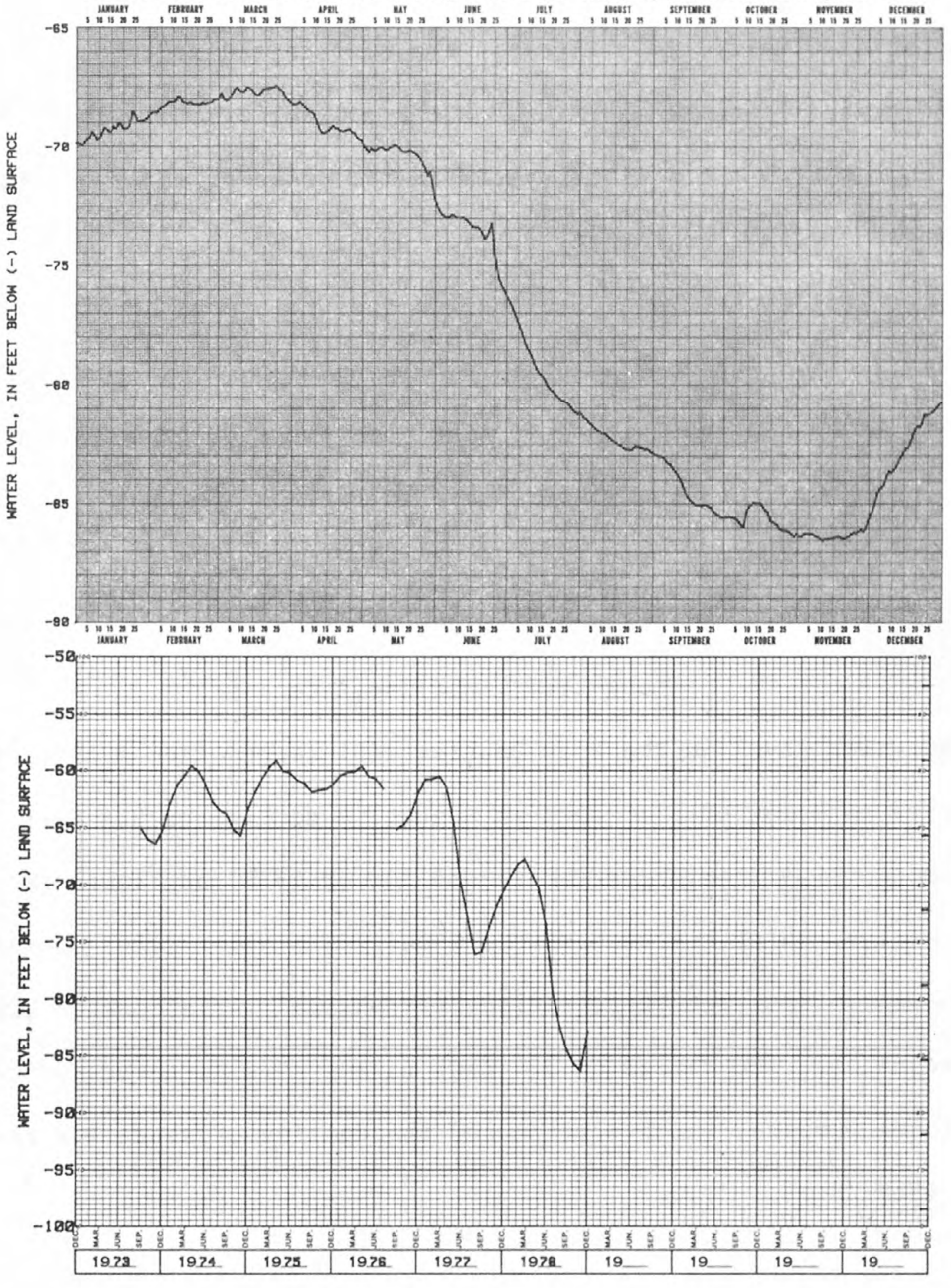
New water-level low in November

Regional ground-water withdrawal, operation of nearby irrigation wells, and reduced rainfall caused the water level in the Tallahassee Plantation well to decline from 68.1 feet in April to a record low of 86.6 feet in November. The November low was 9.1 feet lower than the previous record set in August 1977. By the end of 1978, the water level had recovered 5.8 feet, but remained 10.9 feet below the level at the end of 1977.

The 1978 mean water level was 8.3 feet lower than in 1977. The trend from 1974-76 was a rise of 1.3 feet, and from 1976-78 was a decline of 15.4 feet.

313530084203201 Local number, 11L2.
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, 86.59 ft below land-surface datum, November 11, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



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 sediments and moves down gradient 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.

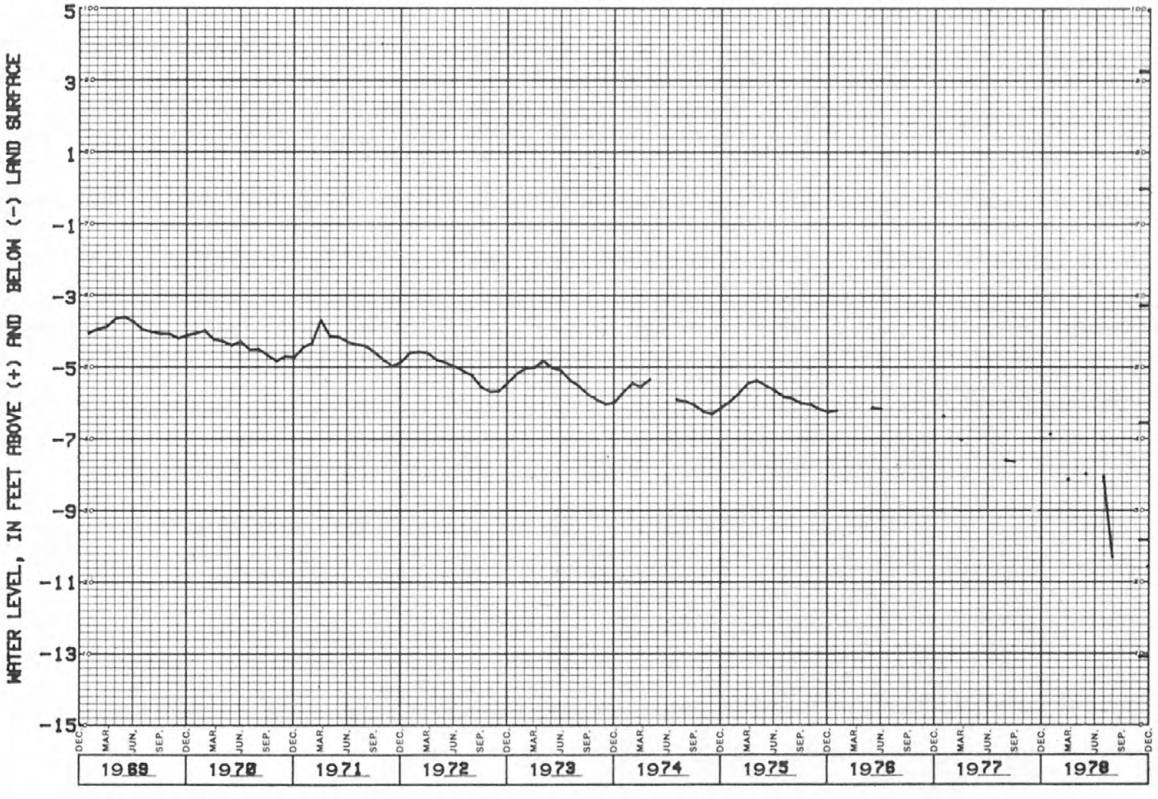
In general, water-level declines in the Cretaceous aquifer system have been negligible. The only exceptions have been in those areas where pumpage was heavy: Houston and Twiggs Counties, northwest Wilkinson County, central Washington County, and the eastern part of Richmond County. The water-level declines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

