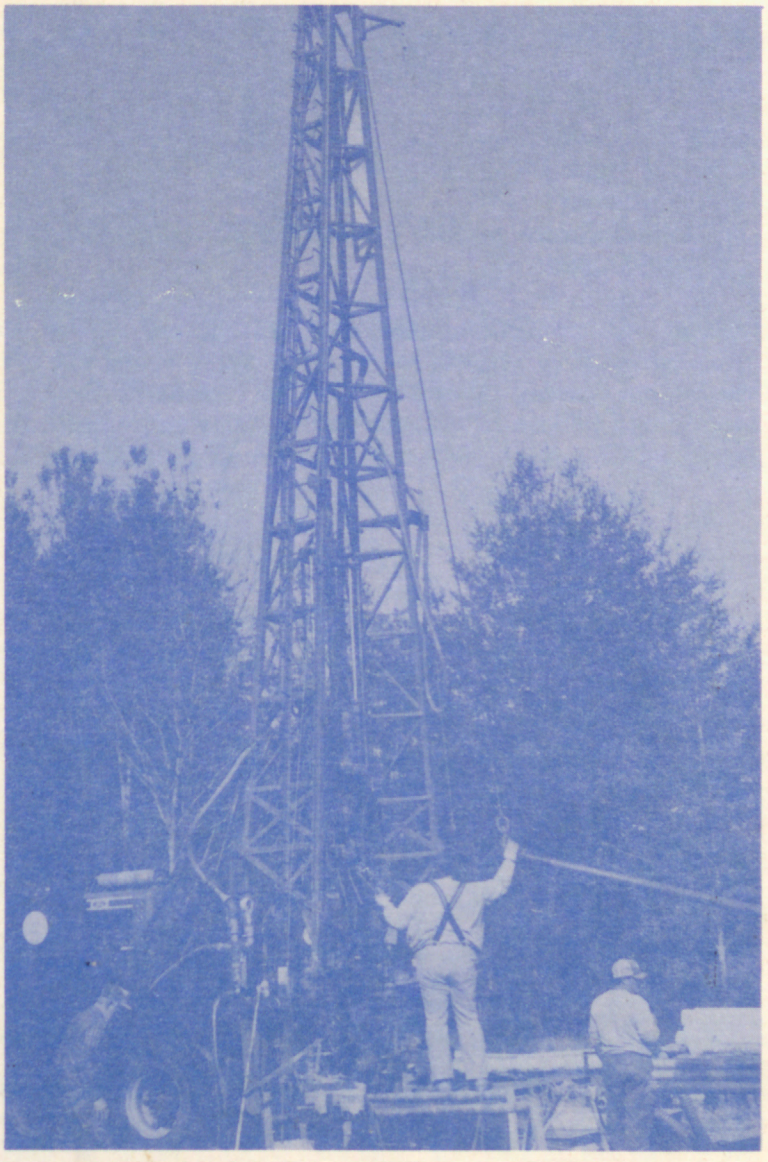
GROUND-WATER CONDITIONS IN GEORGIA, 1991

U.S. GEOLOGICAL SURVEY



Prepared in cooperation with the

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY
ALBANY WATER, GAS, AND LIGHT COMMISSION
CITY OF BRUNSWICK
GLYNN COUNTY
CHATHAM COUNTY-SAVANNAH METROPOLITAN PLANNING COMMISSION
CITY OF VALDOSTA

OPEN-FILE REPORT 92-470

PREFACE

This report was prepared in cooperation with the following agencies, whose assistance in collecting water-level and water-quality data during 1991 is gratefully acknowledged

Georgia Department of Natural Resources
Environmental Protection Division
Georgia Geologic Survey
Albany Water, Gas, and Light Commission
City of Brunswick
Glynn County
Chatham County-Savannah Metropolitan Planning Commission
City of Valdosta

The report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who edited and assembled the report. In addition to the authors, who had primary responsibility for ensuring that the information contained herein is accurate, complete, and adheres to U.S. Geological Survey policy and established guidelines, the following individuals contributed substantially to the collection, processing, tabulation, and review of the data:

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Data used in this report may be obtained upon request from the U.S. Geological Survey, Peachtree Business Center, Suite 130, 3039 Amwiler Road, Atlanta, GA 30360-2824.

[*Cover photograph*: U.S. Geological Survey drill rig coring test well 33X048, Millhaven Plantation, Screven County, Millhaven, Georgia. Photograph courtesy of Winston G. Smith, U.S. Environmental Protection Agency]

GROUND-WATER CONDITIONS IN GEORGIA, 1991

By Michael F. Peck, Charles N. Joiner, and Alan M. Cressler

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CITY OF VALDOSTA

Atlanta, Georgia

1992

U.S. DEPARTMENT OF THE INTERIOR

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	*by*	*to obtain*
	Length	
inch (in.)	2.540	centimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
	Volumetric rate	
gallon per minute (gal/min)	0.06309	liter per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second
	43.81	liter per second

Sea level

Sea Level:--In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Sea Level Datum of 1929."

GROUND-WATER CONDITIONS

IN GEORGIA, 1991

by

Michael F. Peck, Charles N. Joiner, and Alan M. Cressler

ABSTRACT

Ground-water conditions during 1991 and recent ground-water-level and -quality trends in Georgia were evaluated using data from precipitation, ground-water-level, and ground-water-quality monitoring networks. Data for 1991 include precipitation records from 10 National Weather Service stations, continuous water-level records from 158 wells, periodic water-level measurements from an additional 1,028 wells, and chloride analyses from 92 wells.

Annual mean ground-water levels in Georgia in 1991 ranged from about 2.2 feet lower to about 15.4 feet higher than in 1990. Of the 70 wells summarized in this report, 55 wells had annual mean water levels that were higher, 10 wells had annual mean water levels that were lower, and five had annual mean water levels that were about the same as compared to 1990. Record-high daily mean water levels were recorded in two wells tapping the surficial aquifers. These record highs were from about 0.2 to about 0.3 foot higher than previous record highs. Record-low daily mean water levels were recorded in the Coastal Plain physiographic province in wells tapping the surficial aquifer, upper Brunswick aquifer, Clayton aquifer, Cretaceous aquifer, and the Dublin-Midville aquifer system. These record lows were from less than 0.1 foot to about 1.1 feet lower than the previous record lows.

Comparison of chloride-concentration maps for the Floridan aquifer system in the Brunswick area indicates that chloride concentration in water from the Floridan aquifer system generally have changed little since 1988. In the Savannah and Brunswick areas, chloride concentration in water from the Upper Floridan aquifer that exceed State and Federal drinking-water standards has been detected only in the Brunswick area.

INTRODUCTION

Ground-water-level and ground-water-quality data are an essential part of ground-water assessment and management. Water-level and ground-water-quality data are used to define (1) directions of ground-water flow, (2) areas of recharge and discharge, (3) changes in aquifer storage resulting from the affects of distribution and rate of ground-water withdrawal, (4) hydraulic characteristics of aquifers, (5) stream-aquifer relations, and the quality of the water. These data can be used to address water-management needs and to evaluate the effects of management and conservation programs. As part of the cooperative ground-water investigations undertaken by the U.S. Geological Survey and the Sate of Georgia, a statewide water-level-measurement program was initiated in 1938. At the onset, this program consisted of an observation-well network in the coastal area of Georgia to monitor variations in ground-water storage and quality. Data from additional wells were included in areas where variations in water levels and water quality could be used to predict potential water-resource problems. During 1991, periodic water-level measurements were recorded in 1,028 wells, and 158 wells were monitored continuously. Water-level records were obtained using continuous analog (pen and chart) recorders, digital punch recorders that record water levels at 30-minute (min) or 60-min intervals, and data loggers that record water levels at 60-min intervals. At sites having missing record, data were estimated, where possible, using historical data from the well and contemporaneous data from nearby wells having similar water-level trends. Water samples were collected periodically and analyzed from 92 wells during 1991 to monitor chloride concentrations in the Savannah and Brunswick areas.

Purpose and Scope

The purpose of this report is to present selected precipitation, and ground-water-level and ground-water-quality data for Georgia. Precipitation graphs for 10 National Weather Service stations, hydrographs of 70 wells, and potentiometric maps of the Upper Floridan aquifer in the Albany and Valdosta areas, and the Claiborne and Clayton aquifers in southwestern Georgia are presented. Chloride-concentration graphs for water from 13 wells tapping the Floridan aquifer system in the Savannah and Brunswick areas, and a map showing chloride-concentration in water from the upper water-bearing zone of the Upper Floridan aquifer in the Brunswick area, also are included.

Well-Numbering System

Wells described in this report are numbered according to a system based on the U.S. Geological Survey's index of topographic maps of Georgia. Each 7 1/2-minute topographic quadrangle in the State has been assigned a six-digit number and letter designation beginning at the southwestern corner of the State. Numbers increase sequentially eastward and letters advance alphabetically northward. Quadrangles in the northern part of the State are designated by double letters; AA follows Z, and so forth. The letters "I", "O", "II", and "OO" are not used. Wells inventoried in each quadrangle are numbered consecutively, beginning with 01. Thus, the fourth well scheduled in the 11AA quadrangle is designated 11AA04.

PRECIPITATION

Recharge to the ground-water system in Georgia is derived almost entirely from precipitation. Carter and Stiles (1983) stated that based on records for 1941-70 annual precipitation averaged 50 inches (in.) statewide, and ranged from 44 in. in the east-central part to about 76 in. in the northeastern corner (fig. 1). Of the total annual precipitation, about 88 percent is discharged to streams or is lost to evapotranspiration, and about 12 percent enters the ground-water system as recharge (Carter and Stiles, 1983).

Monthly mean precipitation data furnished by the U.S. National Oceanic and Atmospheric Administration (1991) are shown graphically for 10 precipitation stations (figs. 2 -11). For each station, monthly precipitation was compared to the 30-year (yr) (1951-80) average (normal) for the station. Cumulative departure is used to indicate surplus or deficit amounts of precipitation over a designated time period. Cumulative departure curves are used in this report, and were constructed by adding successive monthly values of precipitation departures from normal. Thus, the annual cumulative departure through December would represent the sum of all monthly deficits or surpluses during the year. The 10-yr cumulative departure at the end of December would represent the sum of all monthly deficits or surpluses for the previous 119 months. For each of the precipitation stations, the lower graph (figs. 2 - 11) shows the cumulative departure from normal precipitation for the period 1982-91; the upper graph shows the monthly departure and cumulative departure for 1991.

The cumulative departure of precipitation at the end of 1991 for the 10 stations (figs. 2 - 11), ranged from 3.4 to 18.7 in. above normal. The cumulative departure for the 10-yr period (1982-91) ranged from 40.7 in. below normal to 37.3 in. above normal.

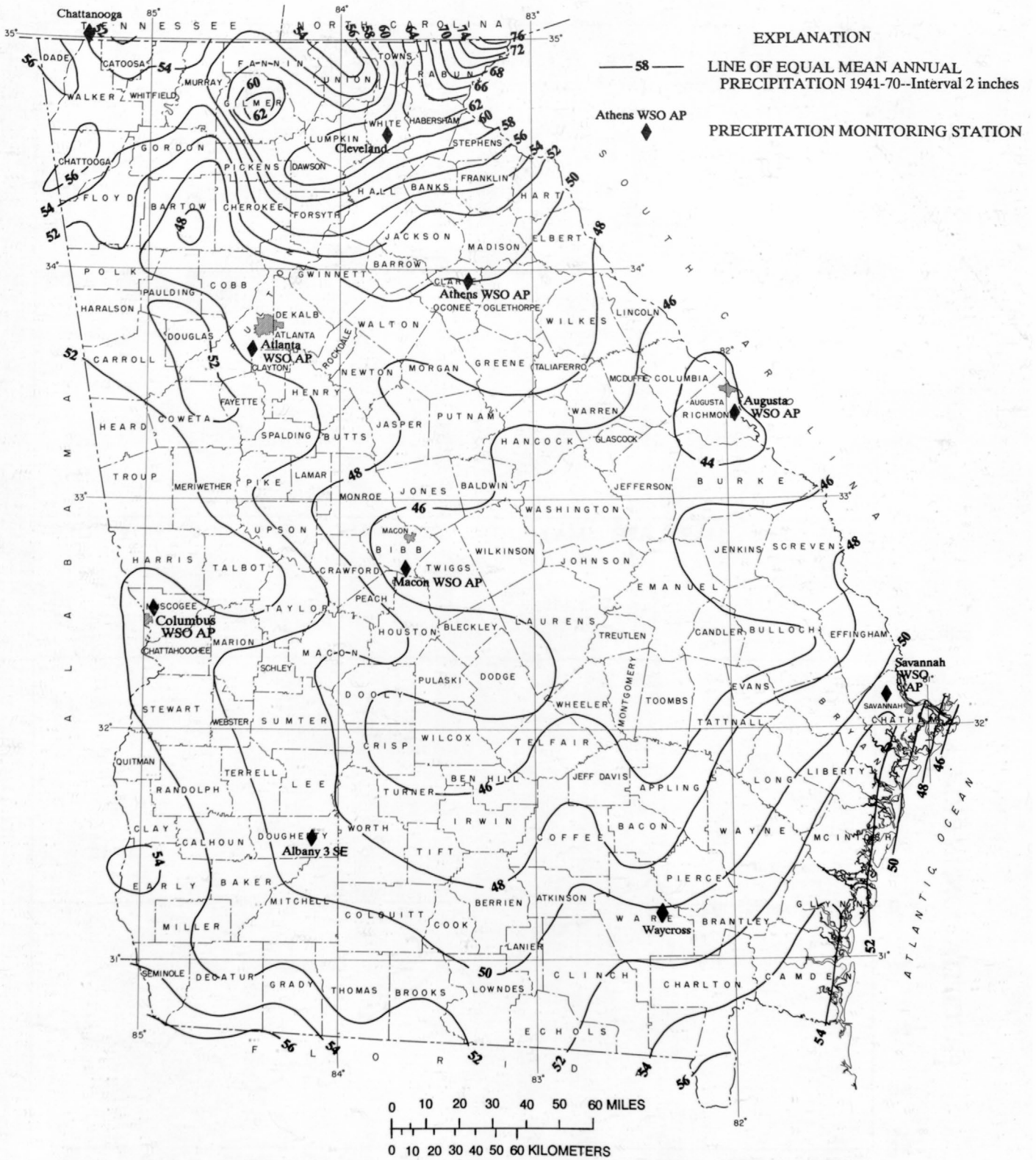
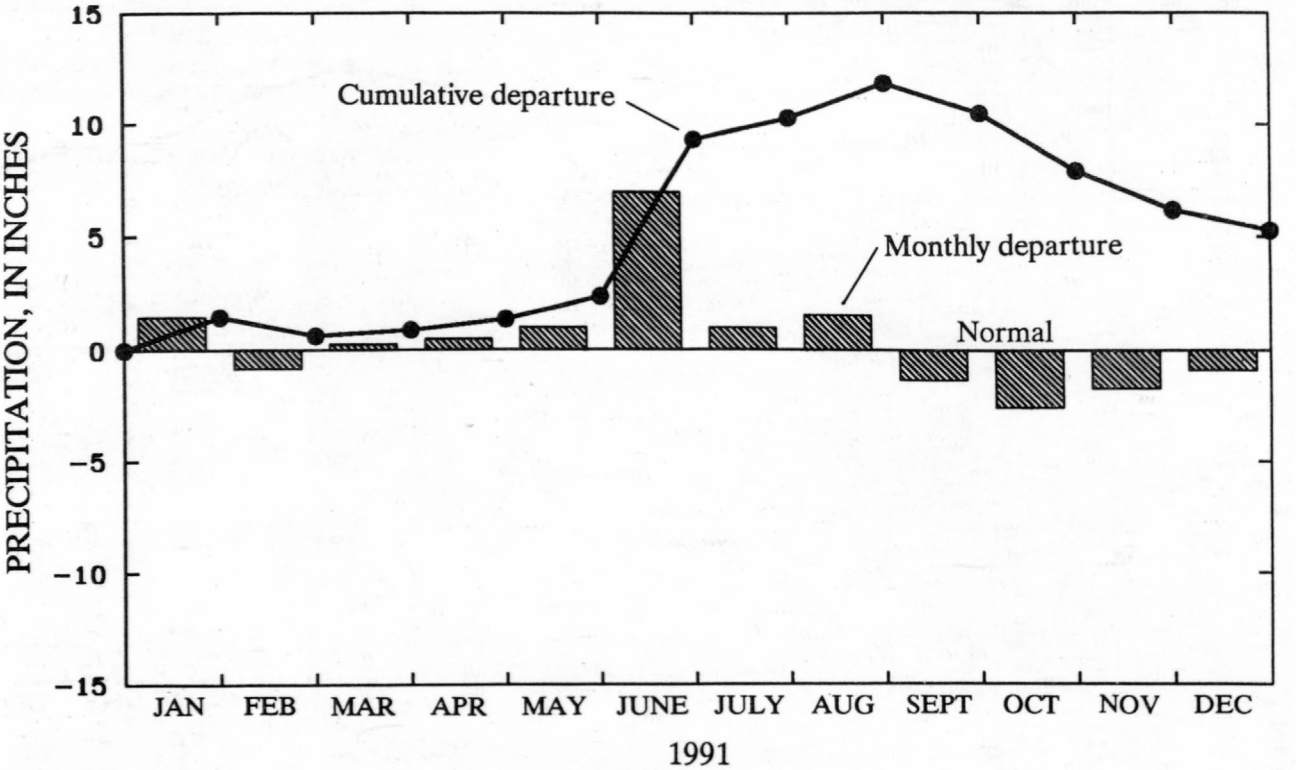


Figure 1.--Locations of precipitation-monitoring stations and mean annual precipitation in Georgia, 1941-70. Modified from Carter and Stiles (1983).



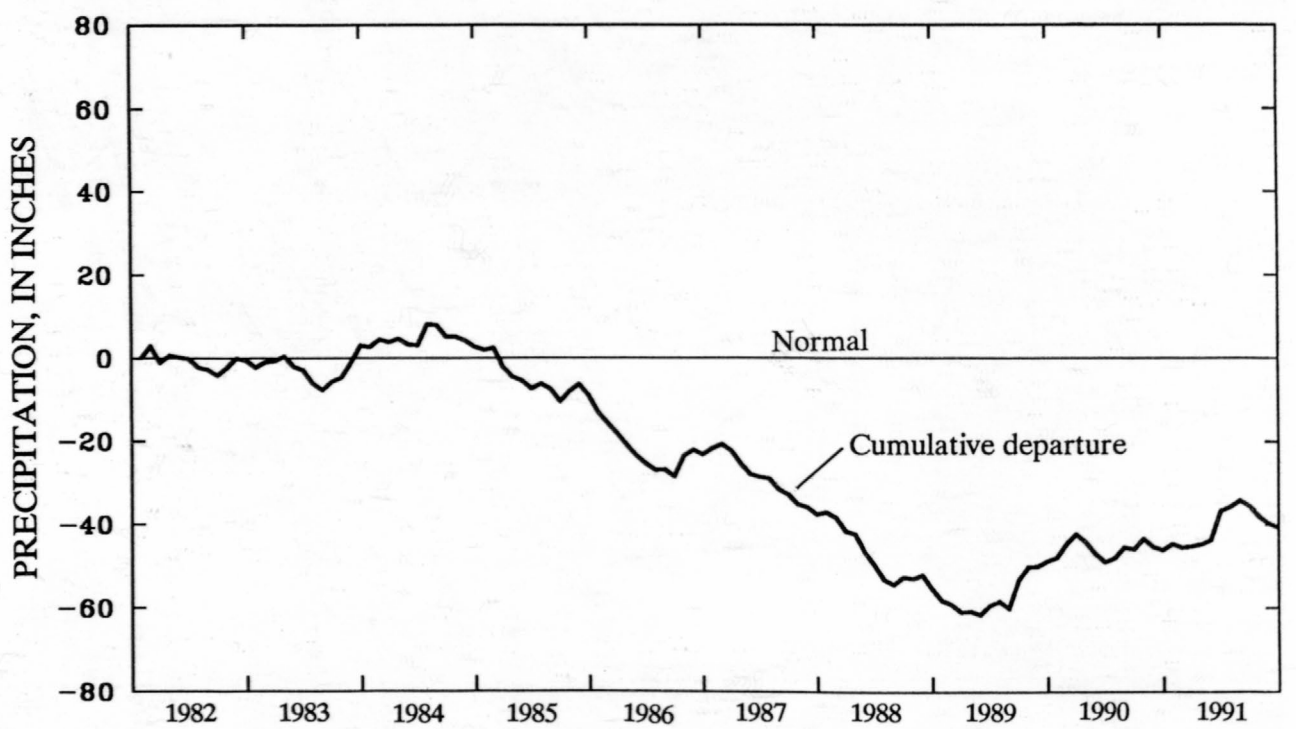


Figure 2.--Precipitation departure from normal for National Weather Service station at Athens airport, Clarke County.

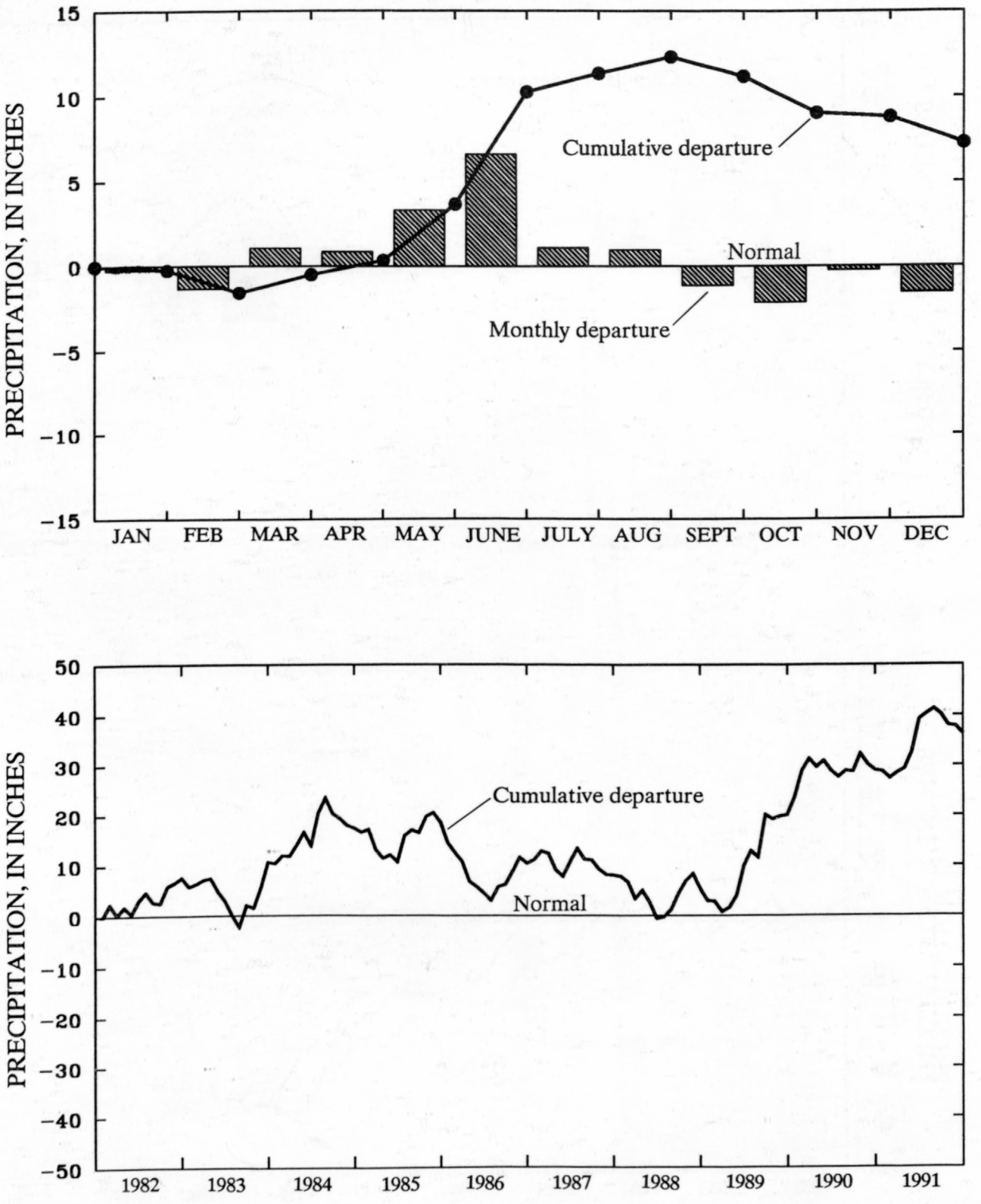
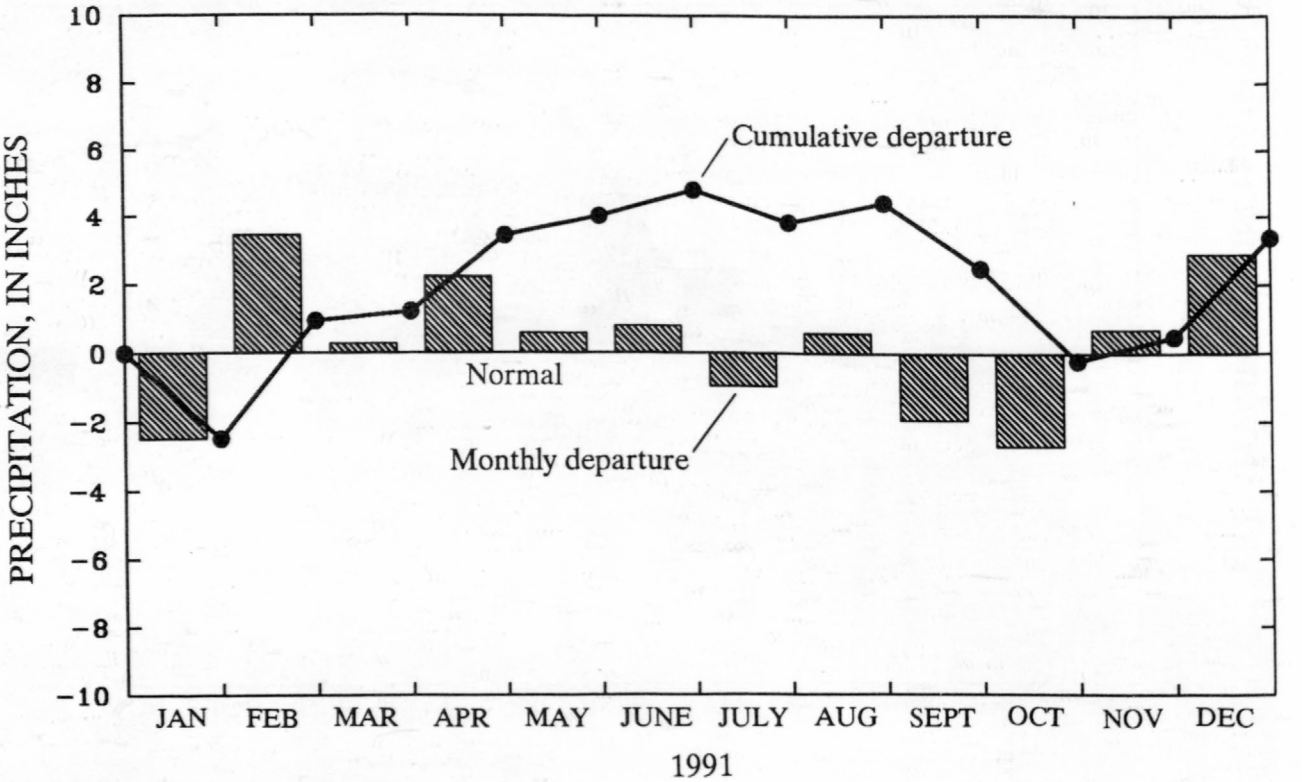


Figure 3.--Precipitation departure from normal for National Weather Service station at Atlanta airport, Fulton County.



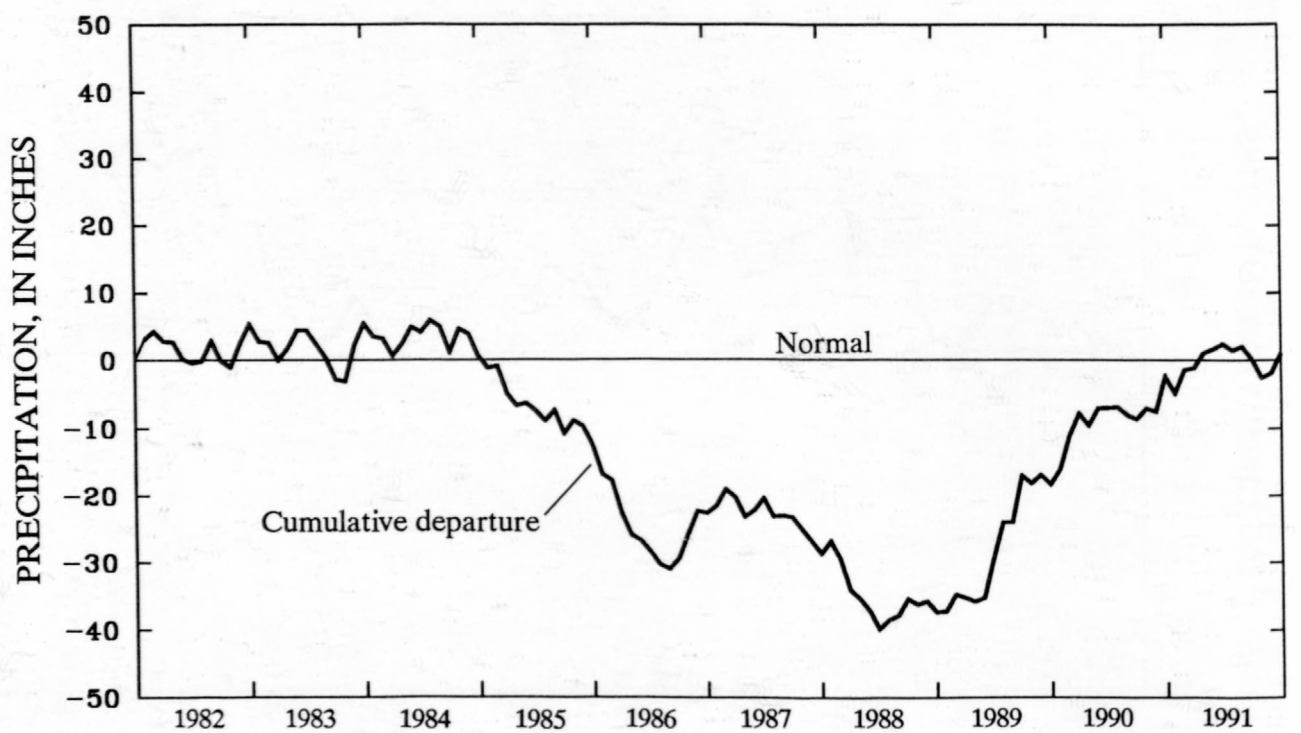


Figure 4.--Precipitation departure from normal for National Weather Service station at Chattanooga airport, Hamilton County, Tennessee.

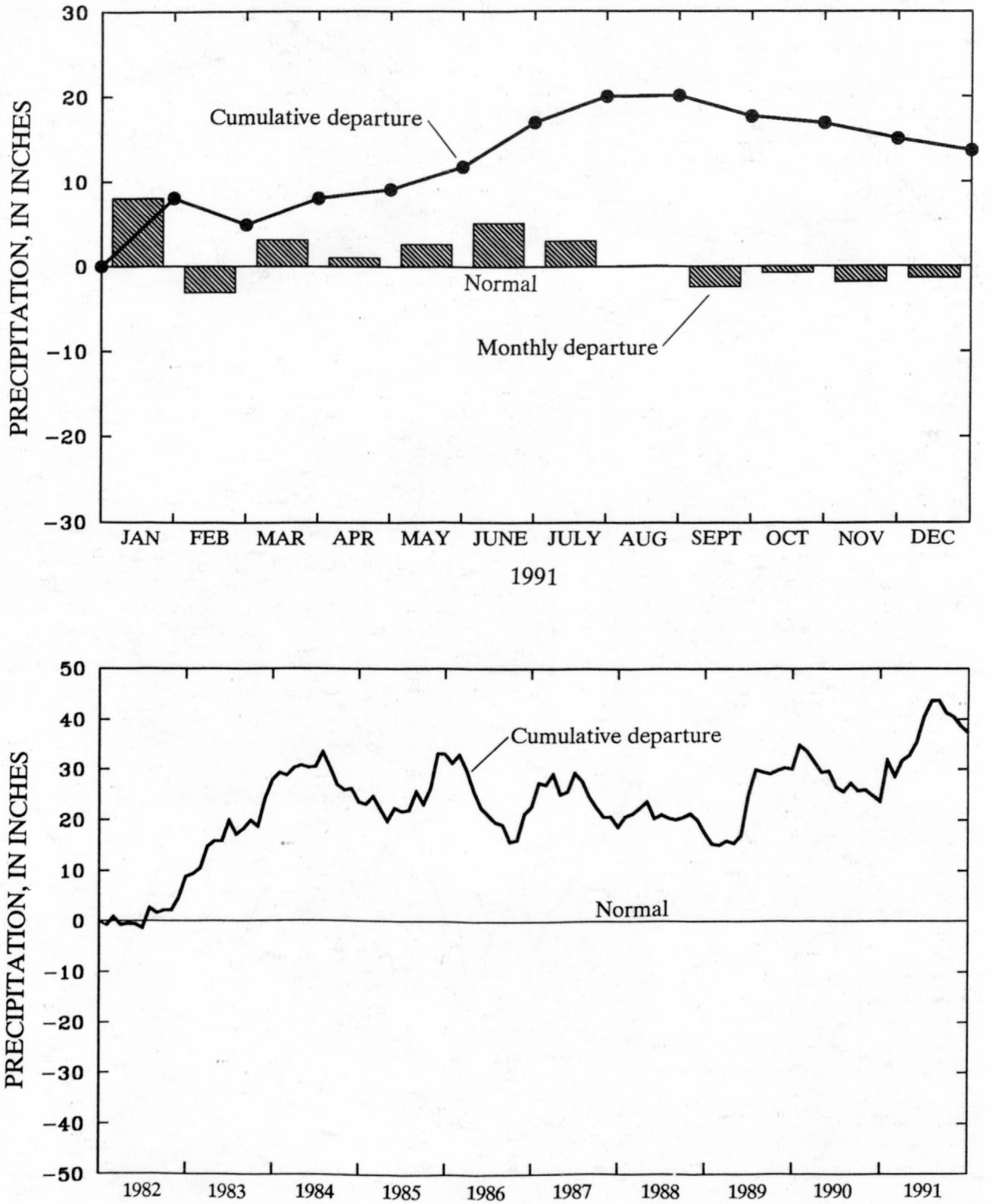


Figure 5.--Precipitation departure from normal for National Weather Service station at Albany 3 SE, Dougherty County.

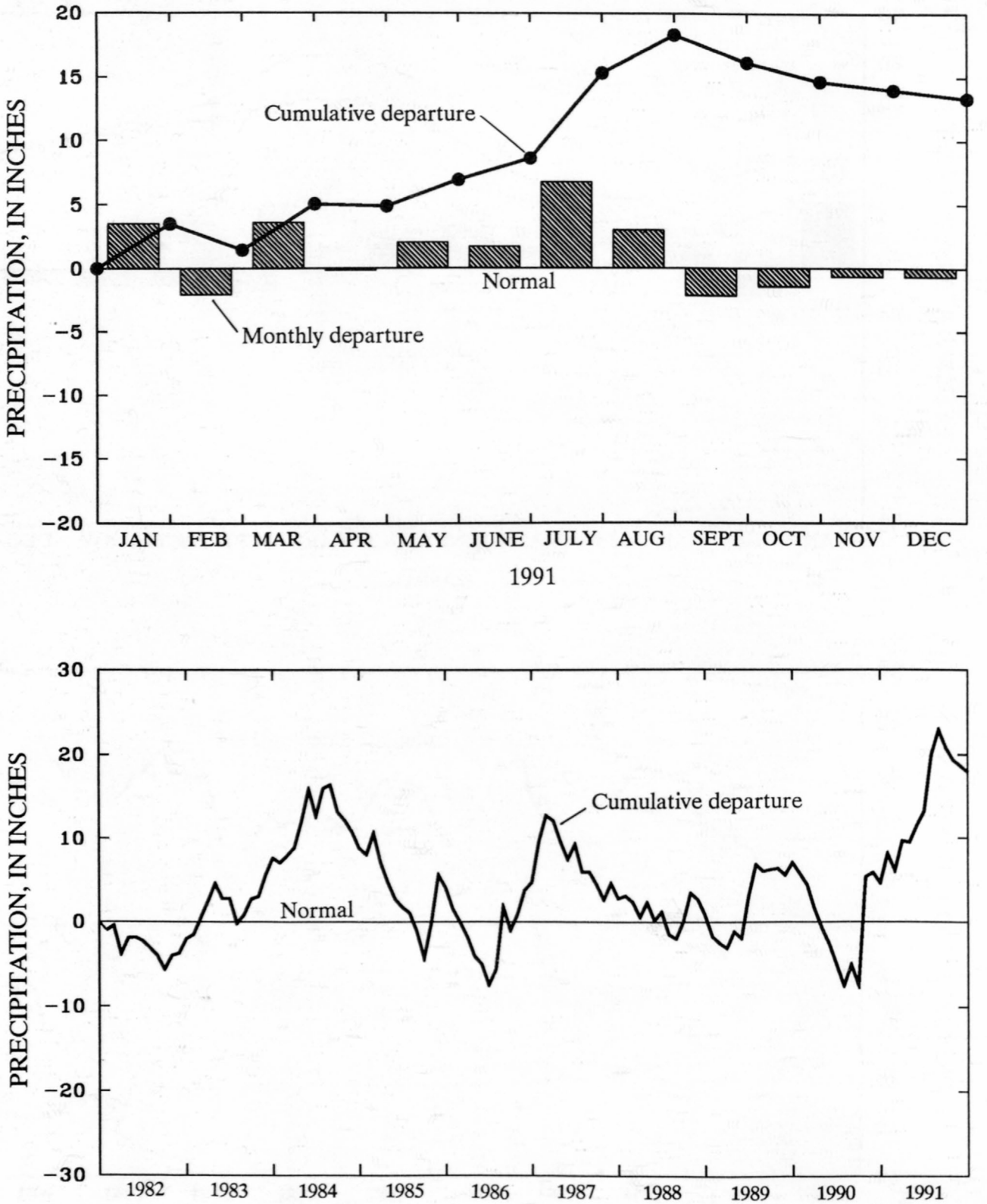


Figure 6.--Precipitation departure from normal for National Weather Service station at Augusta airport, Richmond County.

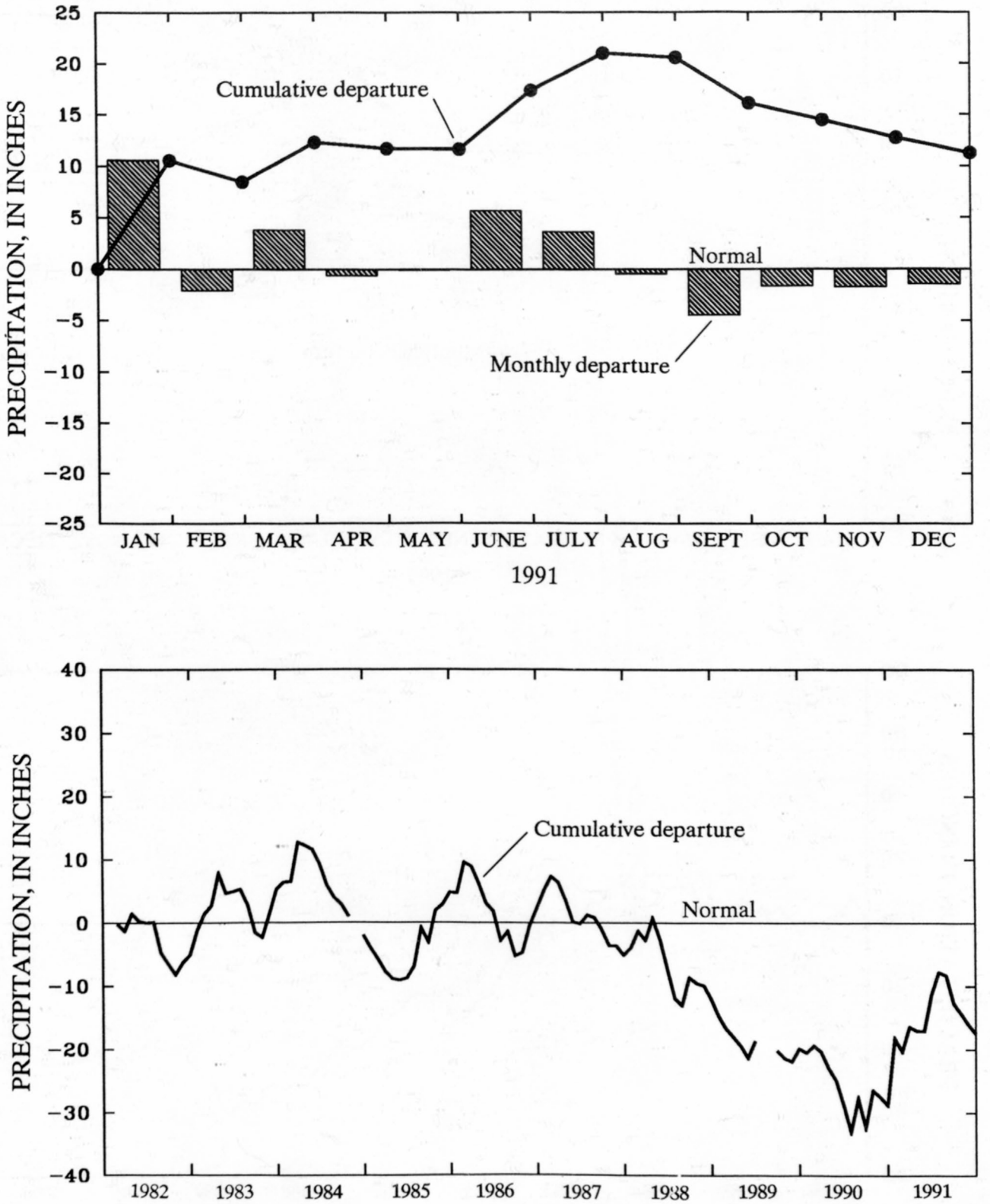


Figure 7.--Precipitation departure from normal for National Weather Service station at Waycross WSMO, Ware County.

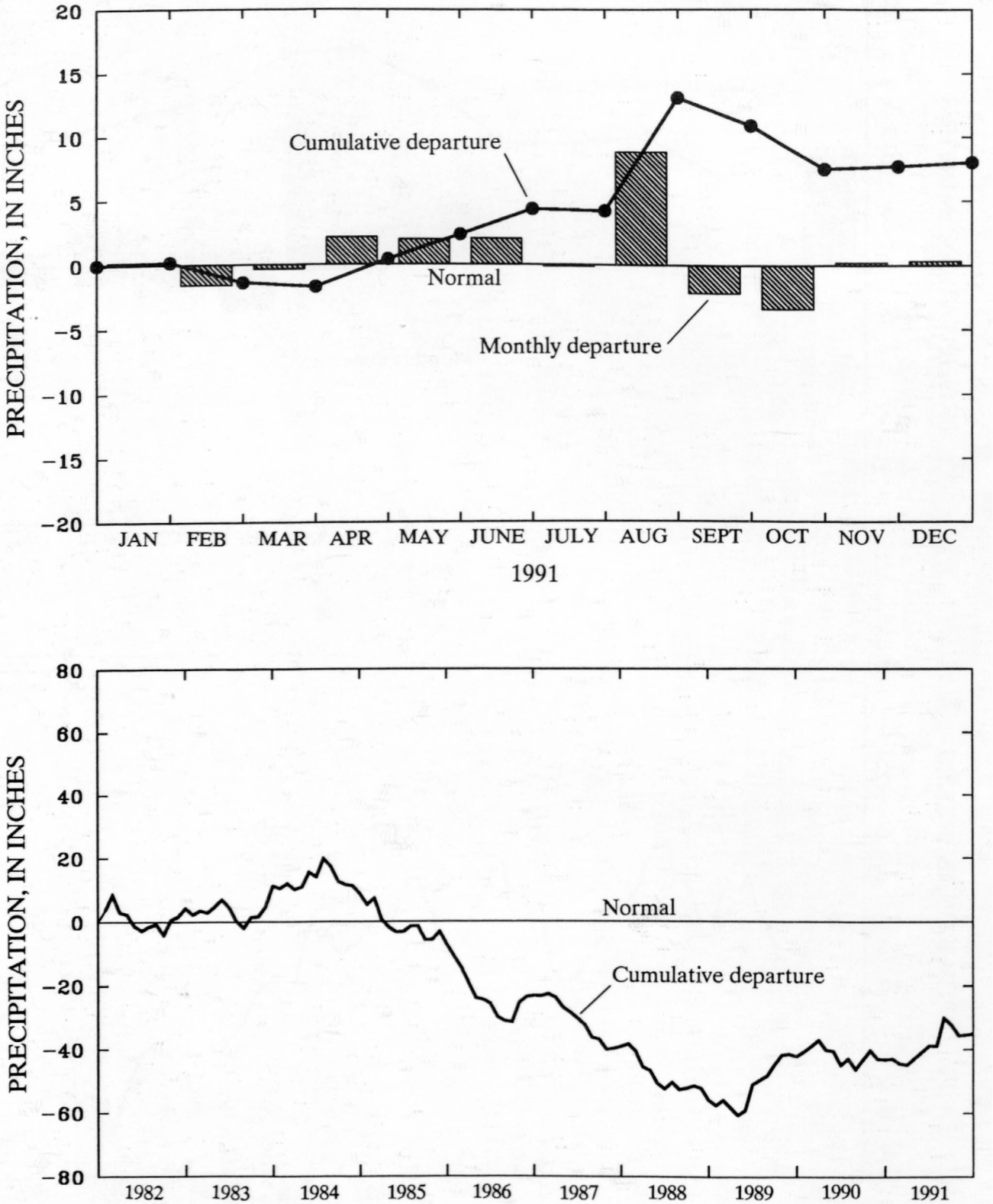


Figure 8.--Precipitation departure from normal for National Weather Service station at Cleveland, White County.

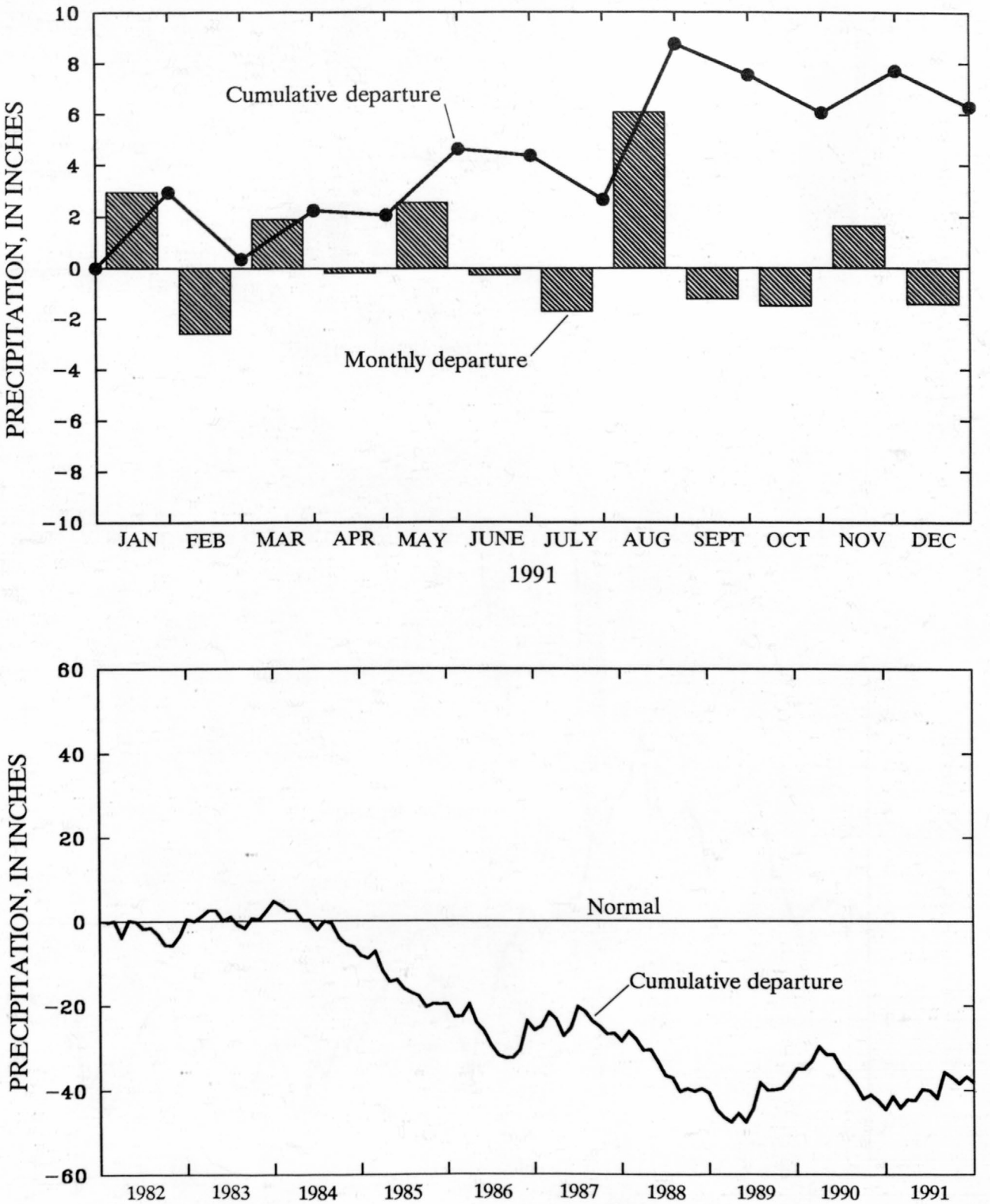
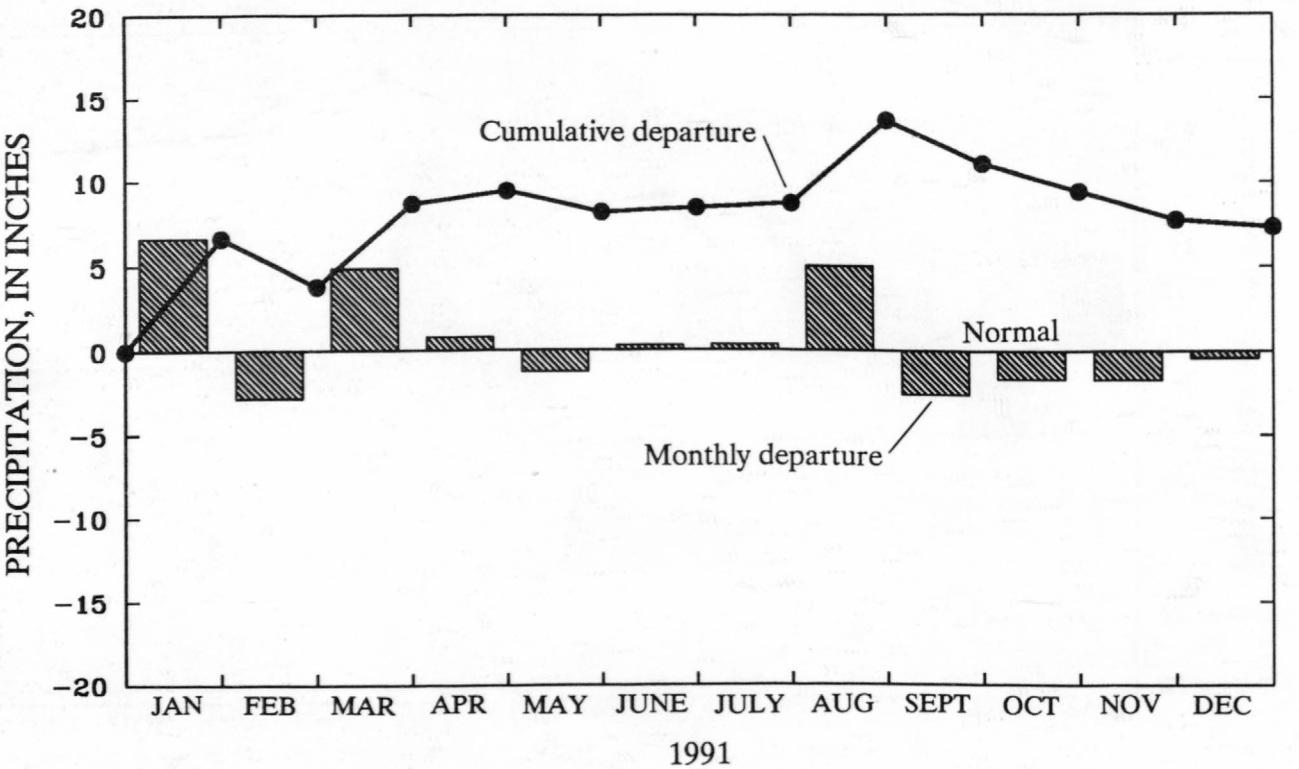


Figure 9.--Precipitation departure from normal for National Weather Service station at Columbus airport, Muscogee County.