Long-term water-level decline

The water level in the Fort Benning well ranged from a high of 6.9 feet in January to a low of 10.3 feet in August, a decline of 3.4 feet. The August low was 19.4 feet above the record low of 1958 that resulted from nearby heavy pumpage, which has been discontinued. The water level usually fluctuates about 1.5 feet per year, reflecting seasonal variations in precipitation and streamflow. The change of 3.4 feet during 1978 corresponded to increases in regional pumpage, which also caused the decline of about 4.4 feet for the period 1969-78.

322036084590301 Local number, 6S1.
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 1978 monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE FORT BENNING OBSERVATION WELL

3.4 Coastal Plain Water-Table Aquifers

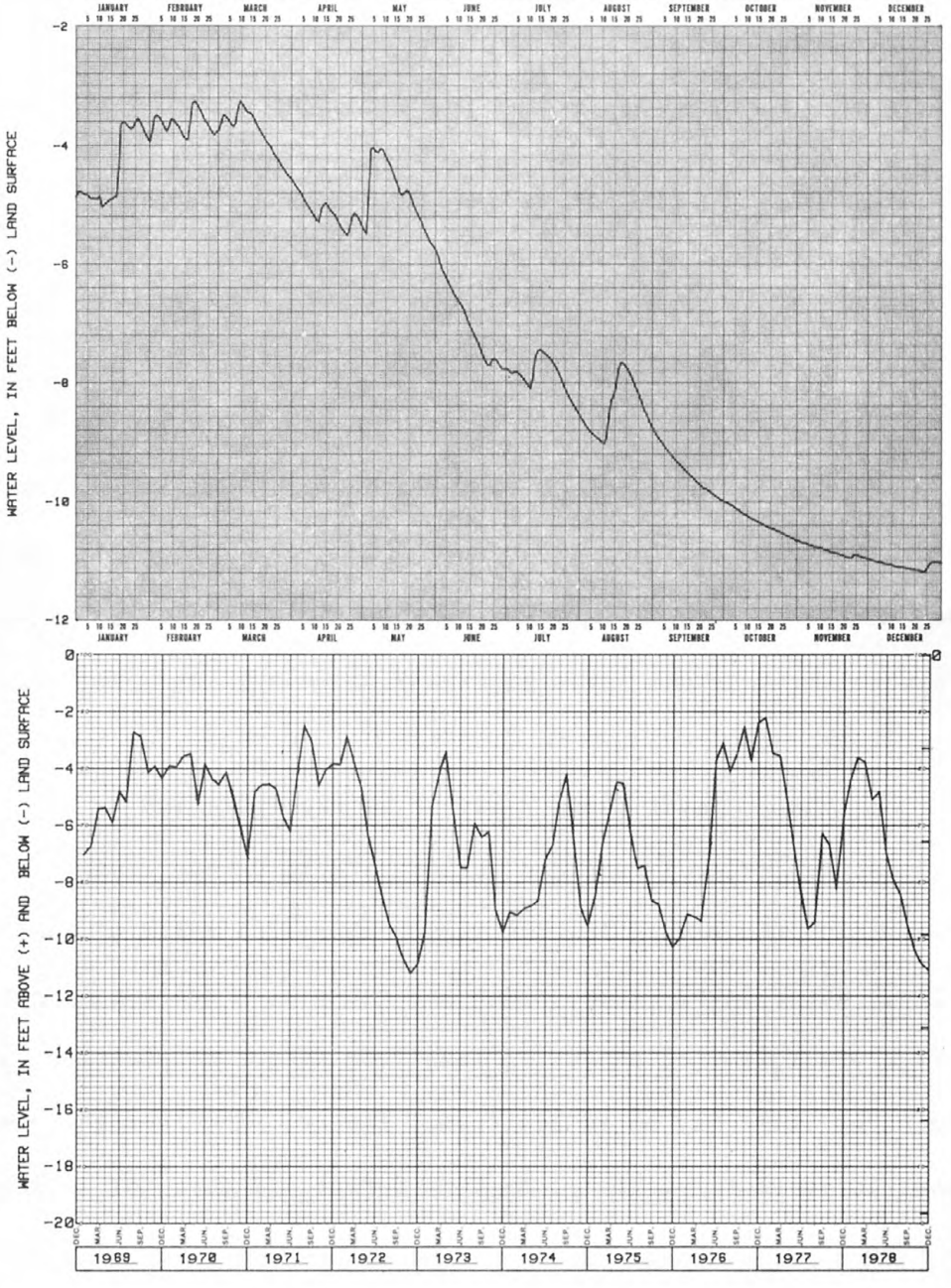
Shallow water-table aquifers in some areas of the Coastal Plain are used for domestic and stock supplies. Precipitation is the main factor affecting water levels in these aquifers. They respond rapidly to changes in precipitation and show marked seasonal fluctuations that correspond to variations in 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 1978

In this shallow water-table well, precipitation is the main factor affecting the water level. At the end of 1978 the water level was 5.9 feet lower than at the end of 1977, but remained 1.2 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.

315950081161201 Local number, 35P94.
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, November 30, 1972.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE U.S.D.A. OBSERVATION WELL

3.5 Piedmont Area

Water levels in four observation wells remained about the same to 2.2 feet lower at the end of 1978 than at the end of 1977. Annual water-level fluctuations in the wells range from 2 to 9 feet. During the past 10 years, average water levels in the wells generally have varied less than 2 feet and indicate no long-term trend.