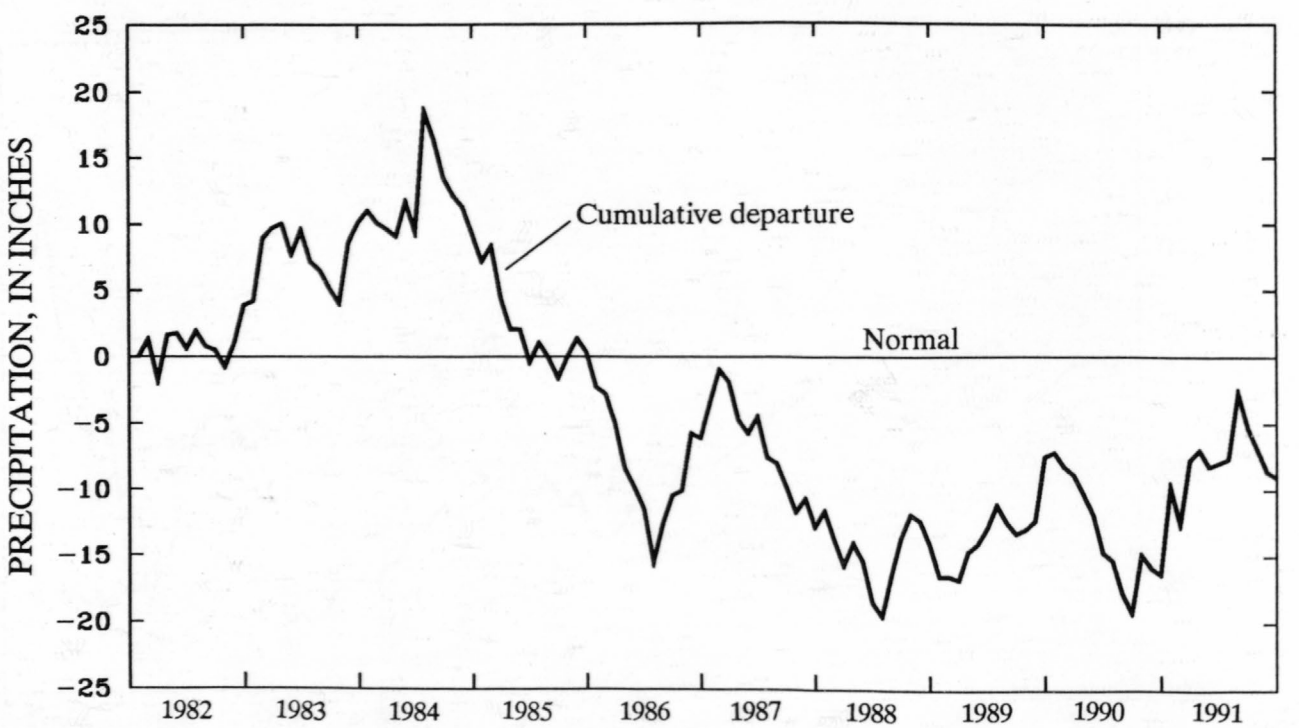
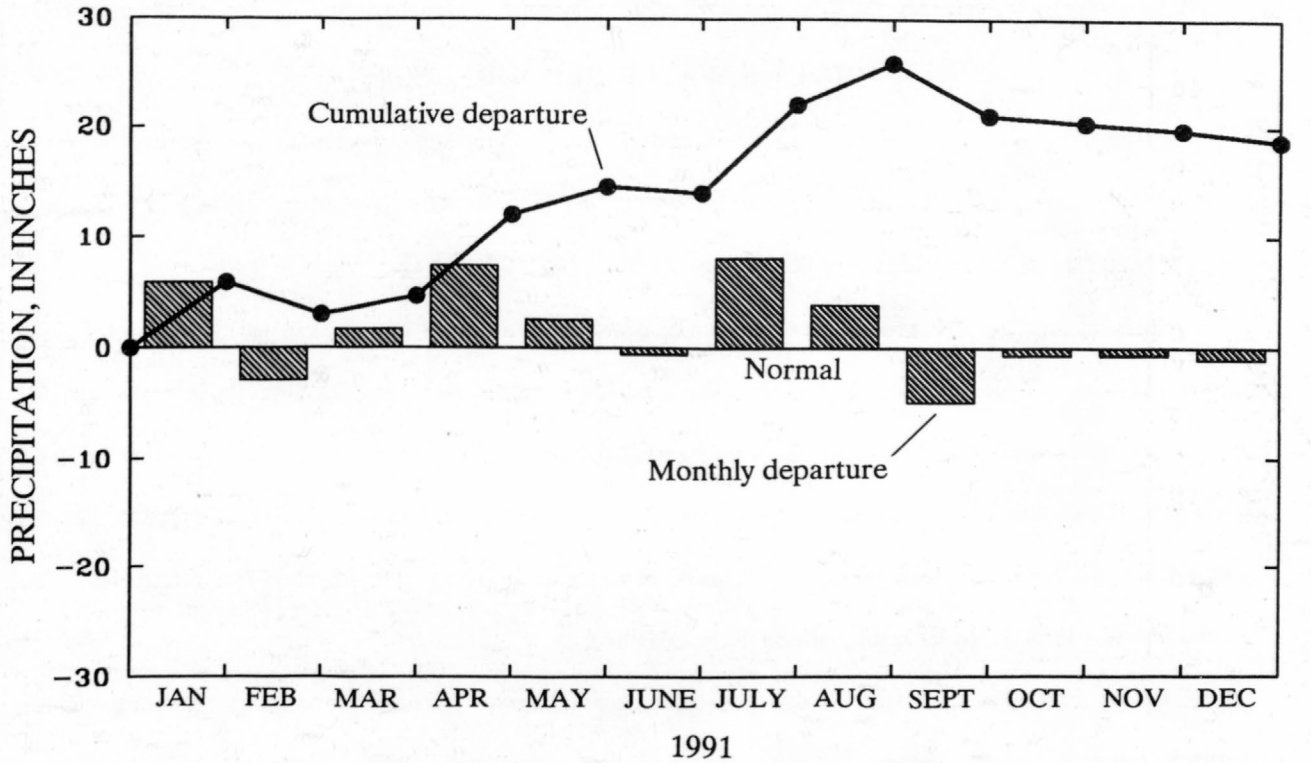


Figure 10.--Precipitation departure from normal for National Weather Service station at Macon airport, Bibb County.



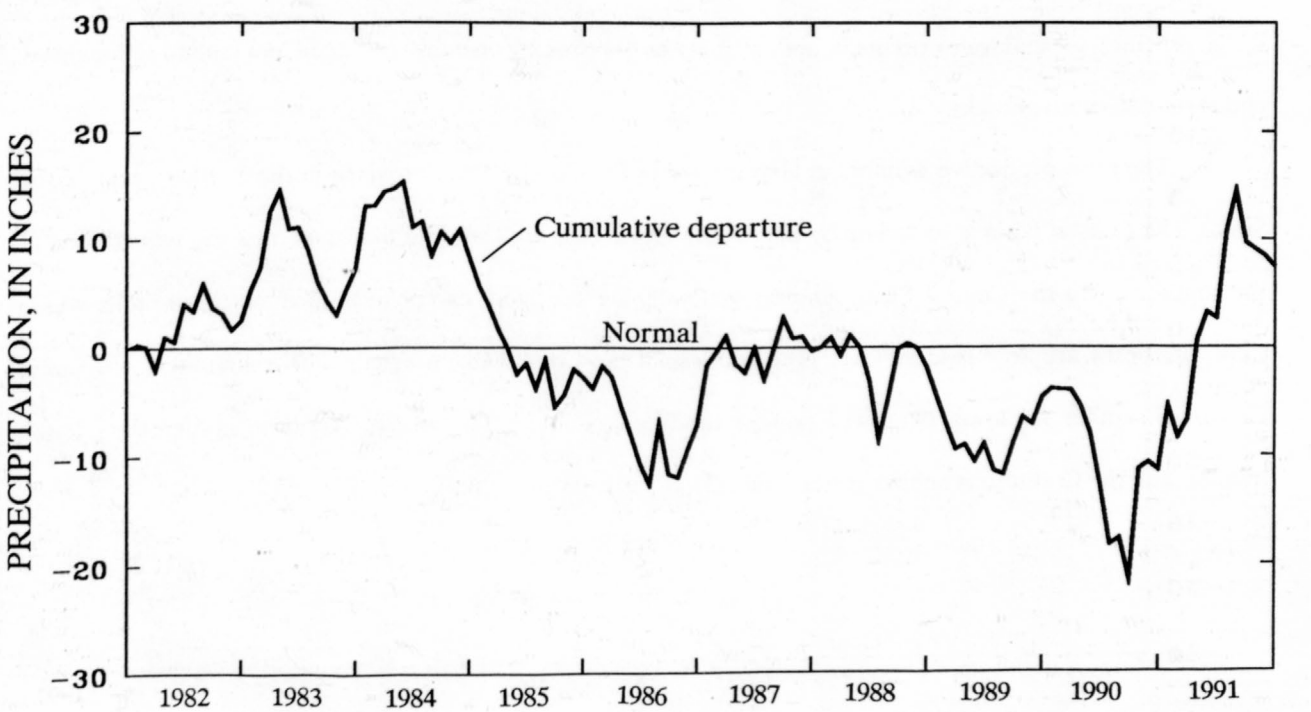


Figure 11.--Precipitation departure from normal for National Weather Service station at Savannah airport, Chatham County.

GROUND-WATER RESOURCES

Contrasting geologic features and landforms of the physiographic provinces of Georgia result in substantial differences in ground-water conditions from one part of the State to another. These features affect the quantity and quality of ground water throughout the State (fig. 12, table 1).

Surficial aquifers are present in each of the physiographic provinces. These aquifers generally are under water-table (unconfined) conditions, and are used for domestic and livestock supplies in most areas of Georgia. In the Piedmont, Blue Ridge, and Valley and Ridge provinces (fig. 12), the surficial aquifers occur in the regolith, which consists of soil, saprolite, stream alluvium, colluvium, and other surficial deposits. In the Coastal Plain province, the surficial aquifers consist of intermixed layers of sand, clay, and limestone. The surficial aquifers locally may be semiconfined in the coastal area.

In the Piedmont and Blue Ridge provinces, ground water occurs in secondary openings along fractures, foliation, joints, contacts, veins, or other geologic features in the crystalline bedrock. Rocks in these provinces are complex and consist of structurally deformed metamorphic and igneous rocks. In the Valley and Ridge province, ground water occurs in both primary and secondary openings in folded and faulted sedimentary and meta-sedimentary rocks.

The most productive aquifers in Georgia are in the Coastal Plain province in the southern part of the State. The Coastal Plain is underlain by alternating layers of sand, clay, and limestone that dip and thicken to the southeast. In the Coastal Plain, aquifers generally are confined, except near their northern limits where they outcrop or are near land surface. The aquifers of the Coastal Plain include surficial aquifers, the upper Brunswick aquifer, the lower Brunswick aquifer, the Floridan aquifer system, the Claiborne aquifer, the Clayton aquifer, and the Cretaceous aquifer system (fig. 12).

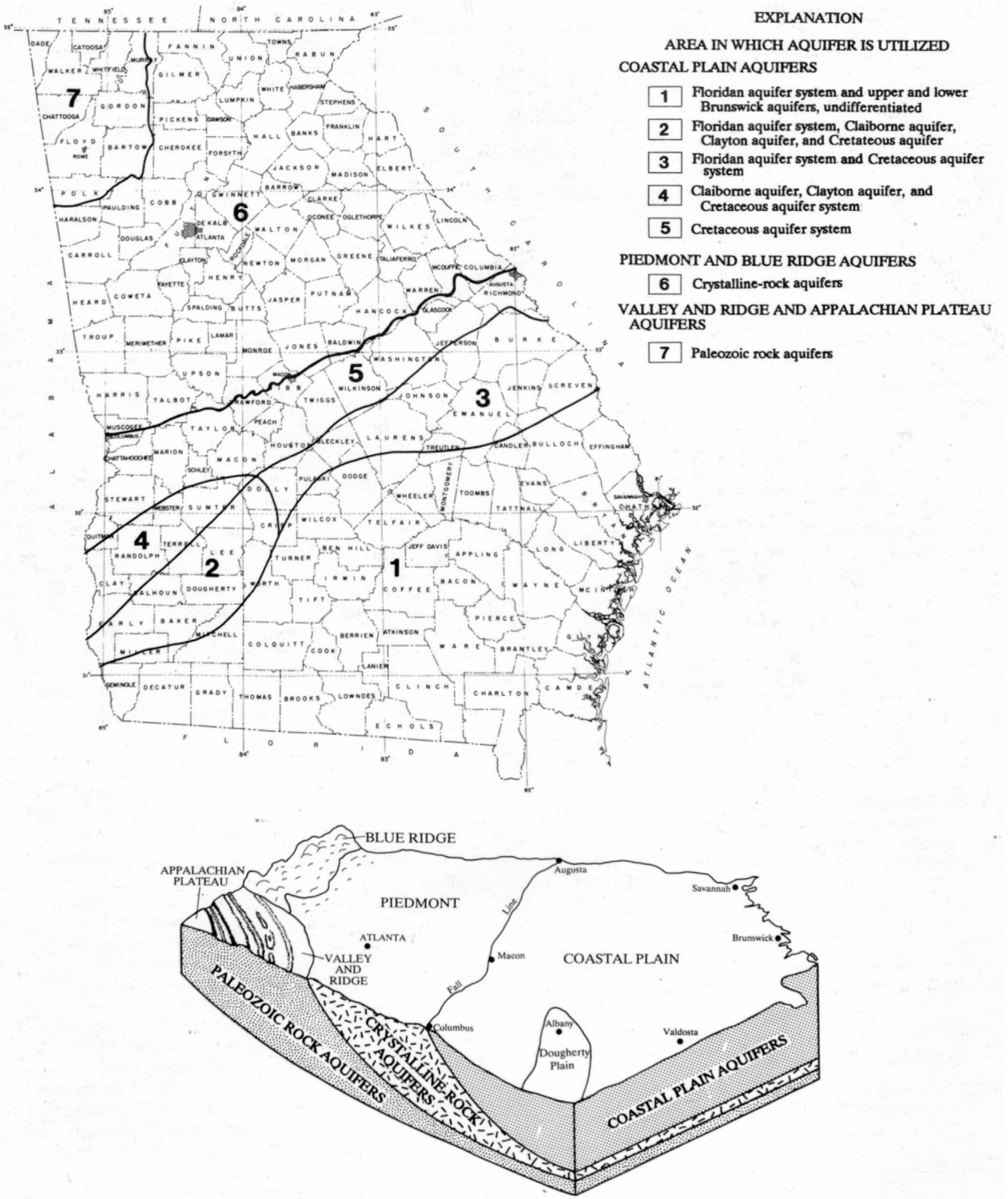


Figure 12.--Areas of utilization of major aquifers and block diagram showing major aquifers and physiographic provinces of Georgia.

Table 1.--*Aquifer and well characteristics in Georgia*

[Modified from Clarke and Pierce, 1984; ft, feet; gal/min, gallons per minute]

Aquifer name and description	Well characteristics: Depth (ft) Common range	Well characteristics: Yield (gal/min) Common range	Well characteristics: Yield (gal/min) May exceed	Remarks
Surficial aquifers: Unconsolidated sediments. Generally unconfined.	variable	variable	not applicable	Primary source of water for domestic use in rural areas. Supplemental source of water in coastal Georgia.
Upper and lower Brunswick aquifers: Phosphatic and dolomitic quartz sand. Generally confined.	85-390	10-30	180	Not a major source of water in coastal Georgia, but considered a supplemental water supply to the Upper Floridan aquifer. Most wells are multi-aquifer, tapping the upper and lower Brunswick aquifers and the Upper Floridan aquifer. The lower Brunswick aquifer currently is not monitored. (See Clarke and others, 1990, p. 26-28).
	190-390	15-30	180	
Floridan aquifer system: Limestone, dolomite, and calcareous sand. Generally confined.	40-900	1,000-5,000	11,000	Supplies 50 percent of ground water in Georgia. The aquifer system is divided into the Upper and Lower Floridan aquifers. In the Brunswick area, the Upper Floridan aquifer includes two freshwater-bearing zones: the upper and lower water-bearing zones. The Lower Floridan aquifer is not considered a major aquifer. In the Brunswick area, the Lower Floridan aquifer includes the brackish-water zone, the deep freshwater zone, and the Fernandina permeable zone (Krause and Randolph, 1989).

Table 1.--*Aquifer and well characteristics in Georgia*--Continued

[Modified from Clarke and Pierce, 1984; ft, feet; gal/min, gallons per minute]

Aquifer name and description	Well characteristics: Depth (ft) Common range	Well characteristics: Yield (gal/min) Common range	Well characteristics: Yield (gal/min) May exceed	Remarks
Claiborne aquifer: Sand and sandy limestone. Generally confined.	20-450	150-600	1,500	Major source of water in southwestern Georgia for irrigation, industrial and municipal users.
Clayton aquifer: Limestone and sand. Generally confined	40-800	250-600	2,150	Major source of water in southwestern Georgia for irrigation, industrial, and municipal users.
Cretaceous aquifer system: Sand and gravel. Generally confined.	30-750	50-1,200	3,300	Major source of water in east-central Georgia. Supplies water for kaolin mining and processing. Includes the Providence aquifer in the southwestern Georgia, and Dublin, Midville, and Dublin-Midville aquifer systems in east-central Georgia.
Paleozoic rock aquifers: Sandstone, limestone, and dolostone.	15-2,100	1-50	3,500	Not laterally extensive. Limestone and dolostone aquifers are most productive. Storage is in regolith, primary openings (sandstone), and secondary fractures and solution openings in rock. Springs in limestone and dolostone aquifers discharge at rates of as much as 5,000 gal/min. Sinkholes may form in areas of intensive pumping.
Crystalline-rock aquifers: Granite, gneiss, schist, and quartzite.	40-600	1-25	500	Not laterally extensive. Storage is in regolith and fractures in rock. Hydrogeology of crystalline rock aquifers is not well understood.

GROUND-WATER LEVELS

Fluctuations and long-term trends in ground-water levels occur as a result of variations in recharge and discharge. Recharge varies in response to precipitation and surface-water infiltration into the aquifer. Discharge occurs as natural flow from the aquifer to streams and springs, as evapotranspiration from shallow water-table aquifers, and as withdrawal from wells.

Water-level fluctuations and trends were monitored during 1991 in a network of 158 wells tapping the surficial and upper Brunswick aquifers, the Floridan aquifer system, the Claiborne and Clayton aquifers, the Cretaceous aquifer systems, the Paleozoic rock aquifers, and the crystalline-rock aquifers. Of the 158 network wells that were monitored continuously during 1991, daily mean water levels are shown in hydrographs for 70 of the wells (fig. 13, table 2). Water-level fluctuations and trends in these 70 wells are considered to be representative of ground-water conditions throughout the State. Discussions of the ground-water conditions shown in these hydrographs were grouped by aquifer and subdivided into areas and subareas in which wells had similar water-level changes in response to variations in recharge and discharge.

For each well, daily mean water levels are shown in hydrographs for 1991, and monthly and annual mean water levels are shown in long-term hydrographs that include the period of record since monitoring began. A summary of monthly and annual mean water-level statistics for 1991 is included with each hydrograph. The text accompanying each section discusses the range in 1991 annual mean water levels for each section compared to the 1990 annual mean water level (Milby and others, 1991) and the occurrence of record-low or record-high water levels in 1991. In this report, a record water level refers to the lowest or highest daily mean water level for the period of record of a particular well. Thus, any individual water-level measurement on a given day may be lower or higher than the record water level mentioned in the text, the minimum or maximum value in the statistics, or the daily mean water level shown on the hydrograph. In discussions of differences in annual, monthly, or daily mean water levels, the terms "slightly" and "about the same" are used for differences less than or equal to 0.1 ft.

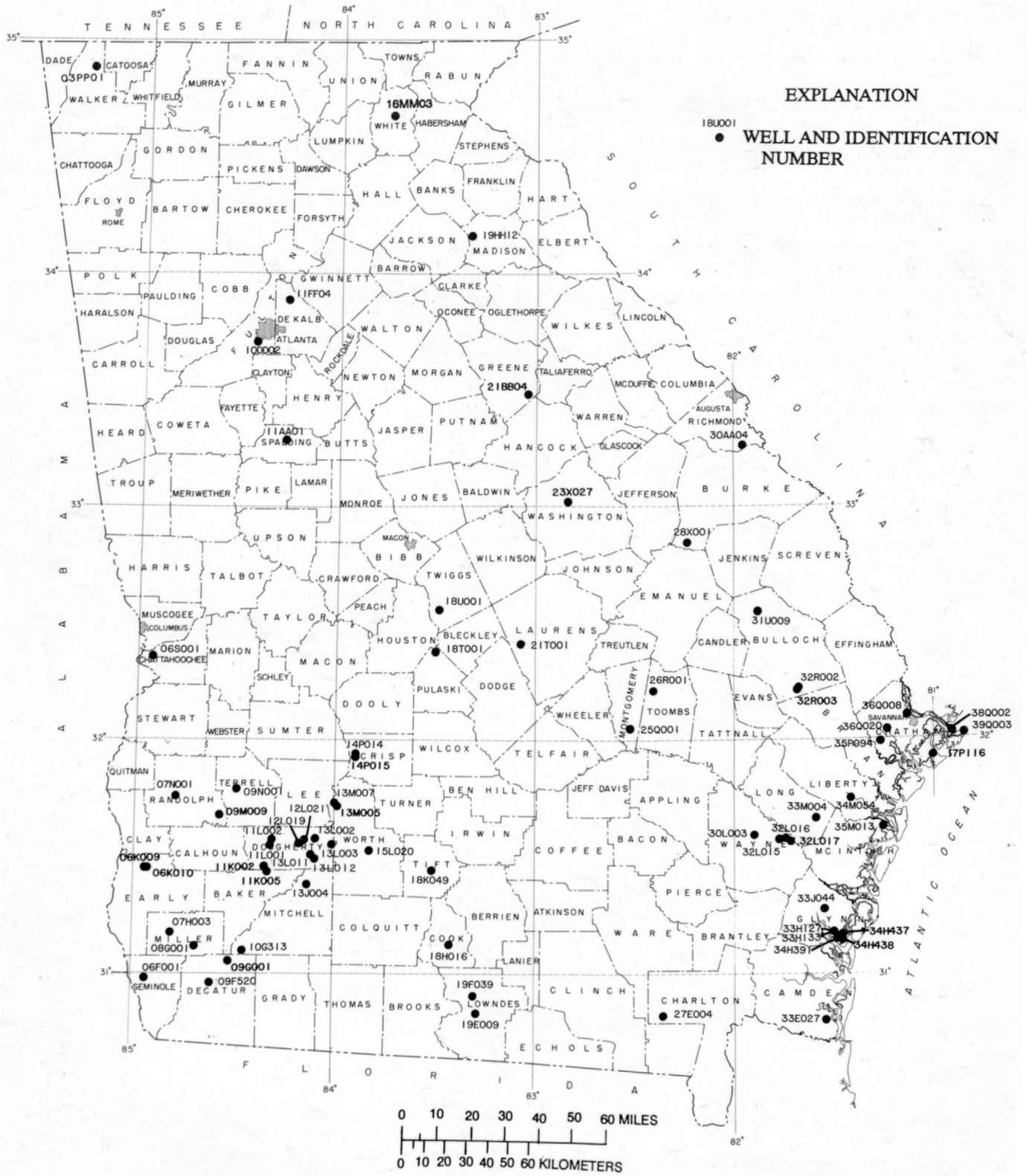


Figure 13.--Locations of observation wells for which hydrographs are included in this report.

Continuous records from the 70 wells indicate that annual mean ground-water levels during 1991 were from about 2.2 ft lower to 15.4 ft higher than in 1990. When compared to 1990 data, the annual mean water level during 1991 was higher in 55 wells, lower in 10 wells, and about the same in five wells. Record-high water levels that were from about 0.2 to about 0.3 ft higher, than the previous highs were recorded in two wells tapping the surficial aquifers. Record-low water levels that were from slightly lower to about 1.1 ft lower than the previous record lows, were measured during 1991 in five wells in the Coastal Plain

Table 2.--*Observation wells for which hydrographs are included in this report*

County	Aquifer	Well number	Well name	page
Bulloch	Upper Floridan	32R002	Bulloch South test well 1	70
Do.	Surficial	32R003	Bulloch South test well 2	32
Do.	Upper Brunswick	31U009	Hopeulikit test well 2	37
Burke	Midville aquifer system	28X001	Midville Experimental Station	115
Camden	Upper Floridan	33E027	Kings Bay	81
Charlton	do.	27E004	Test well OK9	82
Chatham	Surficial	35P094	UGA	30
Do.	Upper Floridan	36Q008	Layne-Atlantic	66
Do.	do.	36Q020	Morrison	67
Do.	Surficial	37P116	Skidaway Institute test well 4	31
Do.	Upper Floridan	38Q002	Pilot House	68
Do.	do.	39Q003	Test well 7, point 3	69
Chattahoochee	Cretaceous aquifer system	06S001	Fort Benning	108
Cook	Upper Floridan	18H016	Adel	55
Crisp	Clayton	14P014	Georgia Veterans Memorial State Park test well 1	105
Do.	Claiborne	14P015	Georgia Veterans Memorial State Park test well 2	96
Decatur	Upper Floridan	09F520	Bolton	45
DeKalb	Crystalline rock	11FF04	GAR, test well 5	126
Dougherty	Providence	12L021	Test well 10	110
Do.	Claiborne	11K002	Test well 11	91
Do.	Clayton	11K005	Test well 12	104
Do.	do.	11L002	Albany Nursery	102
Do.	do.	13L002	Turner City	103
Do.	Claiborne	11L001	Test well 4	92
Do.	do.	12L019	Test well 5	93
Do.	do.	13L011	Test well 2	94
Do.	Upper Floridan	13L003	Albany-Dougherty County	50
Do.	do.	13L012	Test well 3	48
Early	Clayton	06K009	Kolomoki State Park test well 1	99
Do.	Claiborne	06K010	Kolomoki State Park test well 2	89
Fulton	Crystalline rock	10DD02	Fort McPherson	124

Table 2.--*Observation wells for which hydrographs are included in this report*--Continued

County	Aquifer	Well number	Well name	page
Glynn	Upper Floridan	33H127	Test well 3	78
Do.	do.	33H133	Test well 6	79
Do.	Lower Floridan	33J044	Test well 27	86
Do.	do.	34H391	Test well 16	85
Do.	Upper Brunswick	34H437	Coffin Park test well 2	39
Do.	Surficial	34H438	Coffin Park test well 3	33
Greene	Crystalline rock	21BB04	Veazey	127
Laurens	Upper Floridan	21T001	Hogan	60
Liberty	do.	34M054	Test well 2	71
Long	do.	33M004	Test well 3	76
Lowndes	do.	19E009	Valdosta	57
Do.	do.	19F039	Valdosta 8	58
Madison	Crystalline rock	19HH12	Meadowlake Estates	125
McIntosh	Upper Floridan	35M013	Harris Neck	72
Miller	Surficial	07H003	DP-3	28
Do.	Upper Floridan	08G001	Viercocken	46
Mitchell	do.	10G313	Meinders	49
Do.	do.	13J004	Wright	51
Montgomery	do.	25Q001	Uvalda School	61
Pulaski	Midville aquifer system	18T001	Arrowhead test well 1	114
Randolph	Clayton	07N001	Cuthbert	100
Do.	Claiborne	09M009	Martin test well 1	90
Richmond	Dublin-Midville aquifer system	30AA04	McBean 2	117
Seminole	Upper Floridan	06F001	Roddenberry Farms test well 1	47
Spalding	Surficial	11AA01	UGA Experiment Station	26
Terrell	Clayton	09N001	Graves School	101
Tift	Upper Floridan	18K049	Test well 1	54
Toombs	do.	26R001	Vidalia 2	62
Twiggs	Dublin aquifer system	18U001	Test well 3	112
Walker	Paleozoic rock	03PP01	Chickamauga Battlefield	121
Washington	Dublin-Midville aquifer system	23X027	Sandersville 8	118
Wayne	Upper Floridan	30L003	Johnson	74
Do.	do.	32L015	Gardi test well 1	75
Do.	Upper Brunswick	32L016	Gardi test well 2	38
Do.	Surficial	32L017	Gardi test well 3	34
White	Crystalline rock	16MM03	Unicoi State Park No. 4	128
Worth	Claiborne	13M005	DP-7	95
Do.	Surficial	13M007	DP-9	27
Do.	Upper Floridan	15L020	Sylvester	52

Surficial Aquifers

Water-level fluctuations and trends in surficial aquifers are monitored in 13 wells, 8 of which are summarized in this report (fig. 14). Water-level fluctuations in surficial aquifers mainly are caused by variations in precipitation, evapotranspiration, and natural drainage. Water levels in surficial aquifers generally rise rapidly during wet periods and decline slowly during dry periods. Prolonged droughts may cause water levels to decline below pump intakes in shallow wells, particularly those located on hilltops and steep slopes, resulting in temporary well failures. Usually, well yields are restored with an increase in precipitation. In some areas, the surficial aquifer is semiconfined and may be influenced by local pumping.

Northern area

Water-levels in the surficial aquifers in the northern part of Georgia are monitored in two wells, and a summary of the data for one of these wells, 11AA01 (fig. 15) at Griffin, Spalding County, is included in this report (fig. 15). The annual mean water level in well 11AA01 (fig. 15) was about 0.3 ft higher in 1991 than in 1990.