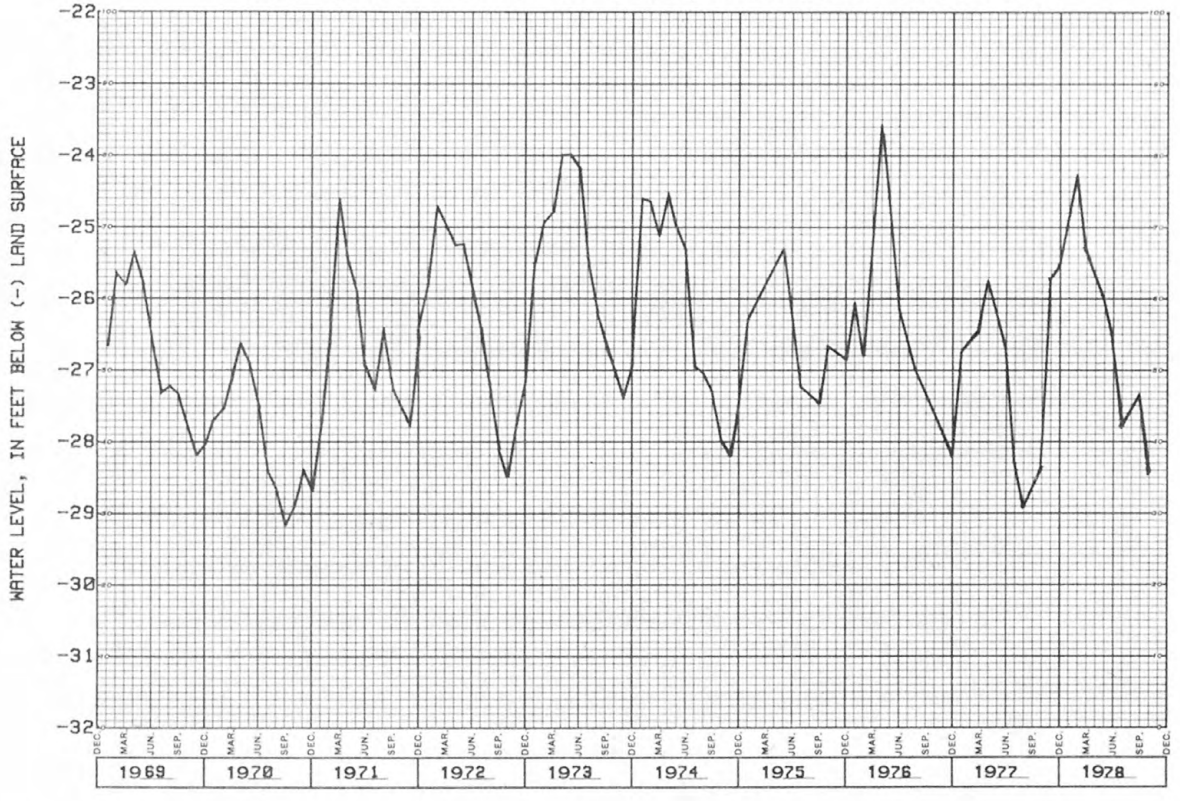
Seasonal changes in precipitation and evapotranspiration produce corresponding changes in ground-water levels. Rainfall in the area is heavy in winter and midsummer and relatively light in spring and autumn. Autumn is the driest season of the year. Ground-water levels rise rapidly with the onset of late 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 light rainfall in the autumn reduces water levels to their annual lows, generally in October or November.

Water level shows response to precipitation

The lowest water level recorded during 1978 in Dawson County test well 1 was 1.1 feet above the record low set in December 1965 and 0.47 foot above the 1977 low. Water-level fluctuations in test well 1 are caused mainly by recharge from precipitation and water loss from evapotranspiration, although changes in river stage may be an additional factor. The average water level for the past 10 years has varied less than 2 feet and does not indicate a long-term trend.

342125084083301 Local number, 085 0010.
LOCATION.--Lat 34°21'25", long 84°08'33", Hydrologic Unit 03150104, approximately 1.5 mi west of intersection of Route 9 north and Route 318 west, on the old Georgia Nuclear Lab site.
Owner: City of Atlanta, U.S. Geological Survey, test well 1.
AQUIFER.--Quartzite and Mica Schist.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 399 ft, cased to 80 ft, open hole.
DATUM.--Altitude of land-surface datum is 1,048.82 ft.
Measuring point: Top of cap on casing, 1.0 ft above land-surface datum.
REMARKS.--Borehole geophysical survey conducted September 20, 1956.
PERIOD OF RECORD.--May 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 19.29 ft below land-surface datum, April 8, 1964; lowest, 29.55 ft below land-surface datum, December 28, 1965.

Water level, in feet below land surface, through calendar year 1978 monthly values.



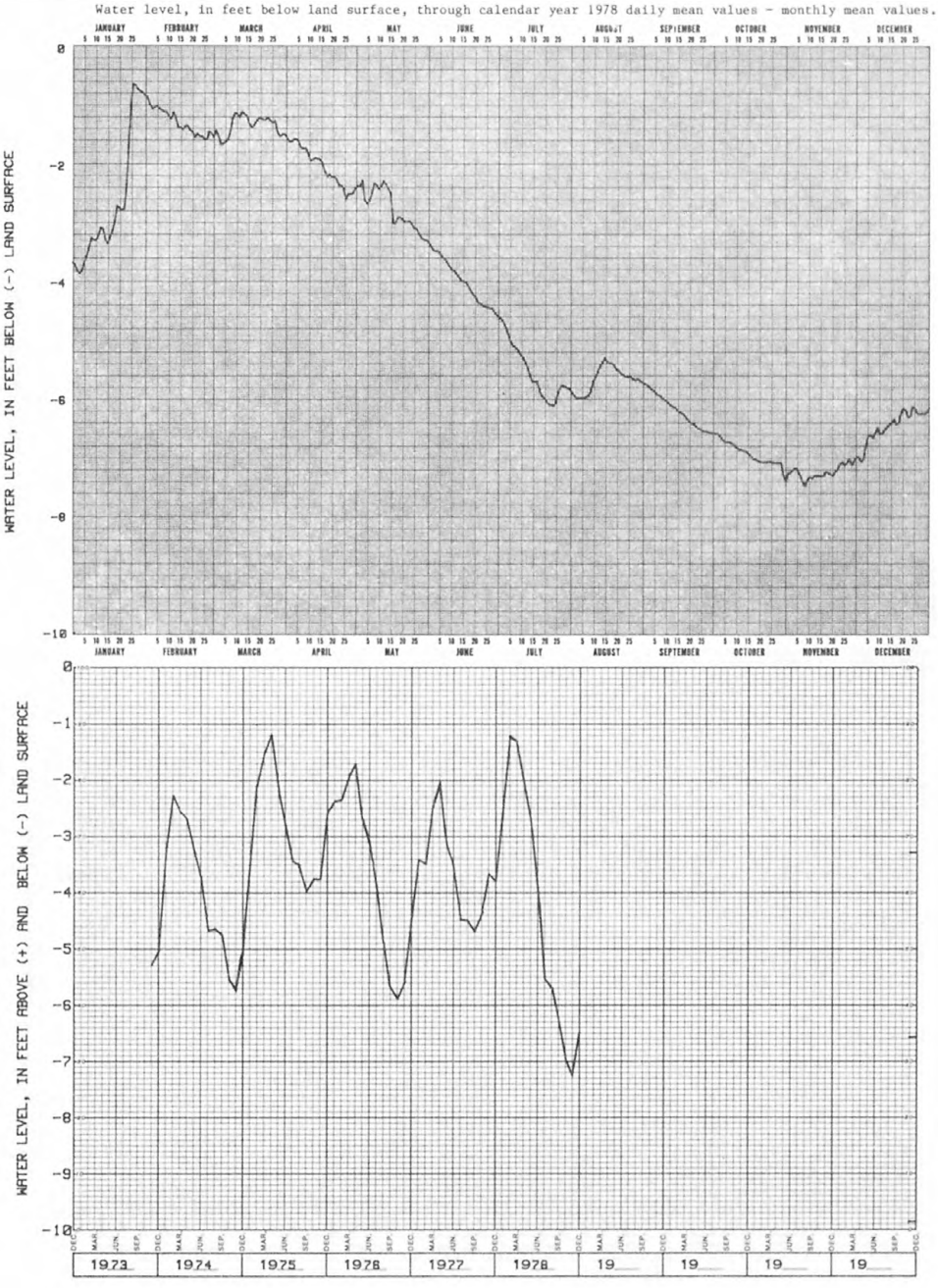
WATER-LEVEL FLUCTUATIONS IN DAWSON COUNTY TEST WELL 1

Water level sets record high and low

The water level in the Fort McPherson well reached a record high and a record low during 1978. The high in January was 0.17 foot higher than the previous record set in March 1975. The November low was 1.5 feet below the previous record of October 1976. The water level fluctuated 6.9 feet during 1978. Rapid recharge from precipitation accounts for sharp water-level rises.

334207084254801 Local number, 10DD2.
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, 7.52 ft below land-surface datum, November 8, 1978.

Water level, in feet below land surface, through calendar year 1978 daily mean values - monthly mean values.



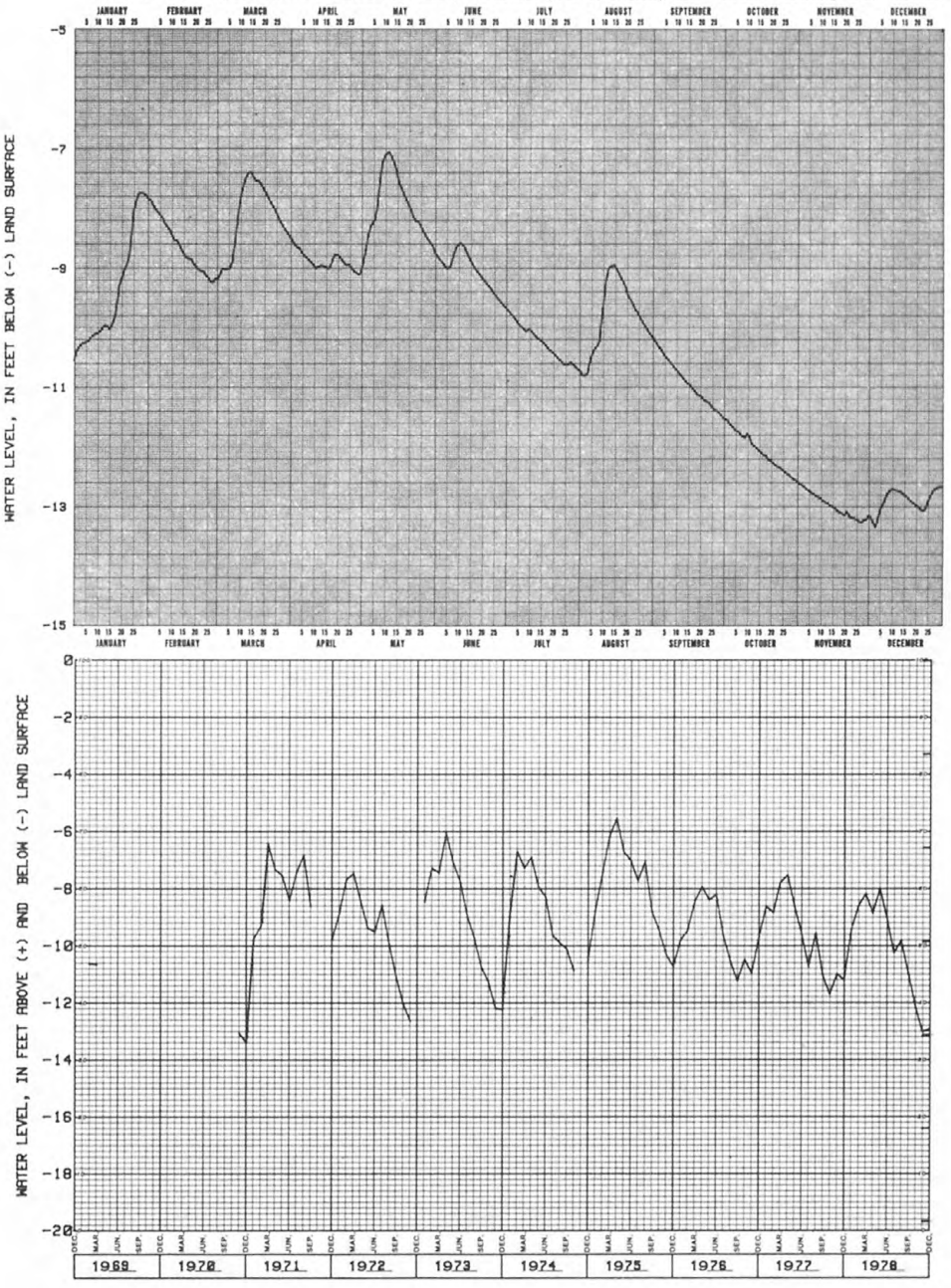
WATER-LEVEL FLUCTUATIONS IN THE FORT MCPHERSON OBSERVATION WELL

Water level lowest since 1970

Water level in the Dixie Pipeline well was about 2.2 feet lower at the end of 1978 than at the end of 1977. The lowest water level, reached in December, was below the 1977 low and only 0.26 foot higher than the record low of December 1970. This well is in saprolite above bedrock and shows a marked response to rainfall.