Southwestern area

Water levels are monitored in five wells that tap the surficial aquifer in the southwestern area, two of which are included in this report (fig. 14). The water level in both wells rose during most of 1991 (figs. 16 and 17). The annual mean water level in these wells ranged from about 2.0 to 4.5 ft higher in 1991 than in 1990. A record-high daily mean water level was recorded in well 07H003 (fig. 17) in January that was about 0.25 ft higher than the previous record high.

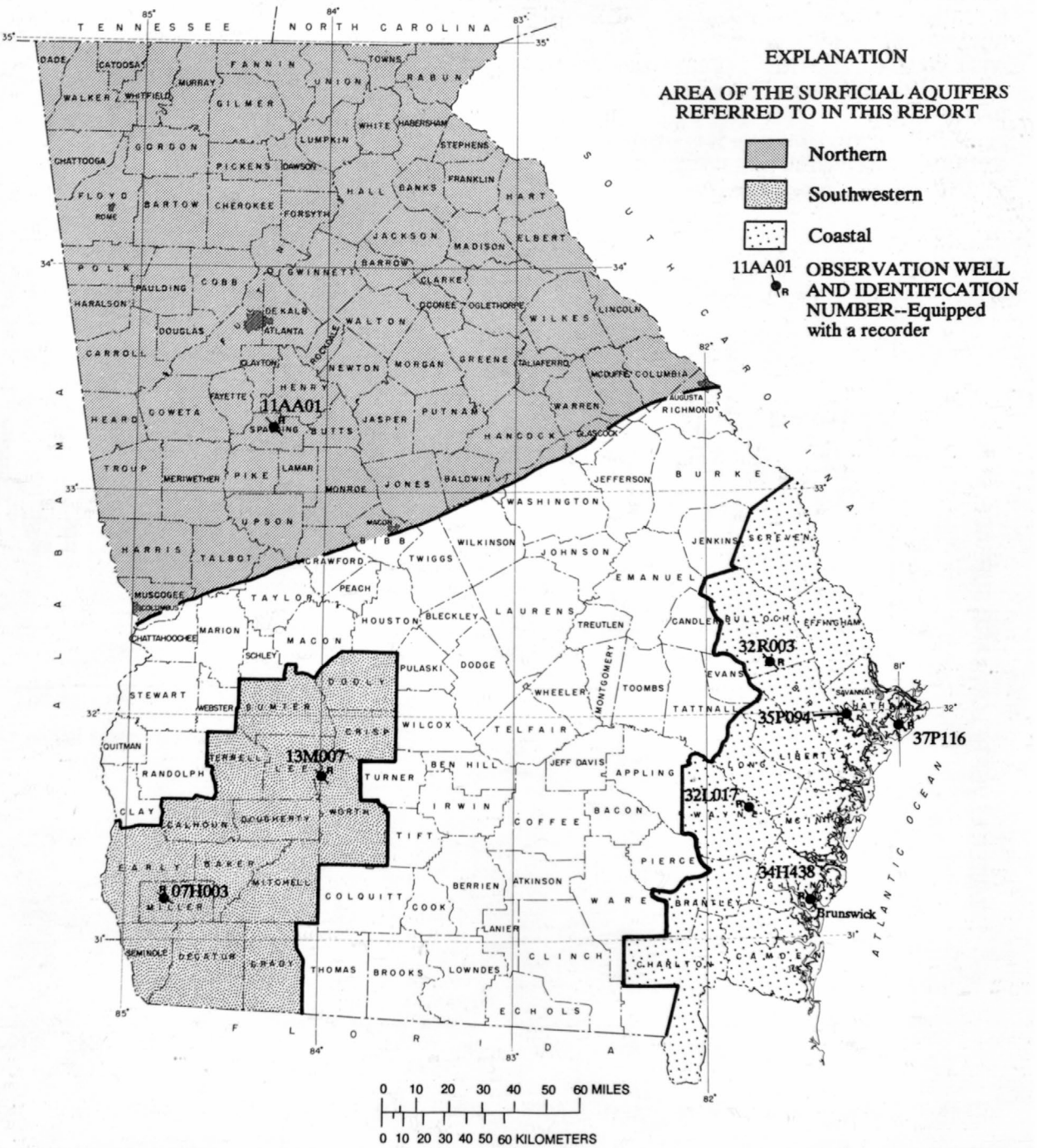
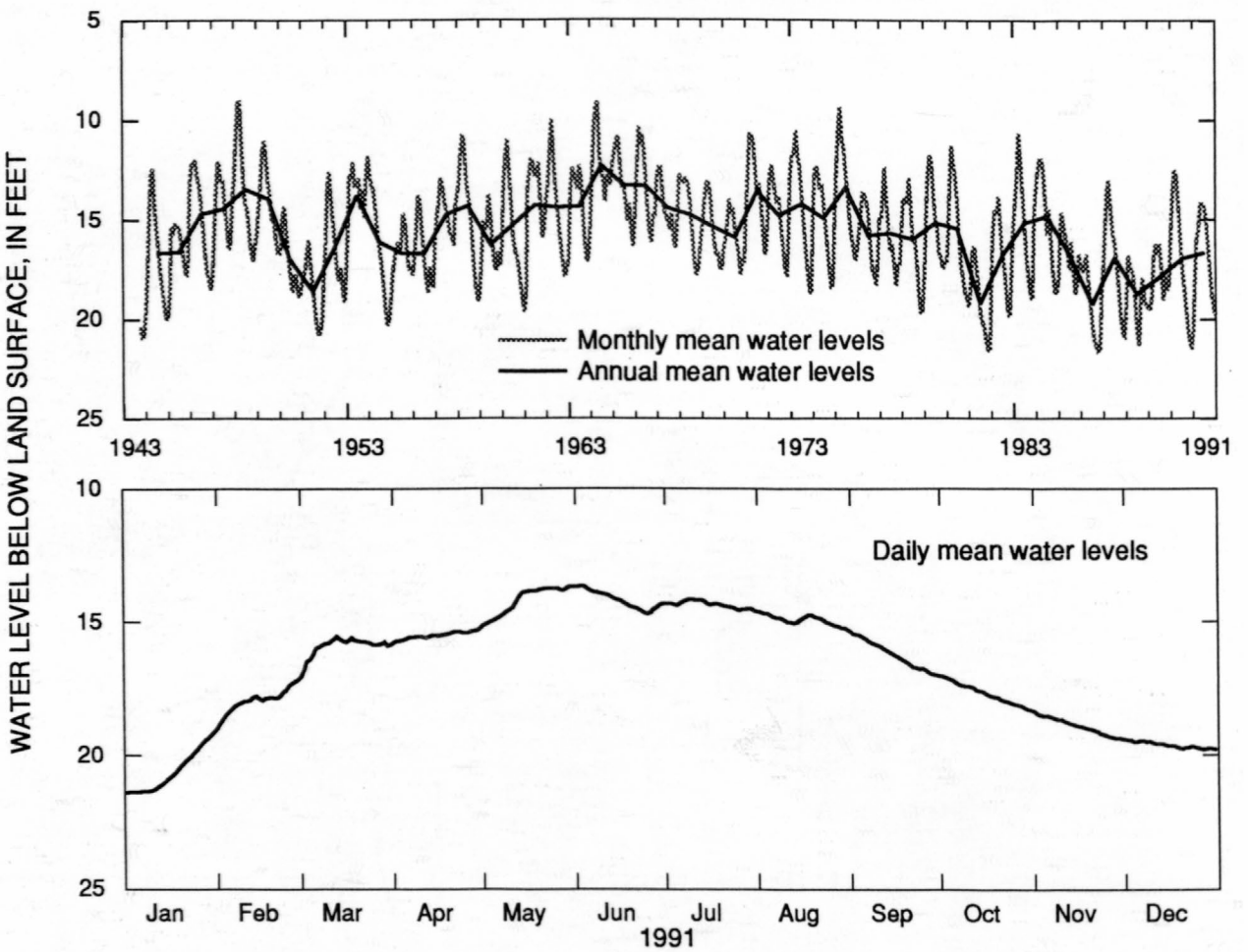


Figure 14.--Locations of observation wells completed in the surficial aquifers.

331507084171801 Local number, 11AA01.
LOCATION.--Lat 33°15'54", long 84°16'56", Hydrologic Unit 03070103.
Owner: University of Georgia.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (residuum).
WELL CHARACTERISTICS.--Dug unused supply well, size 4 x 4 ft, depth 30 ft, cased to 30 ft, open end.
DATUM.--Altitude of land-surface datum is 950 ft.
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, 21.82 ft below land-surface datum, November 18-19, 1986.

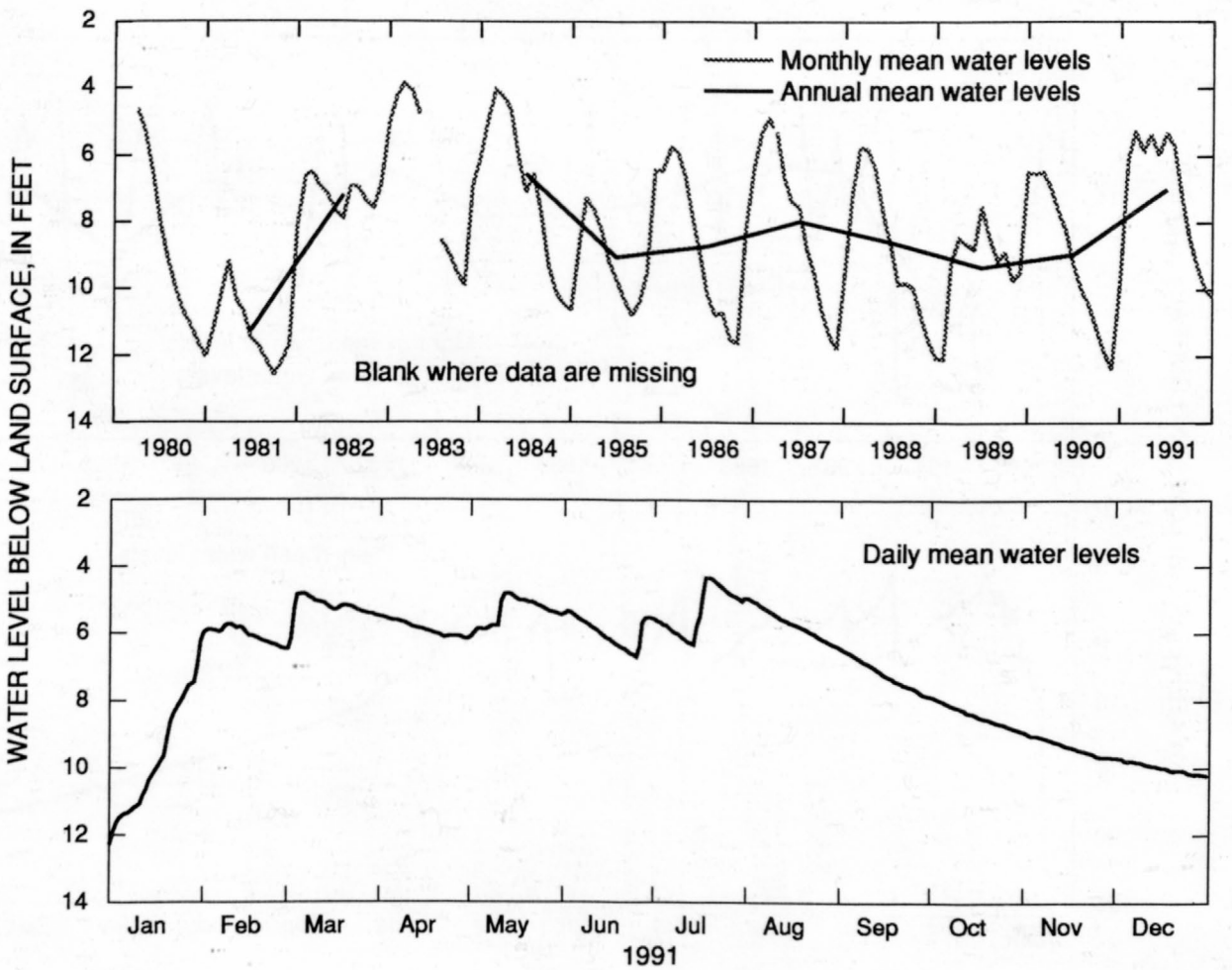


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	20.60	17.94	15.91	15.51	14.17	14.18	14.36	14.93	16.23	17.68	18.90	19.61
LOW	21.38	18.80	16.79	15.73	15.10	14.71	14.59	15.29	17.01	18.32	19.39	19.78
HIGH	19.10	17.16	15.55	15.26	13.66	13.65	14.16	14.64	15.47	17.04	18.45	19.42

CAL YR	1991		MEAN	16.66		HIGH	13.65		LOW	21.38		

Figure 15.--Water level in observation well 11AA01, Spalding County.

314330084005403 Local number, 13M007.
LOCATION.--Lat 31°43'30", long 84°00'54", Hydrologic Unit 03130006.
Owner: U.S. Geological Survey, test well DP-9.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (residuum).
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 25 ft, cased to 10 ft, open hole.
DATUM.--Altitude of land-surface datum is 230 ft.
REMARKS.--None.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.48 ft below land-surface datum, March 7, 1984; lowest, 13.03 ft below land-surface datum, October 22, 1981.

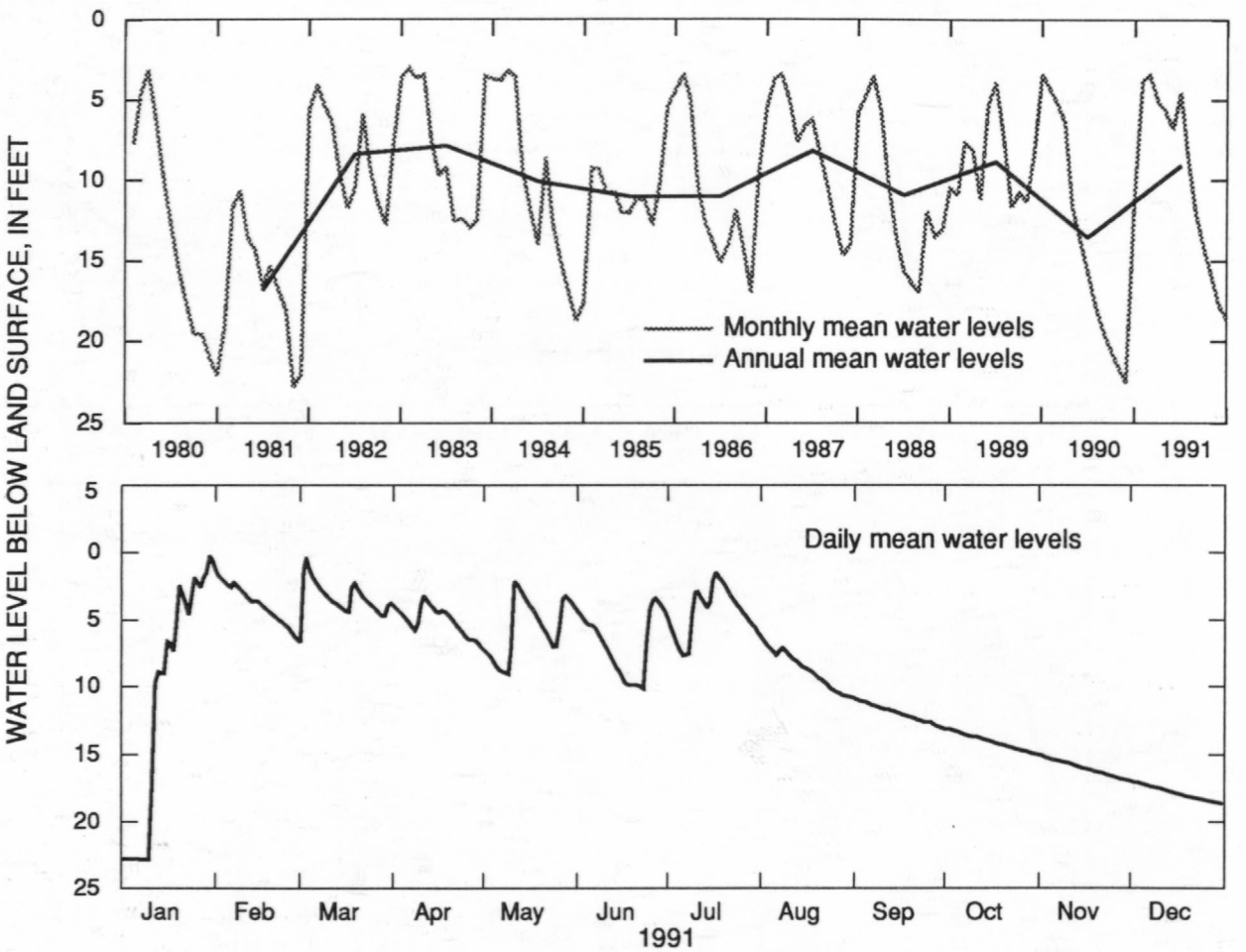


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	9.73	6.06	5.25	5.87	5.35	5.95	5.31	5.69	7.16	8.40	9.34	9.97
LOW	11.93	6.47	6.17	6.16	5.98	6.67	6.33	6.38	7.84	8.89	9.68	10.22
HIGH	6.23	5.74	4.81	5.53	4.80	5.33	4.31	4.98	6.49	7.88	8.98	9.70

CAL YR	1991		MEAN	7.01		HIGH	4.31		LOW	12.27		

Figure 16.--Water level in observation well 13M007, Worth County.

311009084495503 Local number, 07H003.
LOCATION.--Lat 31°10'08", long 84°49'54", Hydrologic Unit 03130010.
Owner: U.S. Geological Survey, test well DP-3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (residuum).
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 40 ft, perforated casing 30 to 40 ft.
DATUM.--Altitude of land-surface datum is 180 ft.
REMARKS.--Well pumped and redeveloped August 11, 1989. Water levels for period of missing record, January 1-9, were estimated.
PERIOD OF RECORD.--February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.25 ft below land-surface datum, January 30, 1991; lowest, 24.19 ft below land-surface datum, November 10, 1981.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.83	3.76	3.35	5.02	5.63	6.82	4.48	8.76	12.02	14.08	15.97	17.79
LOW	22.78	6.46	4.69	7.00	9.09	10.18	7.74	10.85	13.14	15.01	16.88	18.61
HIGH	0.25	1.68	0.39	3.20	2.16	3.41	1.51	6.66	11.05	13.19	15.11	16.98

CAL YR	1991		MEAN	9.08		HIGH	0.25		LOW	22.78		

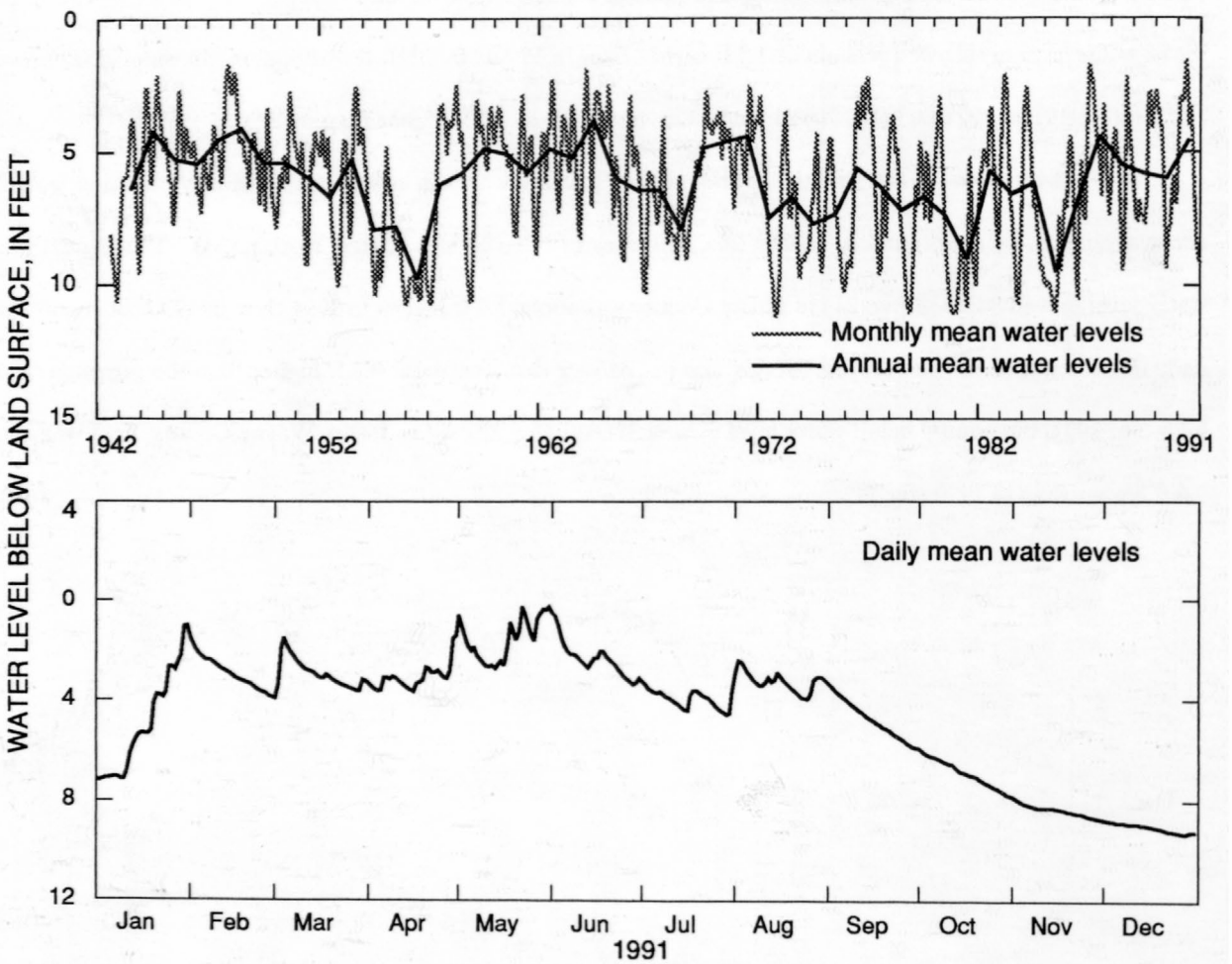
Figure 17.--Water level in observation well 07H003, Miller County.

Coastal area

Water levels in surficial aquifers in the coastal area are monitored in six wells, five of which are included in this report (fig. 14). Water levels in surficial aquifers in the northern part of the coastal area are affected by variations in precipitation, evapotranspiration, and natural drainage. At well 35P094 in Chatham County (fig. 18), recharge by precipitation is reflected by a sharp rise in the water level followed by a gradual decline resulting from evapotranspiration and natural drainage (Clarke and others, 1990, p. 22). The annual mean water level in this well was about 1.5 ft higher than in 1990. In 1991, the annual mean water level in wells 37P116 (fig. 19) and 32R003 (fig. 20) ranged from about 0.3 to 1.4 ft higher than in 1990.

The water-level in the surficial aquifer in the Brunswick area is influenced by nearby pumping from the surficial aquifer, by precipitation, and by tidal fluctuations (Clarke and others, 1990, p. 24). The annual mean water level in well 34H438 (fig. 21) in Glynn County was about 1.0 ft higher in 1991 than in 1990. A record-high daily mean water level was recorded in this well in October that was about 0.2 ft higher than the previous record high. In 1991, the annual mean water level in well 32L017 (fig. 22) in the Jesup, Wayne County, area was about 0.6 ft higher than in 1990 (fig. 22).

315950081161201 Local number, 35P094.
LOCATION.--Lat 31°59'50", long 81°16'12", Hydrologic Unit 03060204.
Owner: University of Georgia, formerly U.S. Department of Agriculture.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (sand of Holocene and Pleistocene age).
WELL CHARACTERISTICS.--Bored observation well, diameter 30 in., depth 15 ft, cased to 15 ft, open end.
DATUM.--Altitude of land-surface datum is 18.67 ft.
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, September 26, 1953; lowest, 12.28 ft below land-surface datum, November 30, 1972.

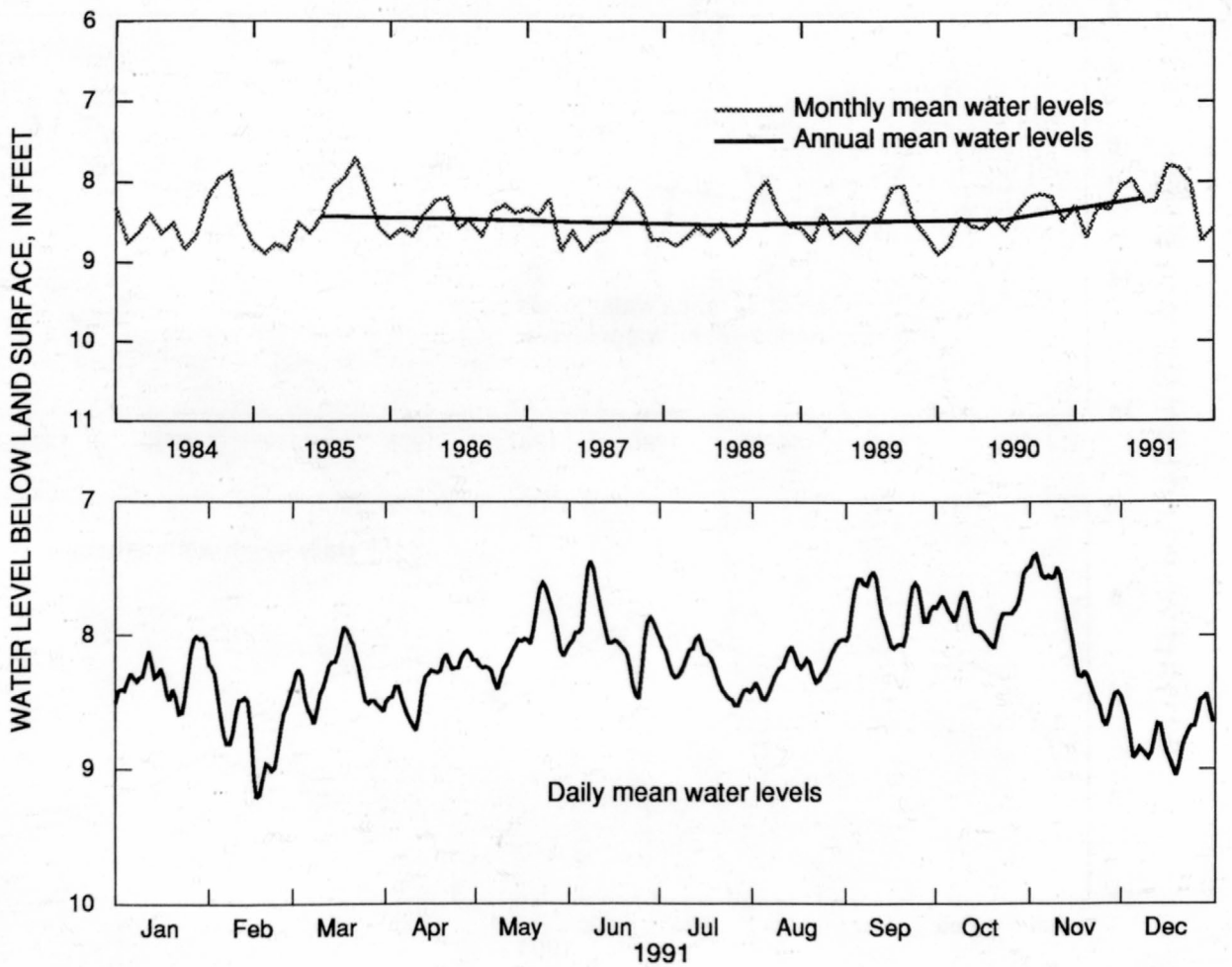


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	5.02	2.90	2.96	3.08	1.56	2.34	3.96	3.27	4.75	6.87	8.33	9.01
LOW	7.18	3.88	3.64	3.66	2.73	3.37	4.59	3.98	5.90	7.79	8.71	9.29
HIGH	1.00	1.76	1.49	1.39	0.28	0.65	3.39	2.44	3.49	6.02	7.90	8.75

CAL YR	1991		MEAN	4.52		HIGH	0.28		LOW	9.29		

Figure 18.--Water level in observation well 35P094, Chatham County.