330858084122901 Local number, 12Z1.
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 1978 daily mean values - monthly mean values.



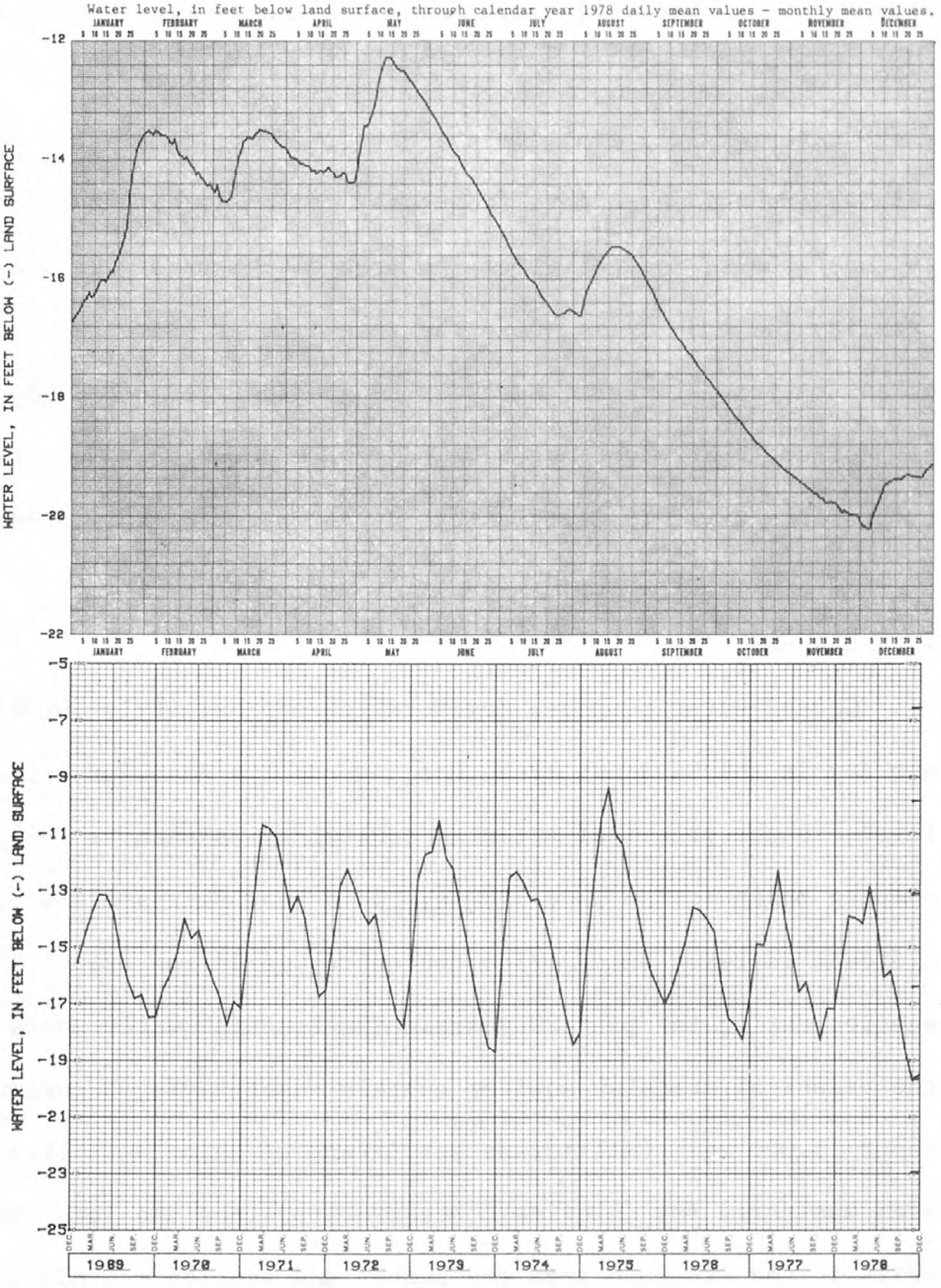
WATER-LEVEL FLUCTUATIONS IN THE DIXIE PIPELINE CO. OBSERVATION WELL

Water level fluctuations indicate no long-term trend

The water level in the University of Georgia Experiment Station well was about 2.2 feet lower at the end of 1978 than it was at the end of 1977. The low water level for the year, reached in December, was 1.6 feet lower than the 1977 low and 0.88 foot higher than the 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.

331507084171801 Local number, 11AA1.
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 1978 daily mean values - monthly mean values.



WATER-LEVEL FLUCTUATIONS IN THE SPALDING COUNTY OBSERVATION WELL

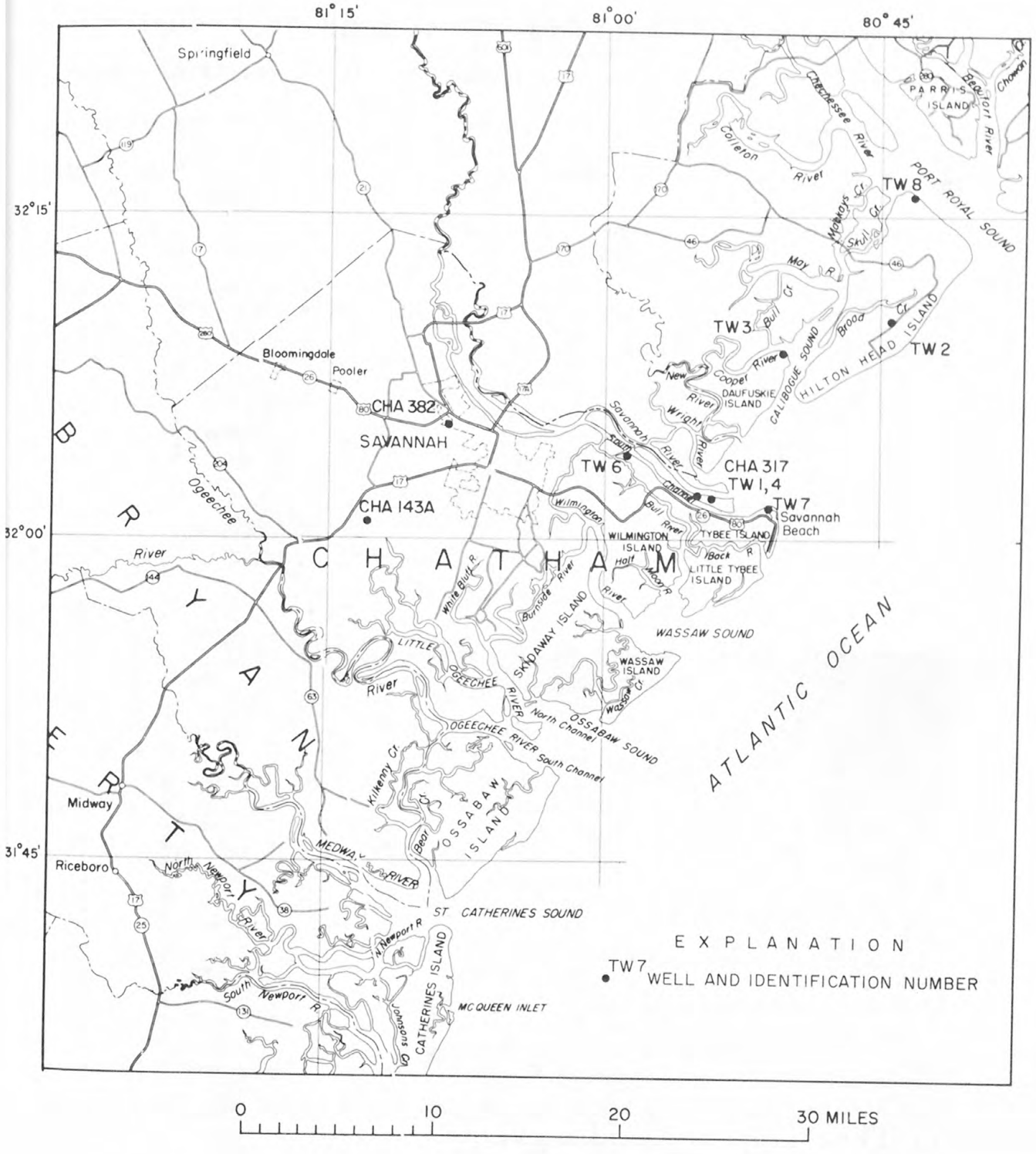
4.0 GROUND-WATER QUALITY NETWORKS

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 the State.

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 seem to be related to pumpage.

4.1 Savannah Area

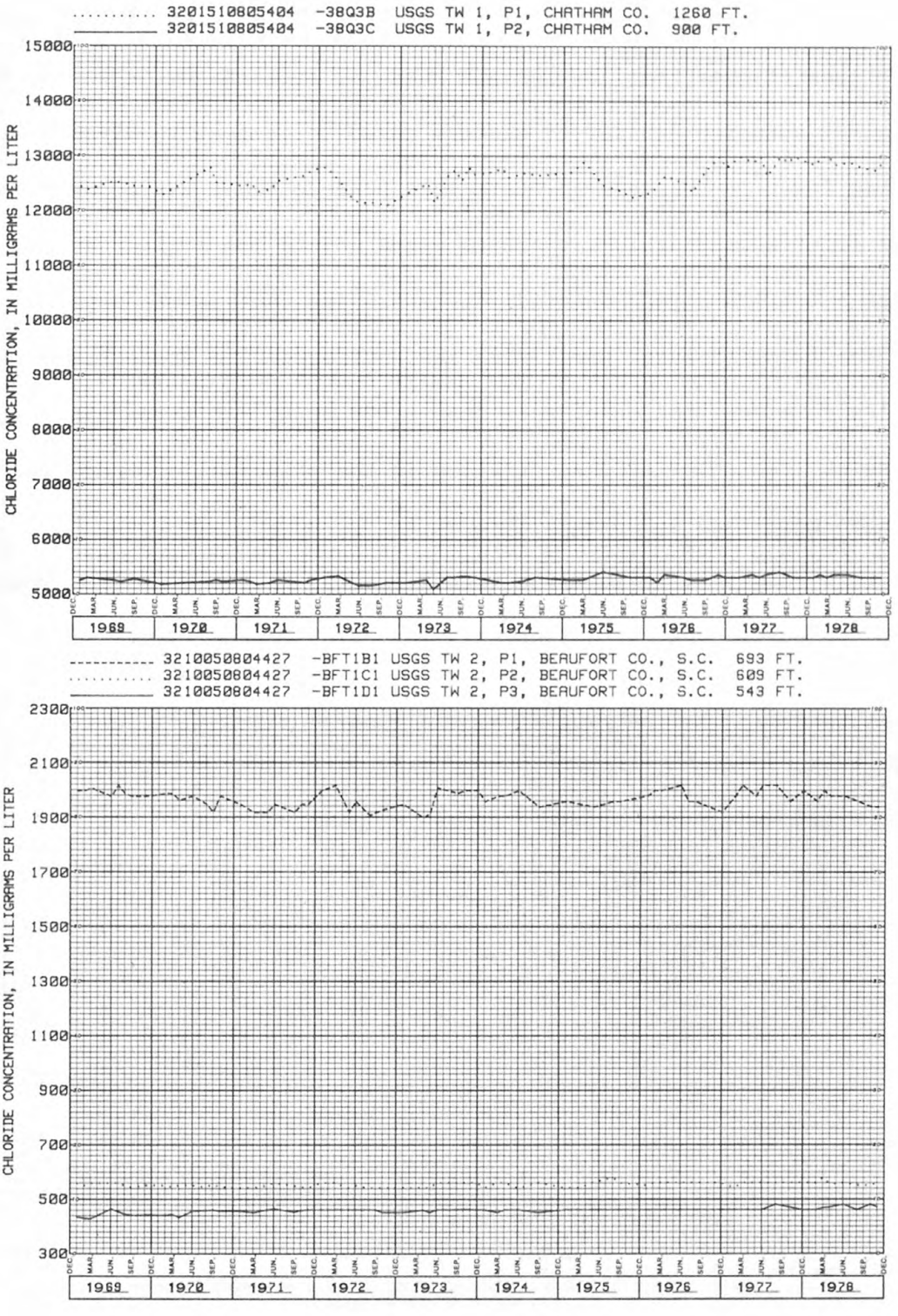
Ground-water pumpage, now totaling approximately 80 million gallons per day in the Savannah area, has lowered the head, or artesian water level, in the principal artesian aquifer by as much as 130 feet since pumping began in the late 1800's. This head decrease has caused no significant increase in chloride concentration in the principal artesian aquifer during the past 20 years. The brackish-water zones underlying the principal artesian aquifer contain water having a 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; 10 wells in the Savannah area are pumped and sampled monthly for chloride analysis. Chloride is indicative of brackish-water contamination and is readily analyzed for in the field.



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 in concentration was recorded during 1976 in the deepest brackish-water zone (test well 1, zone P-1). This increase leveled off and remained stable during 1977-78.