315906081011204 Local number, 37P116.
LOCATION.--Lat 31°59'06", long 81°01'12", Hydrologic Unit 03060204.
Owner: Georgia Geologic Survey, Skidaway Institute test well 4.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (sand of Miocene and post Miocene age).
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 85 ft, cased to 70 ft, screen to 85 ft.
DATUM.--Altitude of land-surface datum is 10 ft.
REMARKS.--None.
PERIOD OF RECORD.--January 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.19 ft below land-surface datum, October 31, 1985; lowest, 9.21 ft below land-surface datum, February 17, 1991.

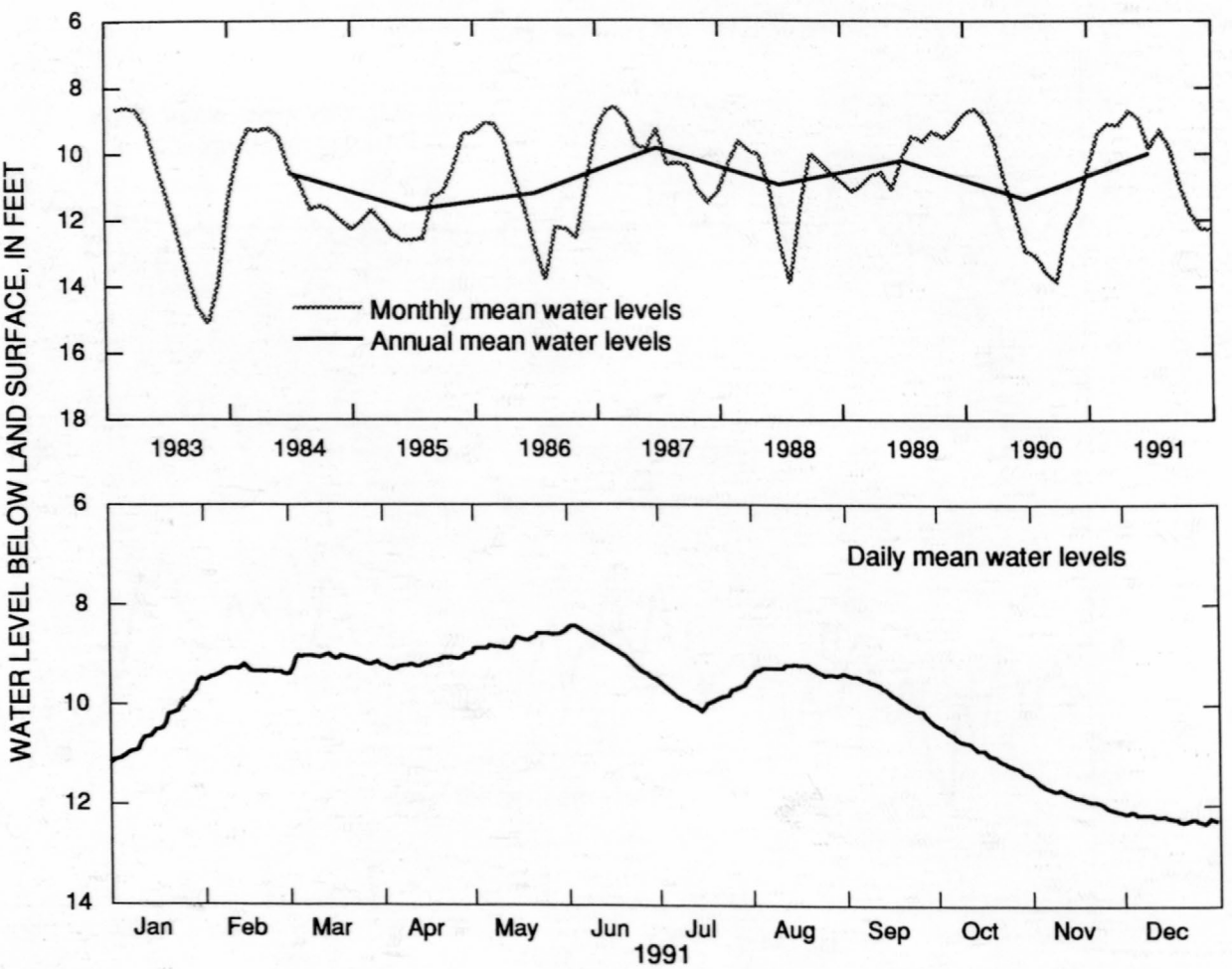


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	8.31	8.70	8.33	8.35	8.06	7.97	8.26	8.24	7.80	7.83	8.02	8.75
LOW	8.59	9.21	8.66	8.71	8.40	8.47	8.52	8.48	8.09	8.09	8.68	9.05
HIGH	8.01	8.24	7.94	8.11	7.60	7.44	8.00	8.02	7.52	7.50	7.39	8.44

CAL YR	1991		MEAN	8.22		HIGH	7.39		LOW	9.21		

Figure 19.--Water level in observation well 37P116, Chatham County.

321240081411502 Local number, 32R003.
LOCATION.--Lat 32°12'40", long 81°41'15", Hydrologic Unit 03060202.
Owner: Georgia Geologic Survey, Bulloch South test well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (sand of Miocene and post Miocene age).
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 155 ft, cased to 134 ft, screen to 155 ft.
DATUM.--Altitude of land-surface datum is 120 ft.
REMARKS.--Well sounded August 1982.
PERIOD OF RECORD.--February 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.40 ft below land-surface datum, March 26, 1983; lowest, 15.27 ft below land-surface datum, November 14, 1983.

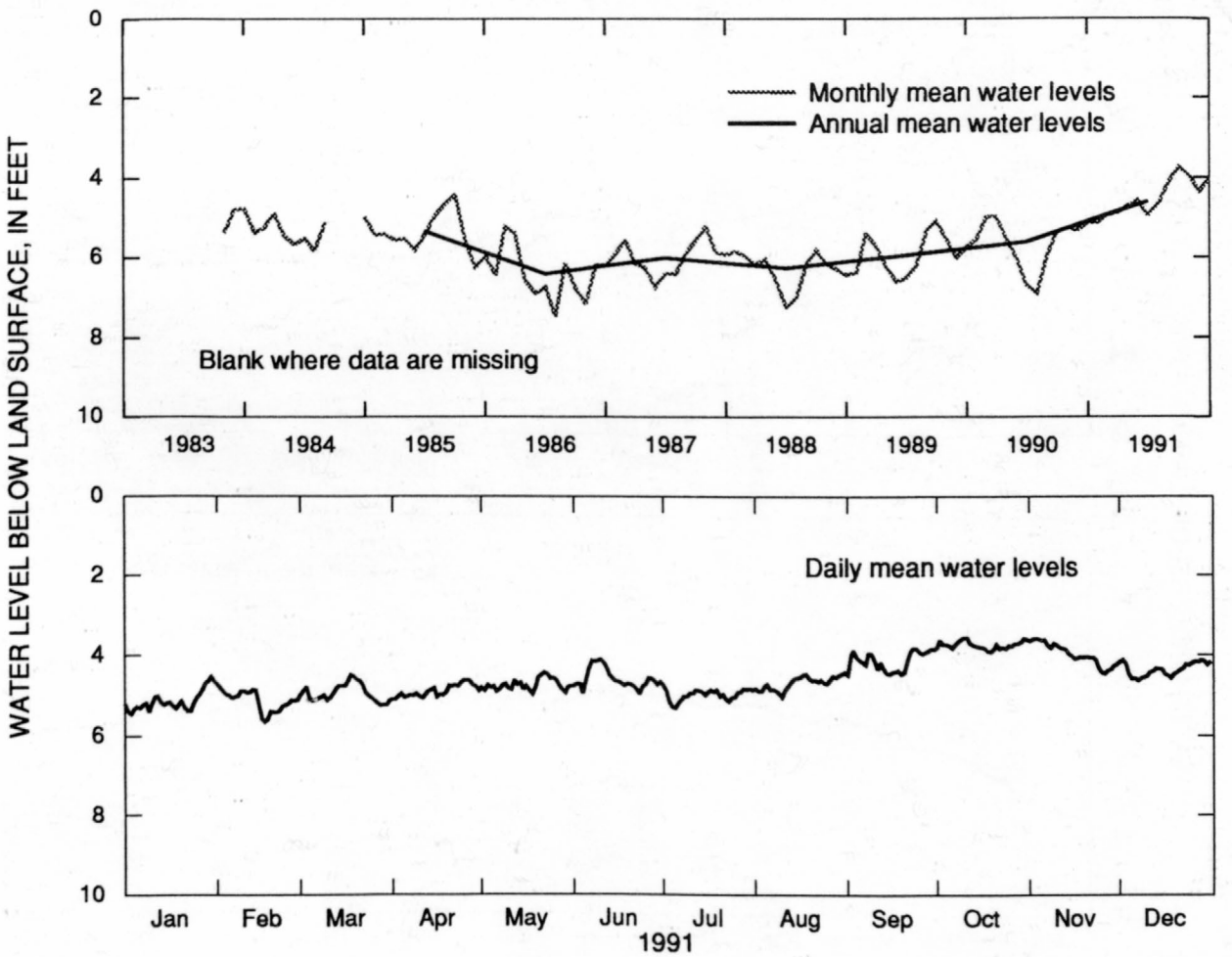


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.45	9.33	9.09	9.15	8.72	8.91	9.82	9.30	9.81	10.94	11.83	12.25
LOW	11.10	9.47	9.26	9.29	8.87	9.50	10.13	9.42	10.40	11.40	12.14	12.36
HIGH	9.48	9.19	8.99	8.96	8.52	8.42	9.48	9.20	9.43	10.44	11.50	12.12

CAL YR	1991		MEAN	9.97		HIGH	8.42		LOW	12.36		

Figure 20.--Water level in observation well 32R003, Bulloch County.

310901081284403 Local number, 34H438.
LOCATION.--Lat 31°09'01", long 81°28'44", Hydrologic Unit 03070203.
Owner: Georgia Geologic Survey, Coffin Park test well 3.
INSTRUMENTATION.--Basic data recorder.
AQUIFER.--Surficial (sand of Miocene and post Miocene age).
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 202 ft, cased to 192 ft, screen to 202 ft.
DATUM.--Altitude of land-surface datum is 7 ft.
REMARKS.--Well pumped and sampled by Georgia Geologic Survey, January 9, 1991. Water levels from period of missing record, August 24 to September 10, were estimated.
PERIOD OF RECORD.--November 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.57 ft below land-surface datum, October 10-11, 1991; lowest, 8.13 ft below land-surface datum, July 12, 1990.

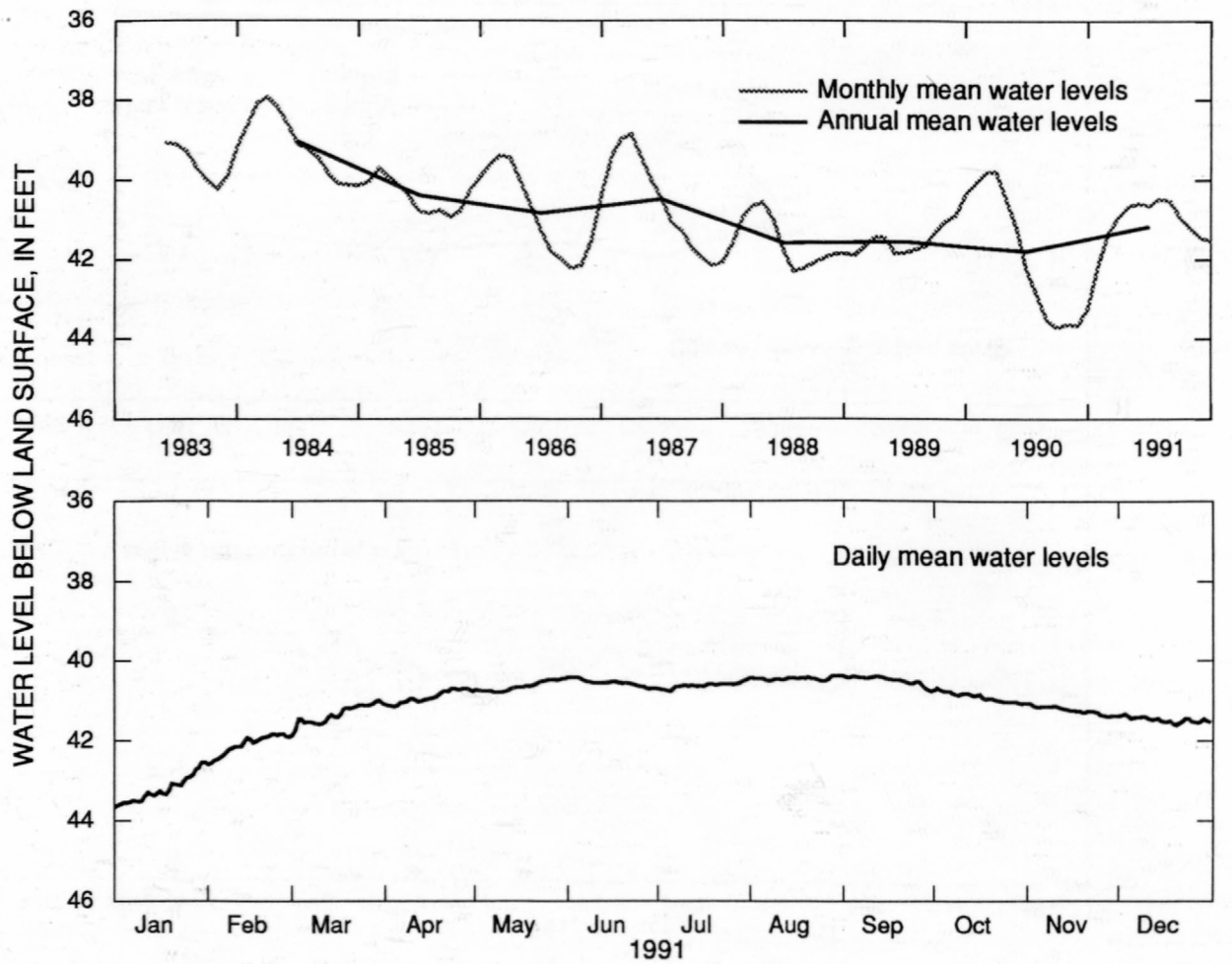


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	5.14	5.14	4.96	4.90	4.74	4.58	4.97	4.68	4.13	3.75	3.98	4.36
LOW	5.44	5.67	5.26	5.10	4.96	4.95	5.30	5.03	4.46	3.92	4.47	4.64
HIGH	4.55	4.83	4.51	4.62	4.44	4.11	4.82	4.42	3.83	3.57	3.60	4.13

CAL YR	1991		MEAN	4.61		HIGH	3.57		LOW	5.67		

Figure 21.--Water level in observation well 34H438, Glynn County.

313253081433504 Local number, 32L017.
LOCATION.--Lat 31°32'52", long 81°43'36", Hydrologic Unit 03070106.
Owner: Georgia Geologic Survey, Gardi test well 3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Surficial (sand of Miocene and post-Miocene age).
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 215 ft, cased to 200 ft, screen to 215 ft.
DATUM.--Altitude of land-surface datum is 74 ft.
REMARKS.--None.
PERIOD OF RECORD.--June 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.85 ft below land-surface datum, April 16, 1984; lowest, 43.91 ft below land-surface datum, October 8, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	43.22	42.09	41.34	40.92	40.65	40.57	40.63	40.46	40.51	40.93	41.24	41.46
LOW	43.62	42.55	41.73	41.16	40.80	40.72	40.78	40.52	40.79	41.09	41.39	41.60
HIGH	42.53	41.82	41.00	40.70	40.45	40.42	40.47	40.39	40.41	40.72	41.10	41.32
CAL YR	1991		MEAN	41.16		HIGH	40.39		LOW	43.66		

Figure 22.--Water level in observation well 32L017, Wayne County.

Upper Brunswick Aquifer

The water level in the upper Brunswick aquifer is monitored in three wells; data for these wells are summarized in this report (figs. 23 - 26). Near pumping centers of the Floridan aquifer system, the water level in the upper Brunswick aquifer responds to pumping from the Upper Floridan aquifer as a result of the hydraulic connection between the aquifers (Clarke and others, 1990, p. 28). Elsewhere, the water level mainly responds to seasonal variations in recharge and discharge

The upper Brunswick aquifer in Bulloch County is under unconfined to semiconfined conditions and is influenced by both variations in recharge from precipitation and by pumping from the Upper Floridan aquifer (Clarke and others, 1990, p. 28). The annual mean water level in well 31U009 (fig. 24) was about 1.4 ft higher in 1991 than in 1990.

In the Wayne and Glynn County areas, the upper Brunswick aquifer is confined and responds to nearby pumping (Clarke and others, 1990, p. 28). In 1991, the annual mean water level in well 32L016 near Jesup (fig. 25) was about 0.5 ft lower than in 1990, continuing a downward trend that began in 1984, which is similar to trends in the underlying Upper Floridan aquifer (see hydrographs for well 30L003, fig. 53 and well 32L015, fig. 54). A record-low daily mean water level was recorded in well 32L016 (fig. 25) in January that was less than 0.1 ft lower than the previous record low. The annual mean water level in well 34H437 near Brunswick (fig. 26) was about 2.5 ft higher in 1991 than in 1990.

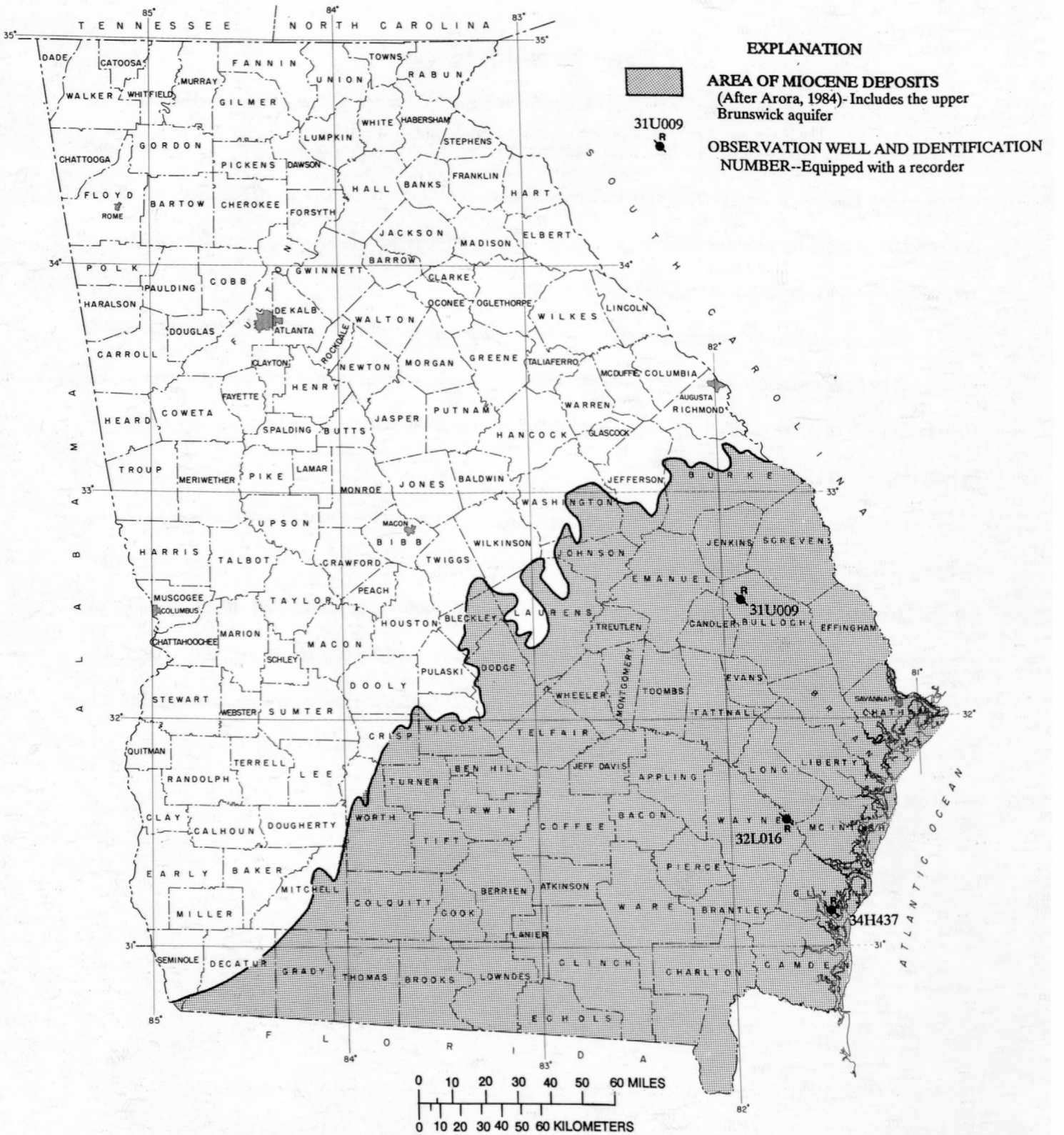
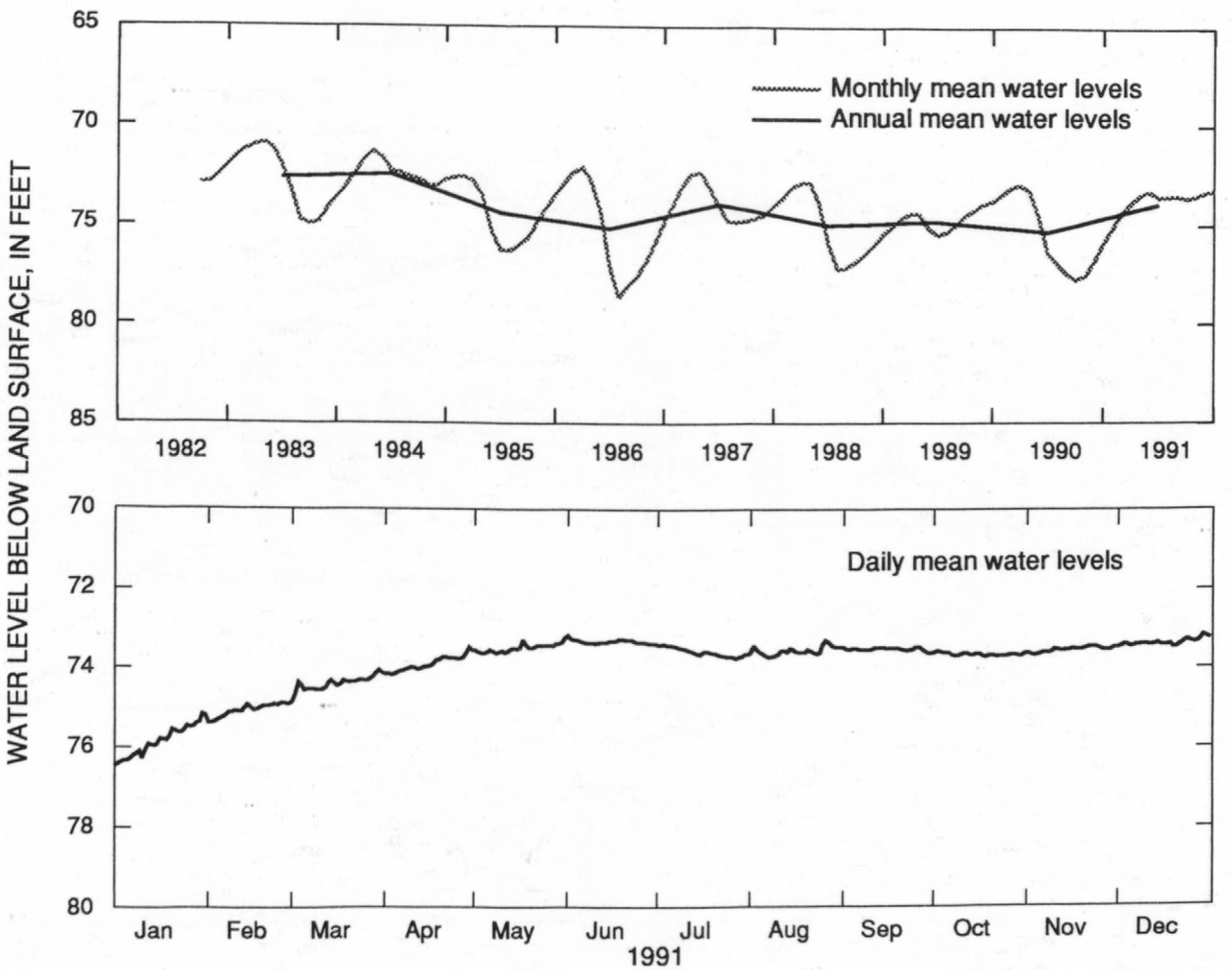


Figure 23.--Locations of observation wells completed in the upper Brunswick aquifer. (The extent of the upper Brunswick aquifer has not been mapped, but is within the area of Miocene deposits shown.)

323123081511602 Local number, 31U009.
LOCATION.--Lat 32°31'23", long 81°51'16", Hydrologic Unit 03060202.
Owner: Georgia Geologic Survey, Hopeulikit test well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Brunswick.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 210 ft, cased to 160 ft, screen to 210 ft.
DATUM.--Altitude of land-surface datum is 205 ft.
REMARKS.--Well sounded August 1982. Well pumped and sampled by Georgia Geologic Survey, January 10, 1991.
PERIOD OF RECORD.--October 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 70.77 ft below land-surface datum, April 24, 1983; lowest, 78.87 ft below land-surface datum, August 4, 1986.

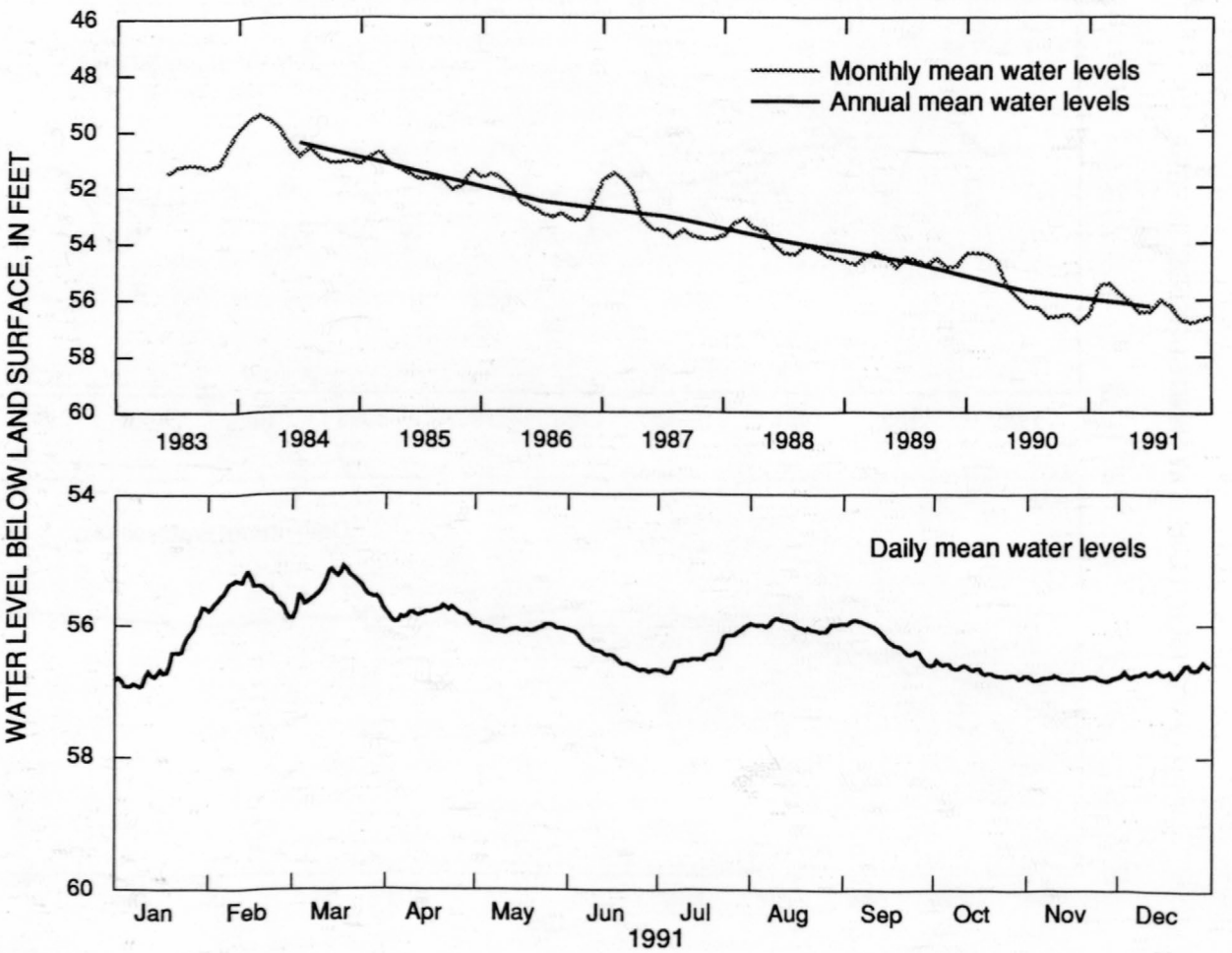


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	75.84	75.06	74.39	73.88	73.47	73.30	73.57	73.55	73.52	73.65	73.54	73.37
LOW	76.40	75.37	74.63	74.16	73.60	73.36	73.74	73.71	73.62	73.71	73.66	73.46
HIGH	75.15	74.86	74.04	73.45	73.21	73.24	73.37	73.29	73.46	73.56	73.45	73.17

CAL YR	1991		MEAN	73.92		HIGH	73.16		LOW	76.47		

Figure 24.--Water level in observation well 31U009, Bulloch County.

313253081433503, Local number, 32L016.
LOCATION.--Lat 31°32'52", long 81°43'36", Hydrologic Unit 03070106.
Owner: Georgia Geologic Survey, Gardi test well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Brunswick.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 340 ft, cased to 320 ft, screen to 340 ft.
DATUM.--Altitude of land-surface datum is 74 ft.
REMARKS.--Well sounded April 26, 1983.
PERIOD OF RECORD.--June 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.26 ft below land-surface datum, March 20, 1984; lowest, 56.93 ft below land-surface datum, January 9, 1991.

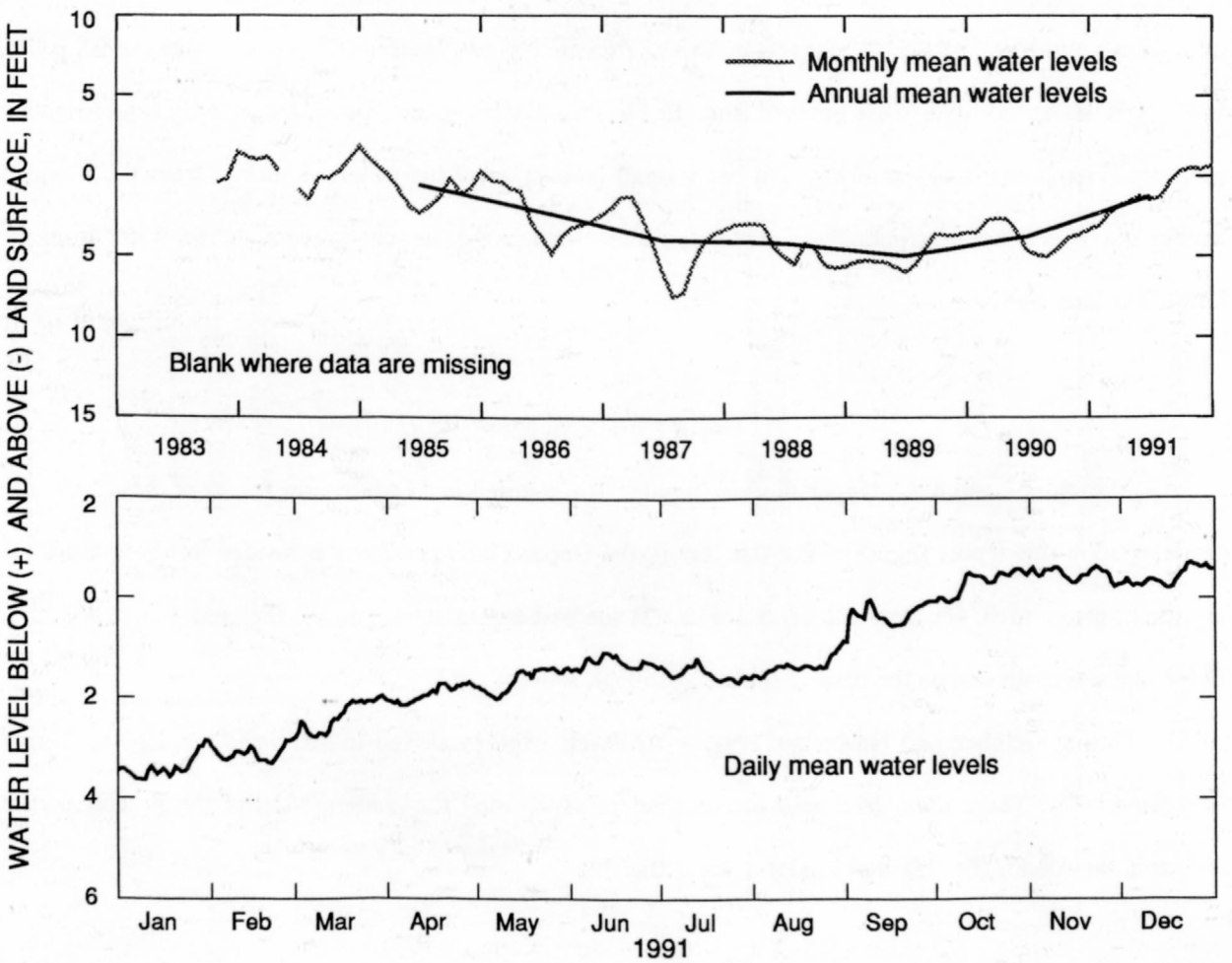


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	56.54	55.50	55.44	55.83	56.05	56.45	56.42	56.01	56.21	56.68	56.80	56.70
LOW	56.93	55.89	55.78	55.99	56.12	56.71	56.73	56.11	56.61	56.81	56.84	56.79
HIGH	55.72	55.17	55.09	55.70	55.99	56.09	56.01	55.89	55.92	56.53	56.75	56.55

CAL YR	1991		MEAN	56.22		HIGH	55.09		LOW	56.93		

Figure 25.--Water level in observation well 32L016, Wayne County.

310901081284402 Local number, 34H437.
LOCATION.--Lat 31°09'01", long 81°28'44", Hydrologic Unit 03070203.
Owner: Georgia Geologic Survey, Coffin Park test well 2.
INSTRUMENTATION.--Basic data recorder.
AQUIFER.--Upper Brunswick.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 328 ft, cased to 315 ft, screen to 328 ft.
DATUM.--Altitude of land-surface datum is 7 ft.
REMARKS.--Water levels for period of missing record, August 24 to September 10, were estimated.
PERIOD OF RECORD.--January 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.26 ft above land-surface datum, January 7, 1985; lowest, 7.80 ft below land-surface datum, August 30, 1987.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	3.38	3.09	2.34	1.88	1.61	1.28	1.50	1.33	0.32	-0.31	-0.47	-0.42
LOW	3.63	3.29	2.76	2.12	2.00	1.45	1.68	1.58	0.55	0.08	-0.23	-0.20
HIGH	2.83	2.82	1.93	1.65	1.37	1.07	1.18	0.85	0.03	-0.58	-0.63	-0.70

CAL YR	1991	MEAN	1.28	HIGH	-0.70	LOW	3.63

[Negative value indicates water level above land surface]

Figure 26.--Water level in observation well 34H437, Glynn County.

Floridan Aquifer System

Water levels in the Floridan aquifer system are monitored in 67 wells; data for 31 of these wells are summarized in this report (figs. 27 and 60). The Floridan aquifer system includes the Upper and Lower Floridan aquifers (table 1). In and near outcrop areas, the Upper Floridan aquifer is semiconfined, and water levels in wells tapping this aquifer fluctuate seasonally in response to variations in recharge rate and pumping (Clarke and others, 1990). Near the coast, where the Upper Floridan aquifer is confined, water levels respond primarily to pumping, and fluctuations related to recharge are less pronounced (Clarke and others, 1990, p. 31). In Georgia, about 655 Mgal/d are pumped from the Floridan aquifer system, mostly for industrial and irrigation purposes (Pierce and Kundell, 1990). All but a small percentage of the water withdrawn from the Floridan aquifer system is from the Upper Floridan aquifer; a few wells in the Savannah area withdraw water from the Lower Floridan aquifer.

Upper Floridan aquifer

The water-level in the Upper Floridan aquifer is monitored in 57 wells; data for 29 of these wells are summarized in this report (fig. 27). For this report, the Upper Floridan aquifer is divided into four areas (1) the southwestern area, (2) the south-central area, (3) the east-central area, and (4) the coastal area (fig. 27). These areas were divided on the basis of similar hydrologic settings.

During October and November 1991, water levels were measured in 200 wells tapping the Upper Floridan aquifer. These data were used to construct maps showing the configuration of the potentiometric surface in the Albany (fig. 28) and Valdosta areas (fig. 39).

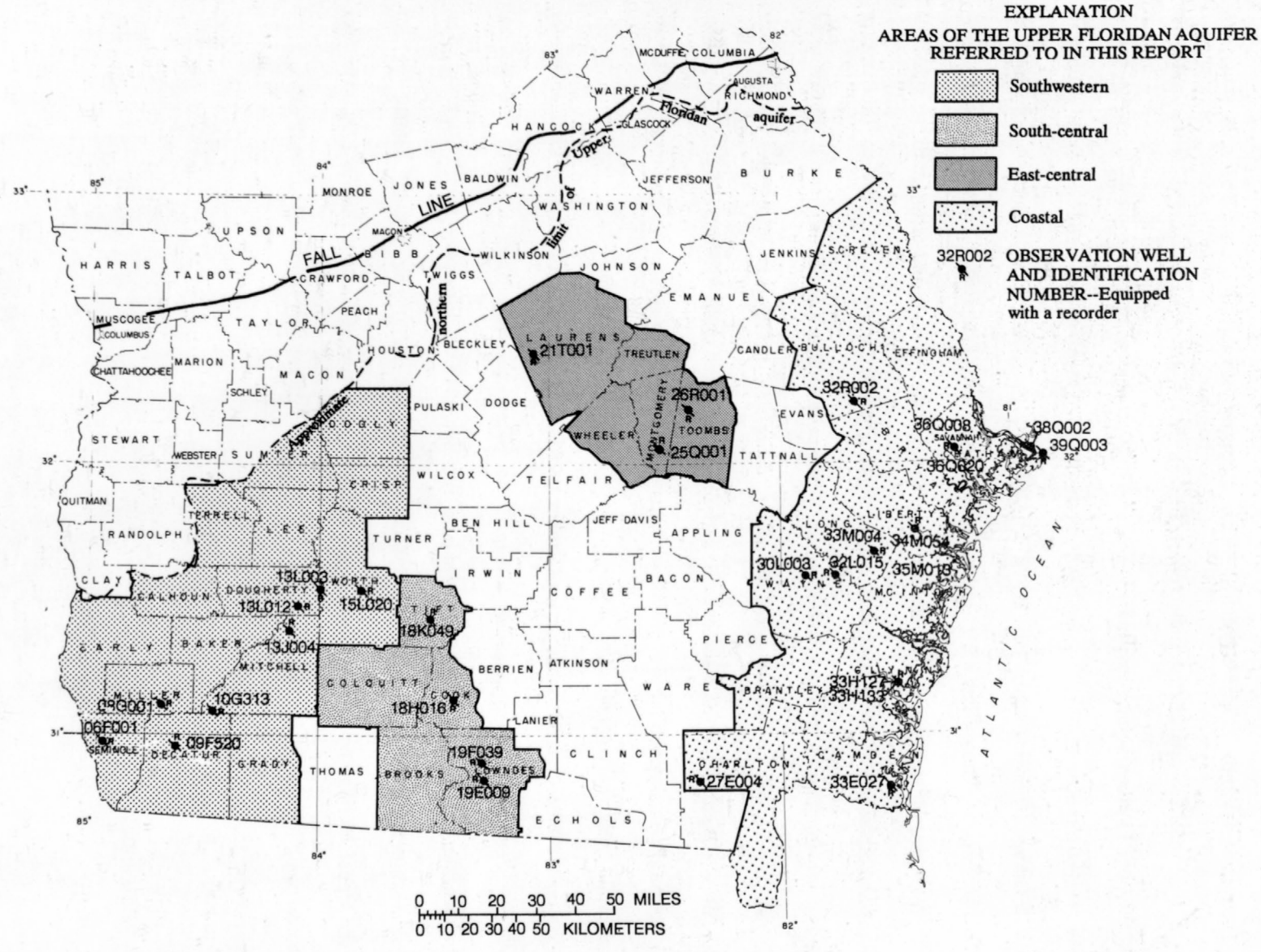


Figure 27.--Subareas and locations of observation wells completed in the Upper Floridan aquifer.

Southwestern area

The water level in the Upper Floridan aquifer in southwestern Georgia is monitored in 24 wells; data for eight of these wells are summarized in this report (fig. 27). In the southwestern area, water levels in wells tapping the Upper Floridan aquifer respond to variations in precipitation, evapotranspiration, pumping, and streamflow (Hayes and others, 1983). During 1990, an estimated 210 Mgal/d were withdrawn from aquifers in southwestern Georgia (Fanning and others, 1992), primarily from the Upper Floridan aquifer, for irrigation purposes. This large withdrawal has not produced a discernible cone of depression across most of the area because the wells are widely separated, the transmissivity of the aquifer is high, and recharge to the aquifer is large (Torak and others, 1991). The withdrawal also has not caused long-term water-level declines over most of the area because pumping is seasonal and recharge is adequate during periods of normal precipitation. Although pumping has not produced discernible cones of depression or long-term water-level declines over most of the area, a depression in the potentiometric surface has developed in the Sylvester, Worth County, area, as a result of local pumping and the less-productive water-bearing characteristics of the aquifer (D.W. Hicks, U.S. Geological Survey, oral commun., 1990).

Water-level measurements made during October 1991 in 188 wells tapping the Upper Floridan aquifer in the Albany area were used to construct a map of the potentiometric surface (fig. 28). The general configuration of the potentiometric surface changed little from that of 1990 (Milby and others, 1991, p. 46). The annual mean water levels in wells 09F520 (fig. 29), 08G001 (fig. 30), 06F001 (fig. 31), and 13L012 (fig. 32) tapping the Upper Floridan aquifer ranged from about 2.6 ft to 9.0 ft higher in 1991 than in 1990. The four wells are near the Flint River or its tributaries where the aquifer is hydraulically connected to the streams.

In areas away from the Flint River and its tributaries, the Upper Floridan aquifer is confined by thicker overburden, is not well connected to streams, and the water level is not rapidly influenced by precipitation (Torak and others, 1991). Water-level fluctuations and trends in these areas are indicated by hydrographs for wells 10G313, 13L003, 13J004, and 15L020 (figs. 33-36). The annual mean water levels in these wells ranged from about 0.2 ft lower to about 6.9 ft higher in 1991 than in 1990. The annual mean water level in well 15L020 was about 0.2 ft lower in 1991 than in 1990 and possibly is a result of increased local pumping and the less-productive water-bearing characteristics of the aquifer in that area (D.W. Hicks, U.S. Geological Survey, oral commun., 1990).

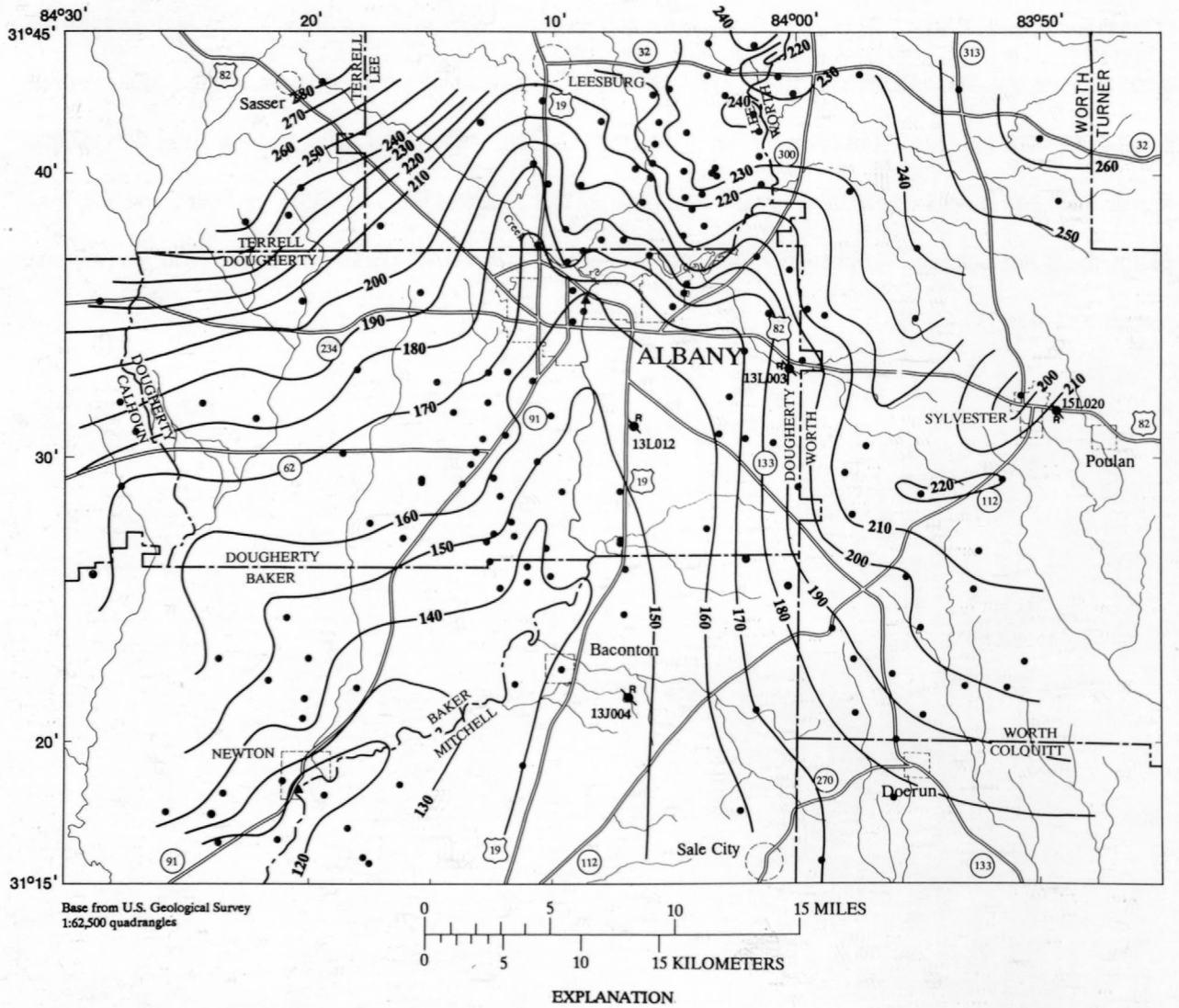
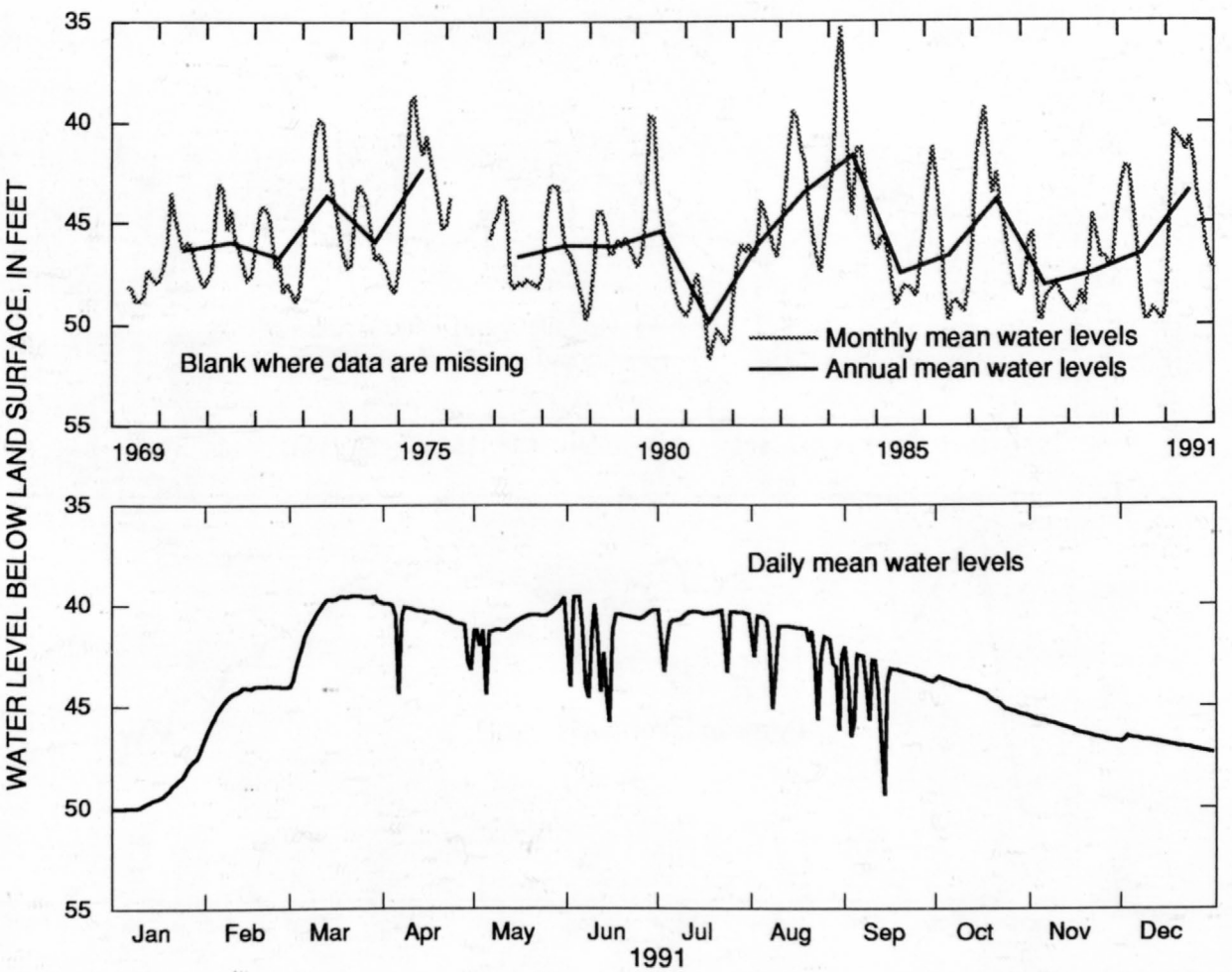


Figure 28.--Water level and locations of observation wells completed in the Upper Floridan aquifer in the Albany area, October 1991.

305736084355801 Local number, 09F520.
LOCATION.--Lat 30°57'42", long 84°35'46", Hydrologic Unit 03130008.
Owner: Graham Bolton.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Unused irrigation well, diameter 12 in., depth 251 ft, cased to 130 ft, open hole.
DATUM.--Altitude of land-surface datum is 128 ft.
REMARKS.--This well is about 15 ft from an irrigation well.
PERIOD OF RECORD.--June 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.86 ft below land-surface datum, April 15, 1984; lowest, 54.89 ft below land-surface datum, September 22, 1990.

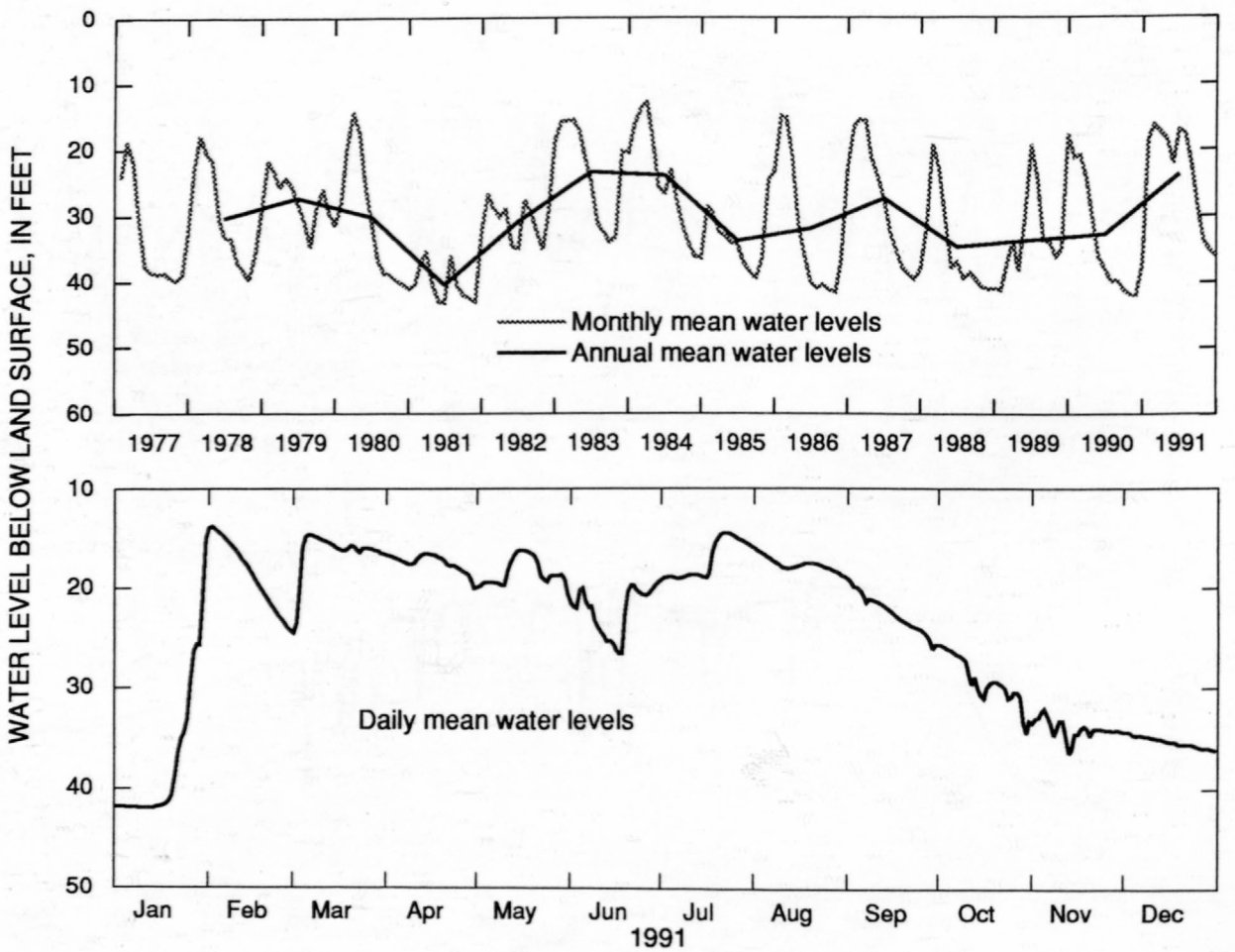


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	49.16	44.50	40.40	40.69	40.87	41.39	40.72	41.97	43.87	44.45	46.16	46.86
LOW	50.02	46.13	43.70	44.37	44.40	45.75	43.31	46.15	49.37	45.45	46.71	47.28
HIGH	46.91	43.97	39.52	39.88	39.61	39.56	40.24	40.53	42.43	43.55	45.58	46.47

CAL YR	1991		MEAN	43.42		HIGH	39.52		LOW	50.02		

Figure 29.--Water level in observation well 09F520, Decatur County.