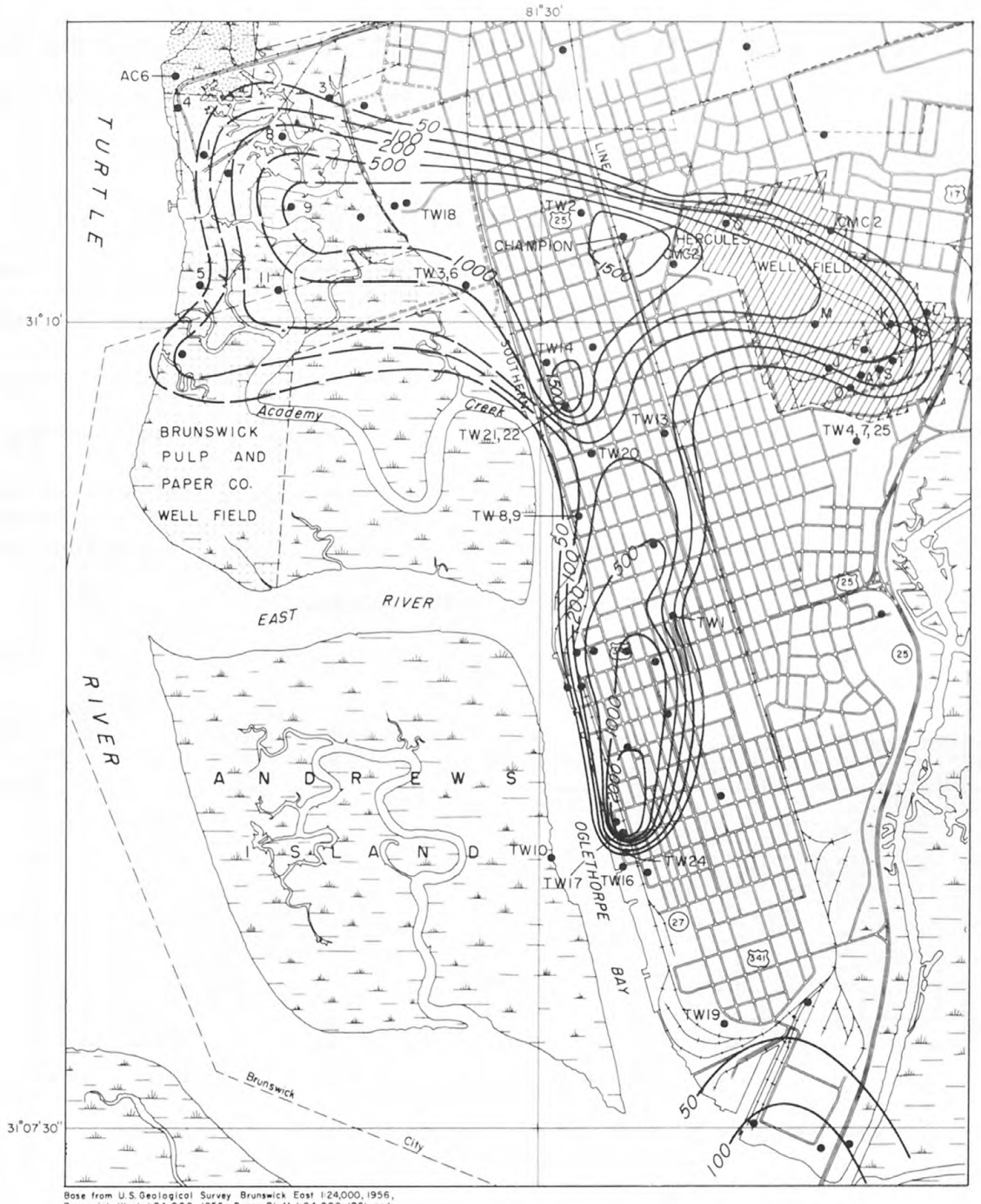
CHLORIDE FLUCTUATIONS IN CHATHAM COUNTY TEST WELLS 1 AND 2

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 more than 6,000 mg/L. At three locations in Brunswick, the chloride concentration in the principal artesian aquifer has risen to more than 1,500 mg/L.

Fifty-eight wells in Glynn County, mostly in the immediate Brunswick area, are pumped and sampled monthly for chloride analysis.

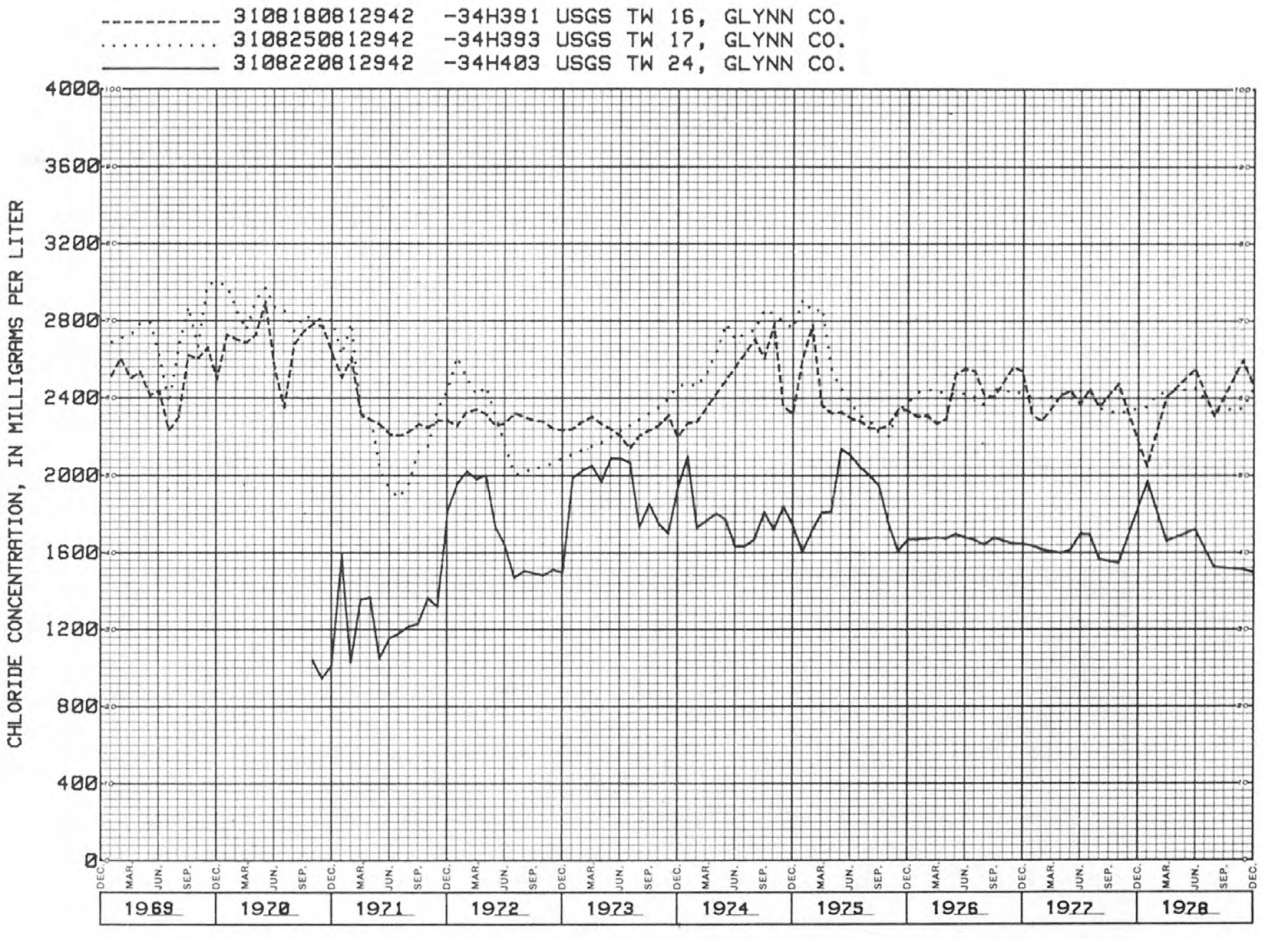


CHLORIDE CONCENTRATION, PRINCIPAL ARTESIAN AQUIFER, BRUNSWICK AREA, FEBRUARY-MAY 1978.

Chloride concentration responds to pumpage

Chloride concentration in the Bay Street wells shows a response to changes in area pumpage. Chloride increases during 1969-70 and 1974-75 corresponded to periods of increased pumpage.

Each test well taps a different water-bearing zone. Test well 17 taps the upper zone and yields water having a chloride concentration of about 2,400 mg/L. Test well 24 is in the lower zone and yields water containing about 1,600 mg/L chloride. Test well 16 taps the brackish-water zone and yields water having a concentration of about 2,400 mg/L chloride. Test well 16 showed a sharp decline in chloride concentration and test well 24 showed a sharp rise in concentration during January 1978. These fluctuations corresponded to a temporary decrease in local pumpage.



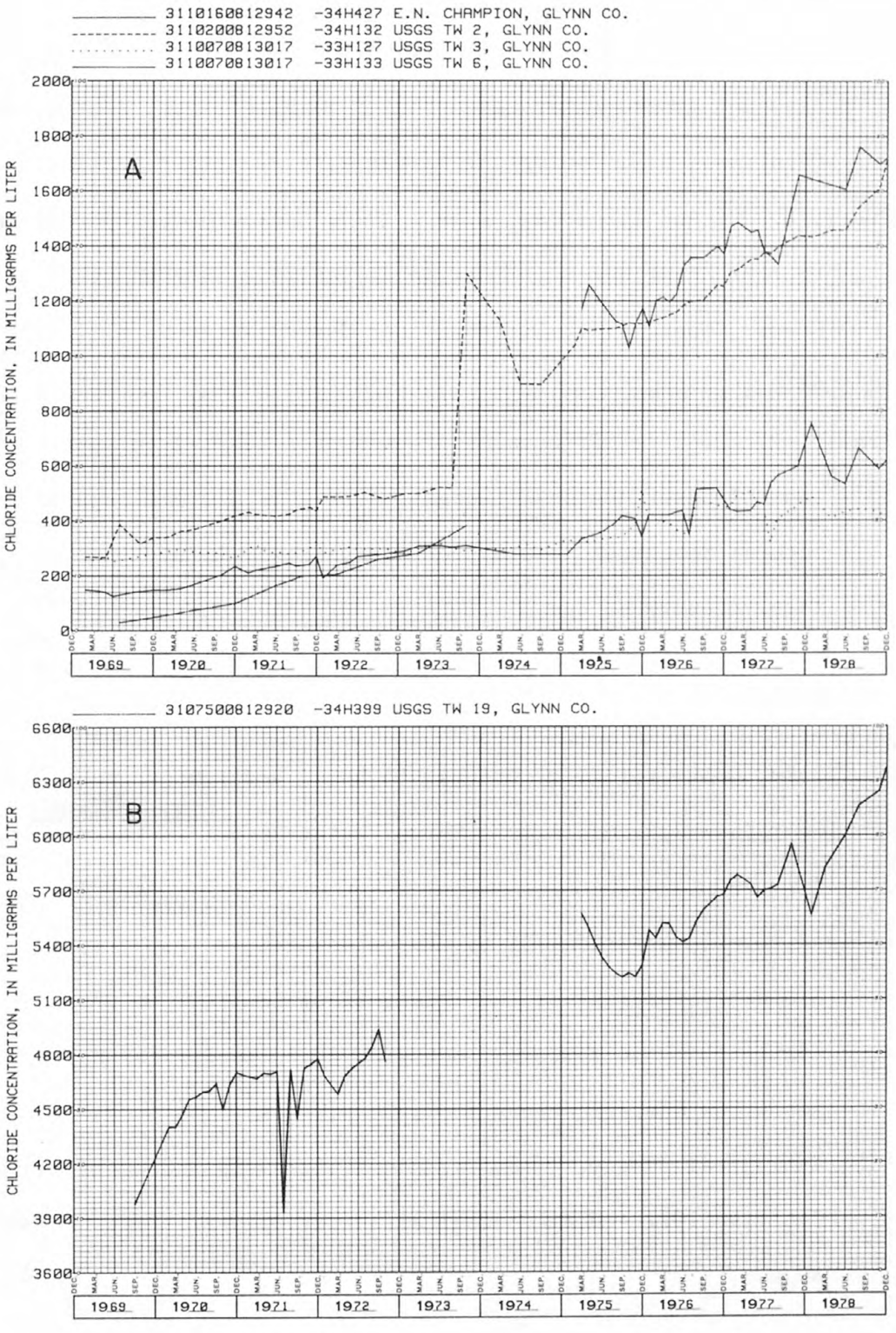
CHLORIDE FLUCTUATIONS IN WELLS 16, 17, AND 24 IN THE BAY STREET AREA

Chloride concentrations continue to rise in north Brunswick

Chloride concentrations continued to rise in the north Brunswick area during 1978. 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 the brackish-water zone beneath the principal artesian aquifer. The chloride concentration in this well has shown a steady increase since 1969. The concentration at the end of 1978 was more than 6,300 mg/L chloride, an increase of about 2,400 mg/L since 1969. This indicates that saltwater is invading the brackish-water zone from a deeper source in the cavernous limestone.



CHLORIDE FLUCTUATIONS IN THE NORTH BRUNSWICK AREA (A)
AND IN TEST WELL 19 (B)

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