310651084404501 Local number, 08G001.
LOCATION.--Lat 31°06'51", long 84°40'45", Hydrologic Unit 03130010.
Owner: Viercocken.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--None.
PERIOD OF RECORD.--February 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 11.18 ft below land-surface datum, April 11, 1984; lowest, 43.88 ft below land-surface datum, July 17, 1981.

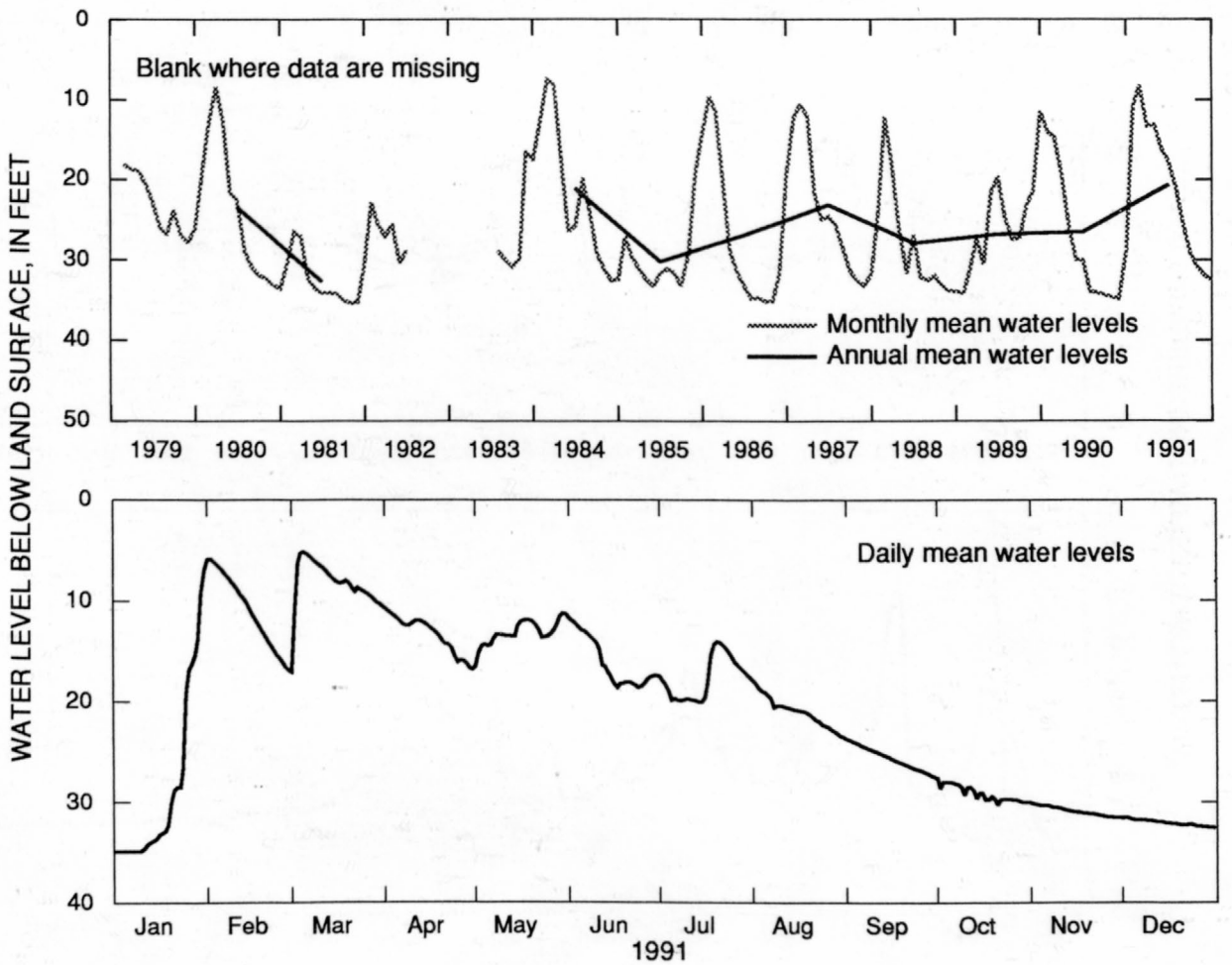


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	37.25	18.49	16.38	17.45	18.41	22.18	17.16	17.65	22.47	29.19	33.95	35.24
LOW	41.90	24.25	23.50	19.98	20.59	26.56	19.03	18.91	26.08	34.49	36.45	36.18
HIGH	15.11	13.81	14.59	16.51	16.22	19.37	14.47	16.25	19.46	25.72	31.98	34.33

CAL YR	1991		MEAN	23.86		HIGH	13.81		LOW	41.90		

Figure 30.--Water level in observation well 08G001, Miller County.

305356084534601 Local number, 06F001.
LOCATION.--Lat 30°54'01", long 84°53'40", Hydrologic Unit 03130004.
Owner: Roddenbery Company Farms, test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 150 ft, cased to 98.5 ft, open hole.
DATUM.--Altitude of land-surface datum is 110 ft.
REMARKS.--Borehole geophysical survey conducted August 10, 1983. Well pumped and redeveloped August 10, 1989. Water levels for periods of missing record, February 1-25, March 4 to April 22, and August 27 to September 30, were estimated.
PERIOD OF RECORD.--March 1979 to July 1982, August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.13 ft below land-surface datum, March 8, 1984; lowest, 35.65 ft below land-surface datum, October 5, 1986.

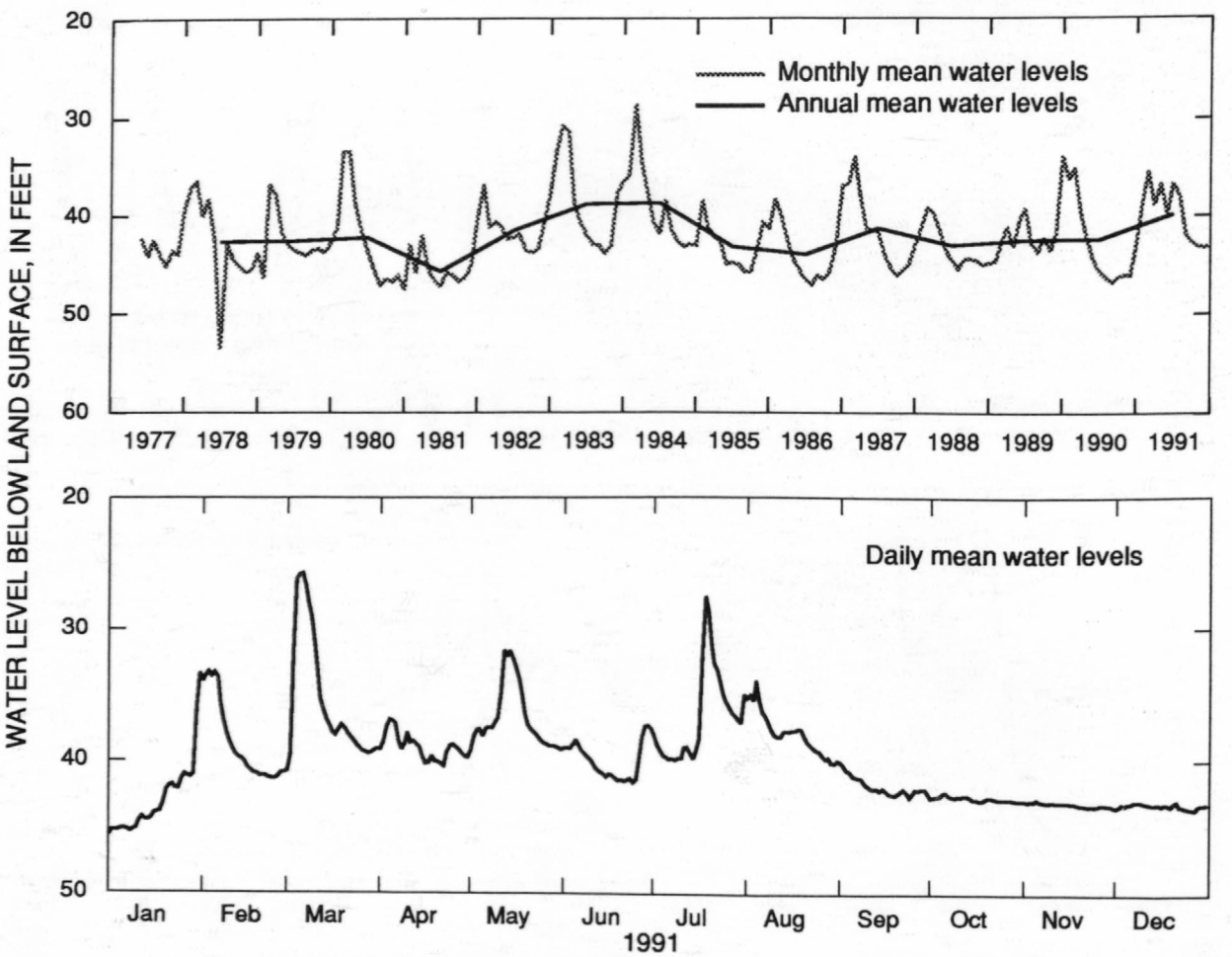


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	28.71	10.84	8.23	13.29	13.08	16.05	17.64	21.00	25.64	29.13	30.85	32.03
LOW	34.85	16.84	11.09	16.76	15.04	18.63	20.04	23.59	27.51	30.24	31.48	32.54
HIGH	7.09	5.84	5.16	10.96	11.18	11.92	13.99	18.20	23.90	27.99	30.19	31.50

CAL YR	1991		MEAN	20.61		HIGH	5.16		LOW	34.85		

Figure 31.--Water level in observation well 06F001, Seminole County.

313105084064302 Local number, 13L012.
LOCATION.--Lat 31°31'05", long 84°06'43", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 218 ft, cased to 54 ft, open hole.
DATUM.--Altitude of land-surface datum is 195 ft.
REMARKS.--Well pumped and redeveloped August 17, 1988.
PERIOD OF RECORD.--June 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 21.92 ft below land-surface datum, March 2, 1979; lowest, 48.18 ft below land-surface datum, July 1, 1981.

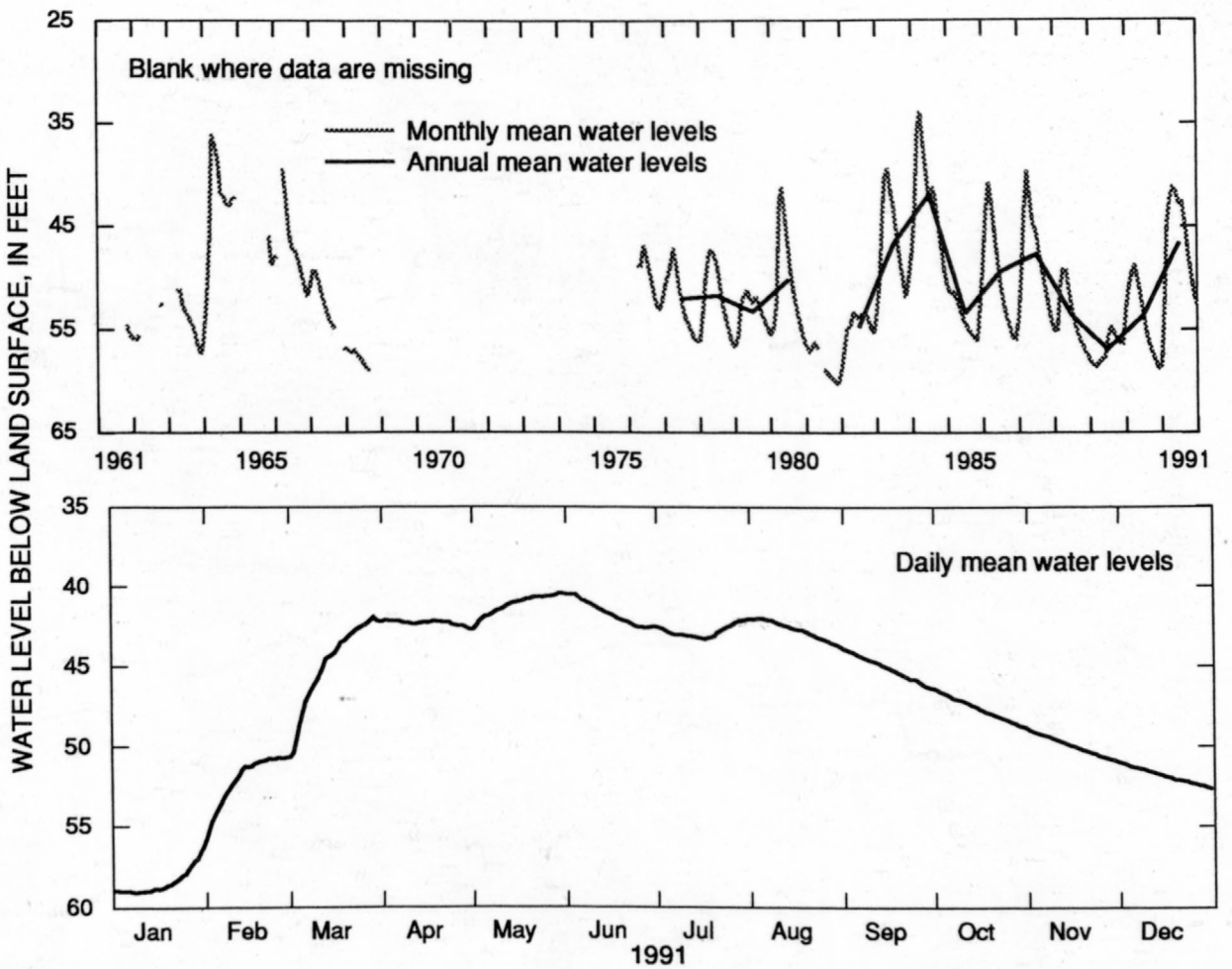


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	43.06	38.62	35.48	38.97	36.73	39.95	36.67	37.87	41.86	42.75	43.15	43.25
LOW	45.39	41.30	39.49	40.38	39.13	41.59	39.91	40.19	42.69	42.96	43.38	43.62
HIGH	33.35	33.25	25.74	36.89	31.60	37.30	27.52	33.93	40.32	42.34	42.84	43.00

CAL YR	1991		MEAN	39.86		HIGH	25.74		LOW	45.66		

Figure 32.--Water level in observation well 13L012, Dougherty County.

310507084262201 Local number, 10G313.
LOCATION.--Lat 31°05'07", long 84°26'22", Hydrologic Unit 03130008.
Owner: Harvey Meinders.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Cable-tool, observation well, diameter 12 in., depth 250 ft, cased to 87 ft, open hole.
DATUM.--Altitude of land-surface datum is 145 ft.
REMARKS.--None.
PERIOD OF RECORD.--November 1961 to September 1968, April 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 32.98 ft below land-surface datum, April 9, 1984; lowest, 60.26 ft below land-surface datum, January 1, 1982.

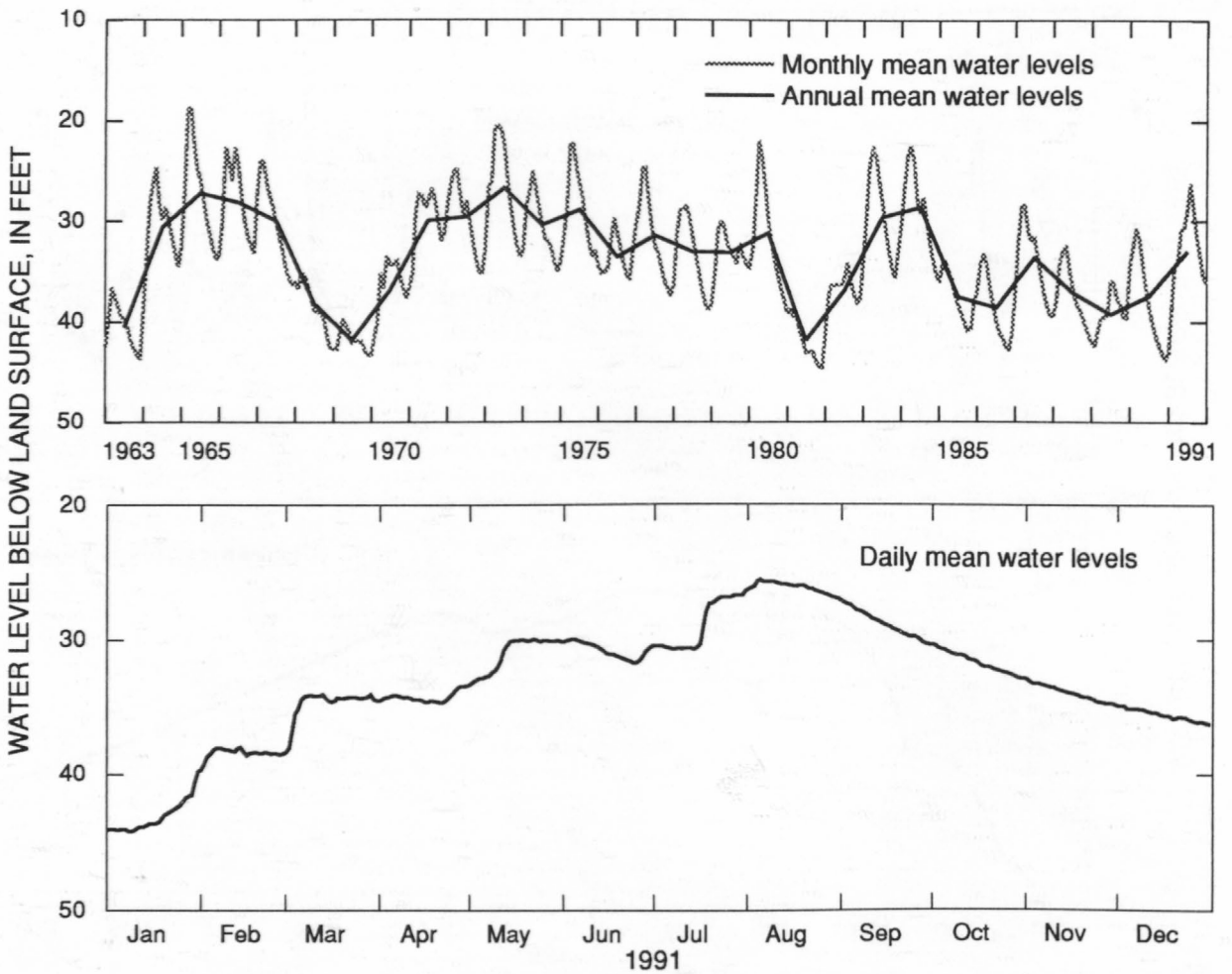


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	58.41	52.03	44.80	42.31	41.17	41.68	42.81	42.72	45.11	47.63	49.95	51.84
LOW	59.03	55.12	50.37	42.71	42.51	42.61	43.29	43.79	46.35	48.80	50.92	52.63
HIGH	56.26	50.69	41.93	42.13	40.44	40.50	42.07	41.98	44.01	46.45	49.02	51.02

CAL YR	1991		MEAN	46.68		HIGH	40.44		LOW	59.03		

Figure 33.--Water level in observation well 10G313, Mitchell County.

313748084002901 Local number, 13L003.
LOCATION.--Lat 31°33'13", long 84°00'21", Hydrologic Unit 03130008.
Owner: City of Albany and Dougherty County.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Well pumped and sounded June 21, 1978; water-quality sample collected at conclusion of pumping.
Borehole geophysical survey conducted March 17, 1977.
PERIOD OF RECORD.--January 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.41 ft below land-surface datum, April 2, 1965; lowest, 44.89 ft below land-surface datum, December 13, 1981.

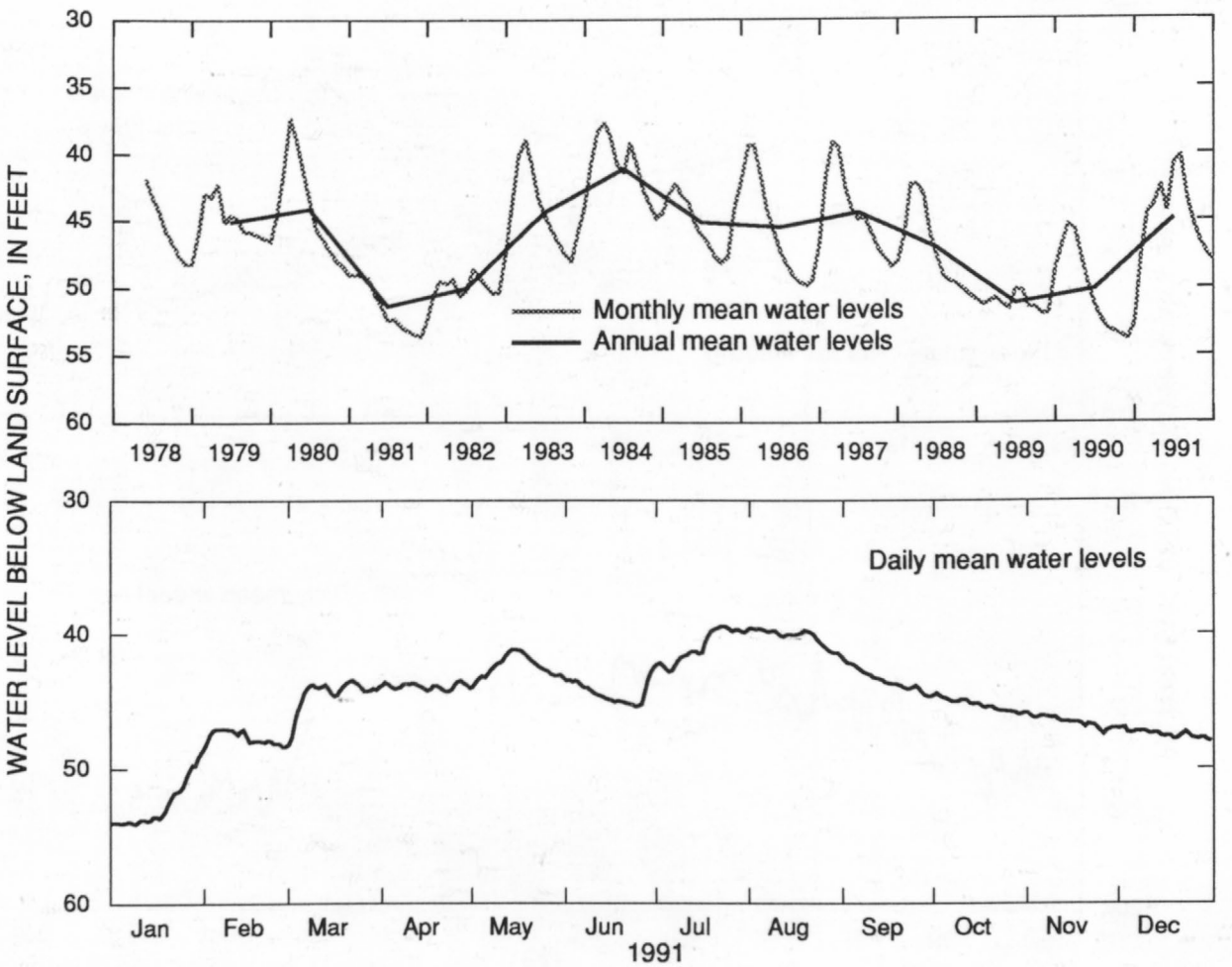


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	43.12	38.39	34.66	34.22	30.99	30.76	28.92	26.17	28.87	31.64	33.87	35.52
LOW	44.15	39.16	38.01	34.65	33.11	31.72	30.70	27.06	30.34	32.78	34.73	36.25
HIGH	39.78	37.97	34.03	33.40	29.95	29.94	26.47	25.58	27.32	30.40	33.03	34.83

CAL YR	1991		MEAN	33.06		HIGH	25.58		LOW	44.15		

Figure 34.--Water level in observation well 13L003, Dougherty County.

312127084065801 Local number, 13J004.
LOCATION.--Lat 31°21'29", long 84°06'57", Hydrologic Unit 03130008.
Owner: Aurora Dairy, Wright 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 12 in., depth 208 ft, cased to 77 ft, open hole.
DATUM.--Altitude of land-surface datum is 200 ft.
REMARKS.--None.
PERIOD OF RECORD.--June 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 36.90 ft below land-surface datum, April 13, 1980; lowest, 54.05 ft below land-surface datum, December 25, 1990.

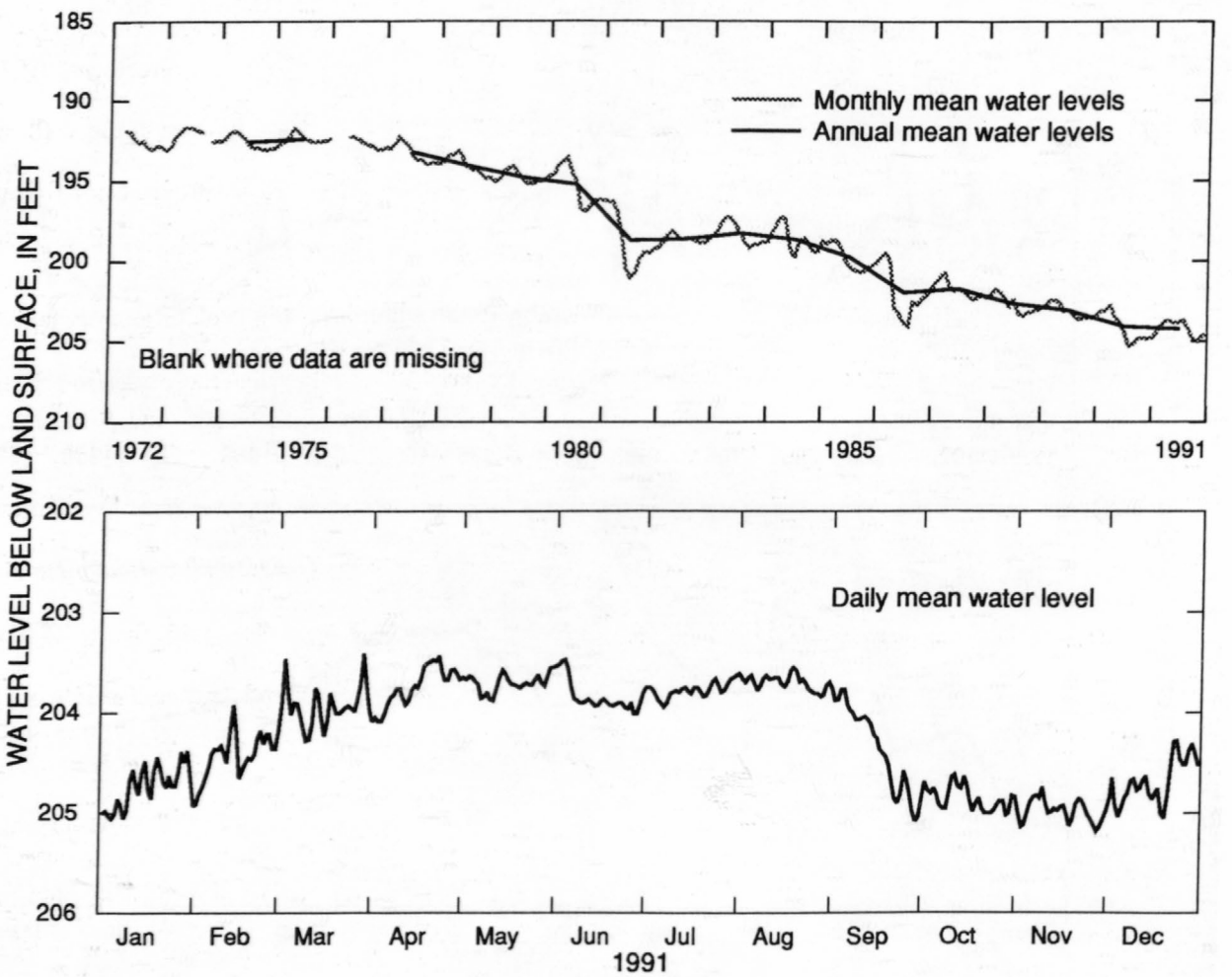


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	52.60	47.66	44.42	43.87	42.38	44.34	40.86	40.19	43.44	45.29	46.60	47.54
LOW	54.03	48.34	47.61	44.25	43.60	45.34	42.79	41.56	44.66	46.02	47.51	48.05
HIGH	48.74	47.03	43.45	43.46	41.11	42.45	39.40	39.55	42.12	44.43	46.10	46.98

CAL YR	1991		MEAN	44.91		HIGH	39.40		LOW	54.03		

Figure 35.--Water level in observation well 13J004, Mitchell County.

313146083491601 Local number, 15L020.
LOCATION.--Lat 31°31'46", long 83°49'16", Hydrologic Unit 03110204.
Owner: City of Sylvester.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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 420 ft.
REMARKS.--Well pumped and sounded July 19, 1978. Borehole geophysical survey conducted June 5, 1975.
PERIOD OF RECORD.--May 1972 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 191.5 ft below land-surface datum, May 17, 1973; lowest, 205.88 ft below land-surface datum, August 20, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	204.74	204.44	203.94	203.75	203.71	203.84	203.78	203.71	204.34	204.86	204.98	204.70
LOW	205.06	204.91	204.28	204.09	203.88	204.02	203.95	203.85	205.09	205.02	205.18	205.05
HIGH	204.38	203.92	203.41	203.44	203.55	203.48	203.64	203.56	203.78	204.62	204.75	204.28

CAL YR	1991		MEAN	204.23		HIGH	203.41		LOW	205.18		

Figure 36.--Water level in observation well 15L020, Worth County.

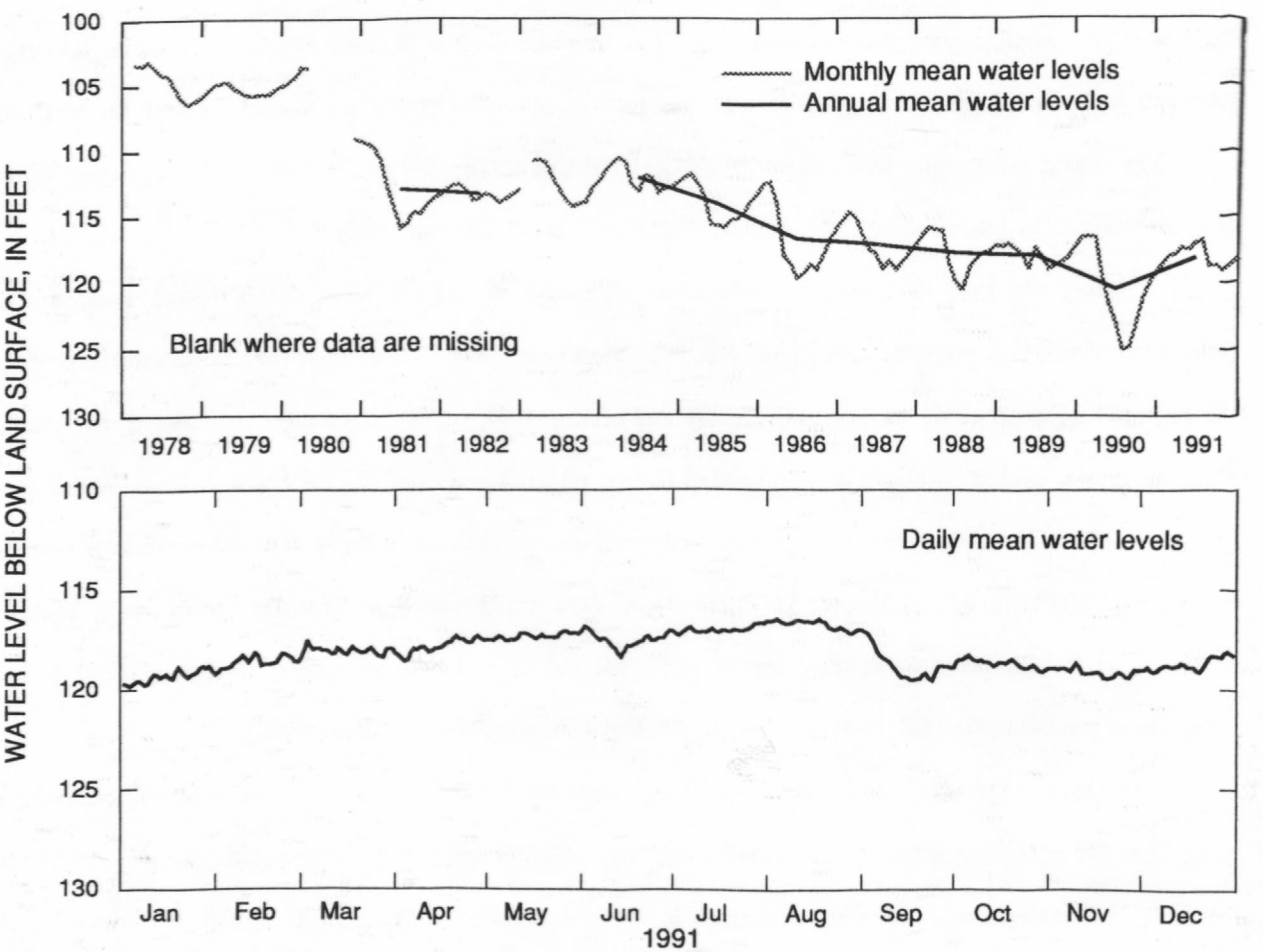
South-central area

The water level in the Upper Floridan aquifer in south-central Georgia is monitored in six wells; data from four of these wells are summarized in this report (fig. 27). Water levels in wells tapping the aquifer in this area are affected by variations in precipitation, evapotranspiration, and to a lesser degree, pumping (Krause, 1979). In the Valdosta area, water levels also are affected by streamflow (Krause, 1979). The water level generally is highest following the winter and spring rainy seasons, and lowest in the fall. During 1990, an estimated 72.7 Mgal/d was withdrawn from aquifers in south-central Georgia (Fanning and others, 1992), primarily from the Upper Floridan aquifer. Of this amount, about 7.47 Mgal/d was withdrawn in the Valdosta area. The annual mean water levels in well 18K049 in Tift County (fig. 37) and in well 18H016 in Cook County (fig. 38) were about 2.3 and about 1.2 ft higher, respectively, in 1991 than in 1990.

During October 1991, water levels were measured in 112 wells in the Valdosta area, and a potentiometric surface map was constructed (fig. 39). Most water levels were higher than those used to prepare the previous potentiometric surface map (Milby and others, 1991, p. 58). Increased recharge to the Upper Floridan aquifer caused by above-normal rainfall (fig. 5) resulted in substantial water-level rises. Withdrawal from the Upper Floridan aquifer has resulted in the development of small cones of depression around pumping centers near Valdosta, and at Moody Air Force Base. Other depressions in the water surface, such as those northwest of Valdosta and at Bemiss, appear to be anomalous and may have developed as a result of the influence of karst features (J.B. McConnell, U.S. Geological Survey, oral commun., 1992).

The Upper Floridan aquifer receives recharge from the Withlacoochee River north of Valdosta where water from the river flows directly into sinkholes and large solution openings into the aquifer (Krause, 1979). In this area, increased precipitation and streamflow in winter and early spring result in high ground-water levels. During most years, decreased precipitation and increased evapotranspiration in the summer results in low streamflow and correspondingly low water levels. However, because of above-normal rainfall in 1991, the water levels remained higher through the summer and did not decline until the fall (J.B. McConnell, U.S. Geological Survey, oral commun., 1992). This relation is illustrated on hydrographs for wells 19E009 (fig. 40) and 19F039 (fig. 41), where the annual mean water levels were about 9.5 and 11.0 ft higher in 1991 than in 1990, respectively.

312712082593301 Local number, 18K049.
LOCATION.--Lat 31°27'12", long 82°59'33", Hydrologic Unit 03110203.
Owner: U.S. Geological Survey, test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 620 ft, cased to 270 ft, open hole.
DATUM.--Altitude of land-surface datum is 330 ft.
REMARKS.--Borehole geophysical survey conducted March 18, 1978.
PERIOD OF RECORD.--March 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 102.70 ft below land-surface datum, May 14, 1978; lowest, 126.23 ft below land-surface datum, August 26, 1990.

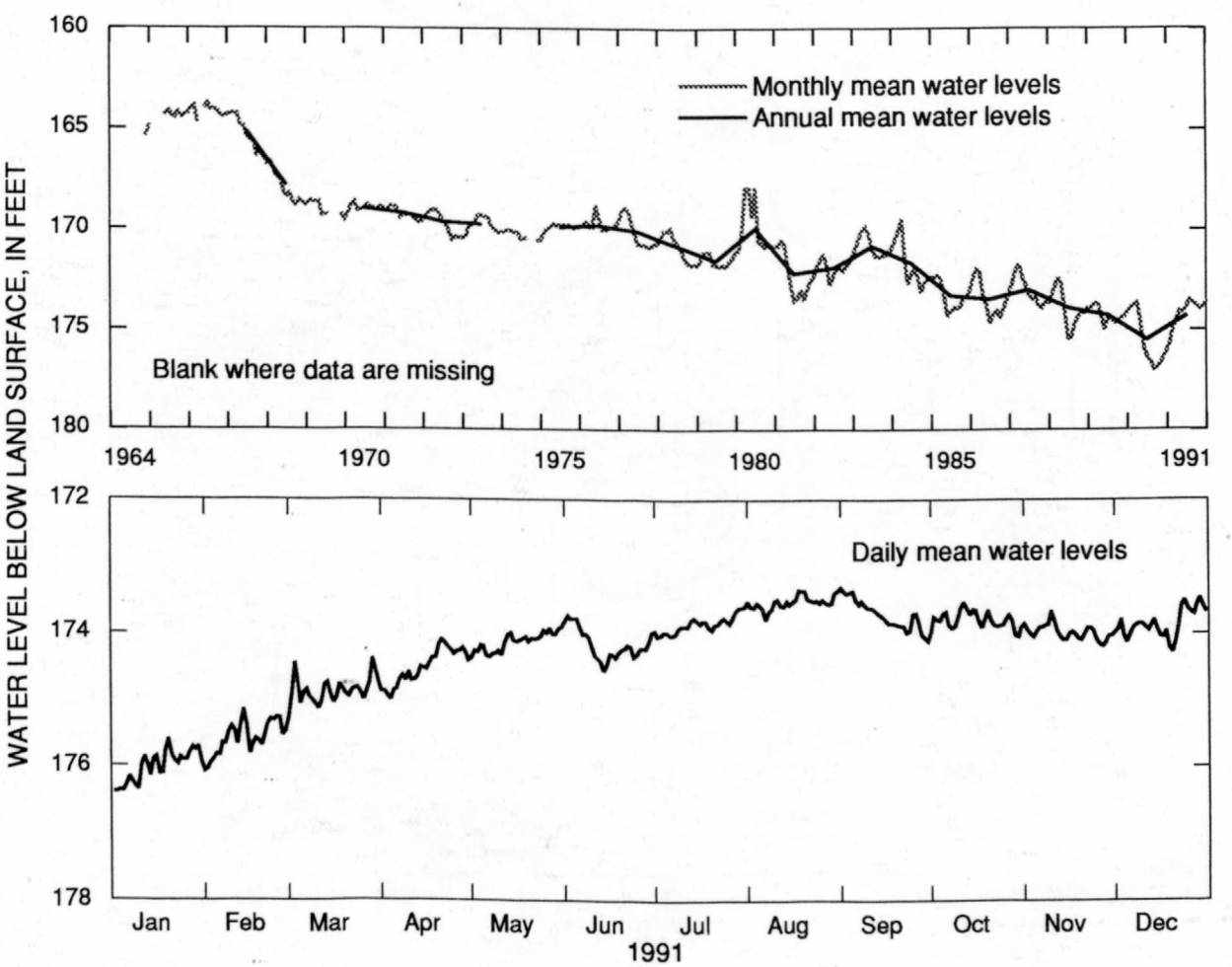


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	119.33	118.62	118.08	117.89	117.37	117.56	117.05	116.79	118.78	118.70	119.11	118.72
LOW	119.83	119.10	118.41	118.61	117.59	118.40	117.33	117.26	119.59	119.11	119.46	119.12
HIGH	118.83	118.19	117.56	117.37	117.09	116.88	116.70	116.49	117.14	118.32	118.69	118.13

CAL YR	1991		MEAN	118.16		HIGH	116.49		LOW	119.83		

Figure 37.--Water level in observation well 18K049, Tift County.

310813083260301 Local number, 18H016.
LOCATION.--Lat 31°08'13", long 83°26'03", Hydrologic Unit 03110203.
Owner: U.S. Geological Survey, Adel test well.
AQUIFER.--Upper Floridan 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: Top of recorder shelf, 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, 177.39 ft below land-surface datum, October 8, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	176.03	175.58	174.86	174.50	174.12	174.15	173.85	173.52	173.71	173.79	173.99	173.86
LOW	176.39	176.04	175.13	174.99	174.35	174.55	174.04	173.79	174.11	174.05	174.19	174.28
HIGH	175.60	175.15	174.38	174.09	173.89	173.72	173.59	173.34	173.36	173.53	173.66	173.46

CAL YR	1991		MEAN	174.32		HIGH	173.30		LOW	176.39		

Figure 38.--Water level in observation well 18H016, Cook County.

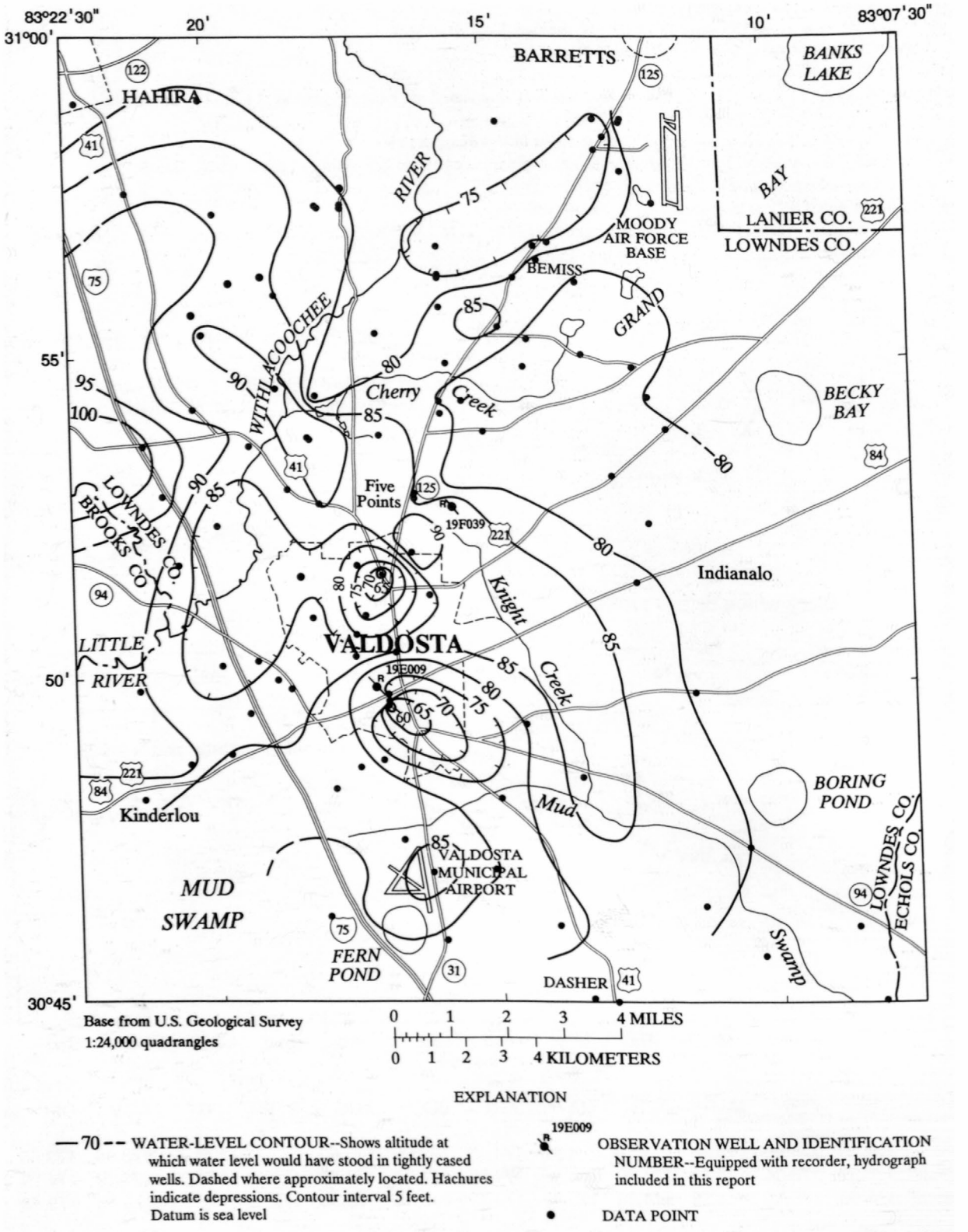
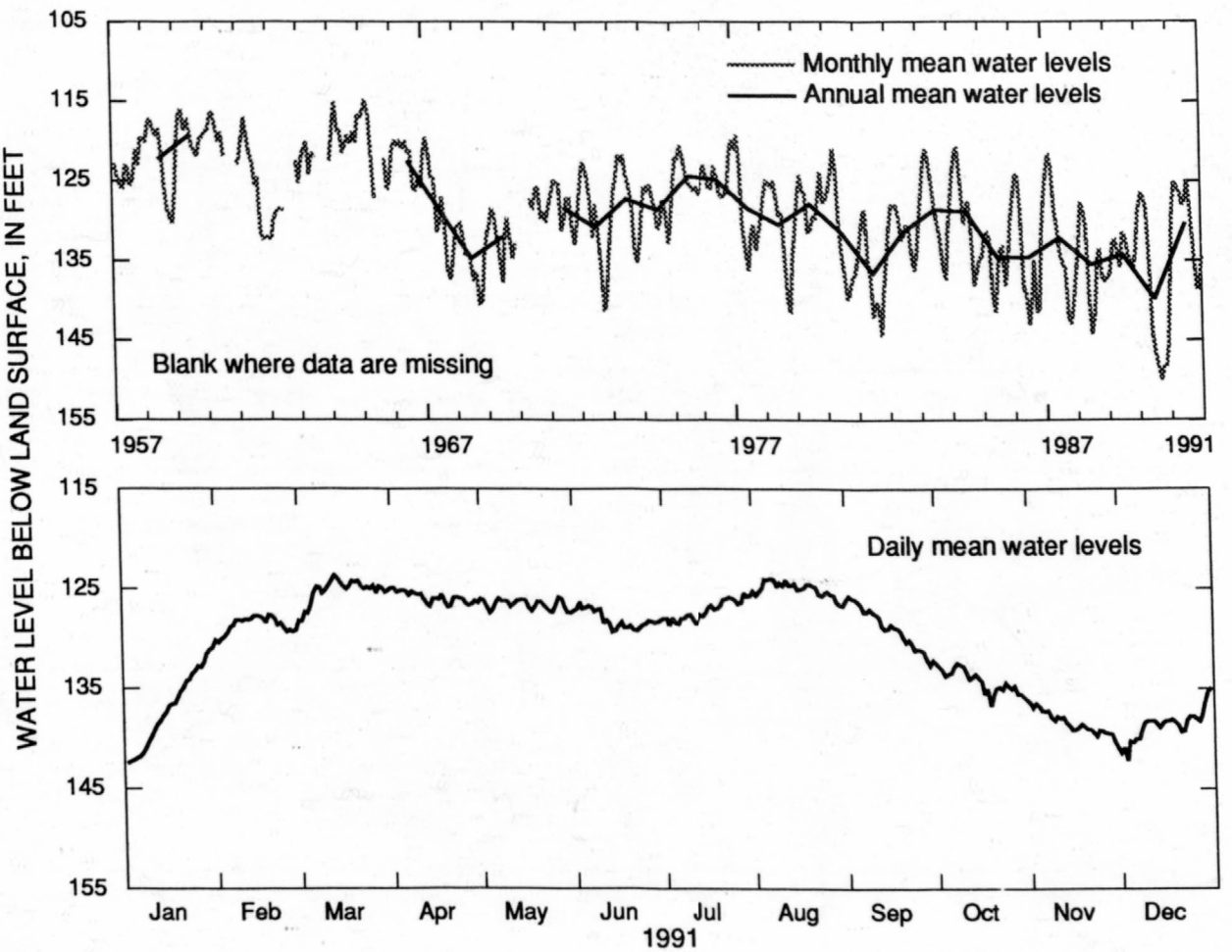


Figure 39.--Water level and locations of observation wells completed in the Upper Floridan aquifer in the Valdosta area, October 1991.

304949083165301 Local number, 19E009.
LOCATION.--Lat 30°49'51", long 83°16'58", Hydrologic Unit 03110202.
Owner: City of Valdosta.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Well pumped July 18, 1978; 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, 151.79 ft below land-surface datum, September 19, 1990.

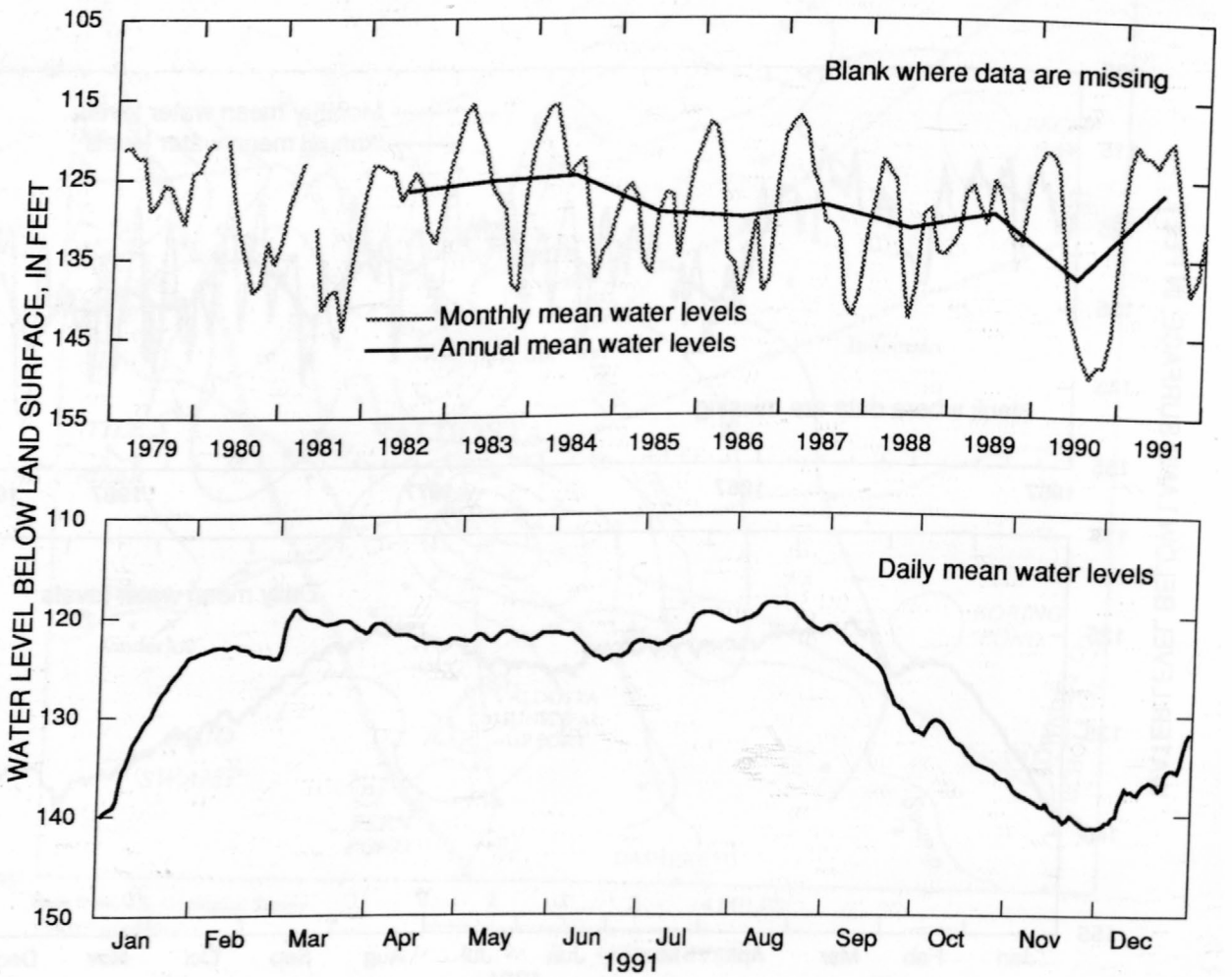


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	137.11	128.62	125.18	125.86	126.53	128.03	127.12	124.97	128.84	134.24	138.47	138.60
LOW	142.46	130.42	128.21	126.78	127.37	129.30	128.59	126.66	132.65	136.71	140.84	142.13
HIGH	130.92	127.62	123.62	124.86	125.81	126.32	125.34	123.91	125.67	132.42	136.41	134.92

CAL YR	1991		MEAN	130.31		HIGH	123.62		LOW	142.56		

Figure 40.--Water level in observation well 19E009, Lowndes County.

305241083154401 Local number, 19F039.
LOCATION.--Lat 30°52'41", long 83°15'46", Hydrologic Unit 03110203.
Owner: City of Valdosta, well 8.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused municipal supply well, diameter 16 in., depth 450 ft, cased to 350 ft, open hole.
DATUM.--Altitude of land-surface datum is 222 ft.
REMARKS.--Water levels for periods of missing record, June 5 and December 4-31, were estimated.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 114.28 ft below land-surface datum, April 9, 1984; lowest, 151.28 ft below land-surface datum, October 9, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	131.56	123.44	120.65	121.97	122.11	123.26	121.48	120.01	125.34	133.31	139.44	137.30
LOW	140.05	124.18	123.25	122.80	122.57	124.65	123.20	121.62	131.28	136.40	141.30	141.16
HIGH	123.93	122.79	119.14	120.61	121.53	121.76	119.80	118.83	121.23	130.60	136.88	131.72

CAL YR	1991		MEAN	126.67		HIGH	118.83		LOW	141.30		

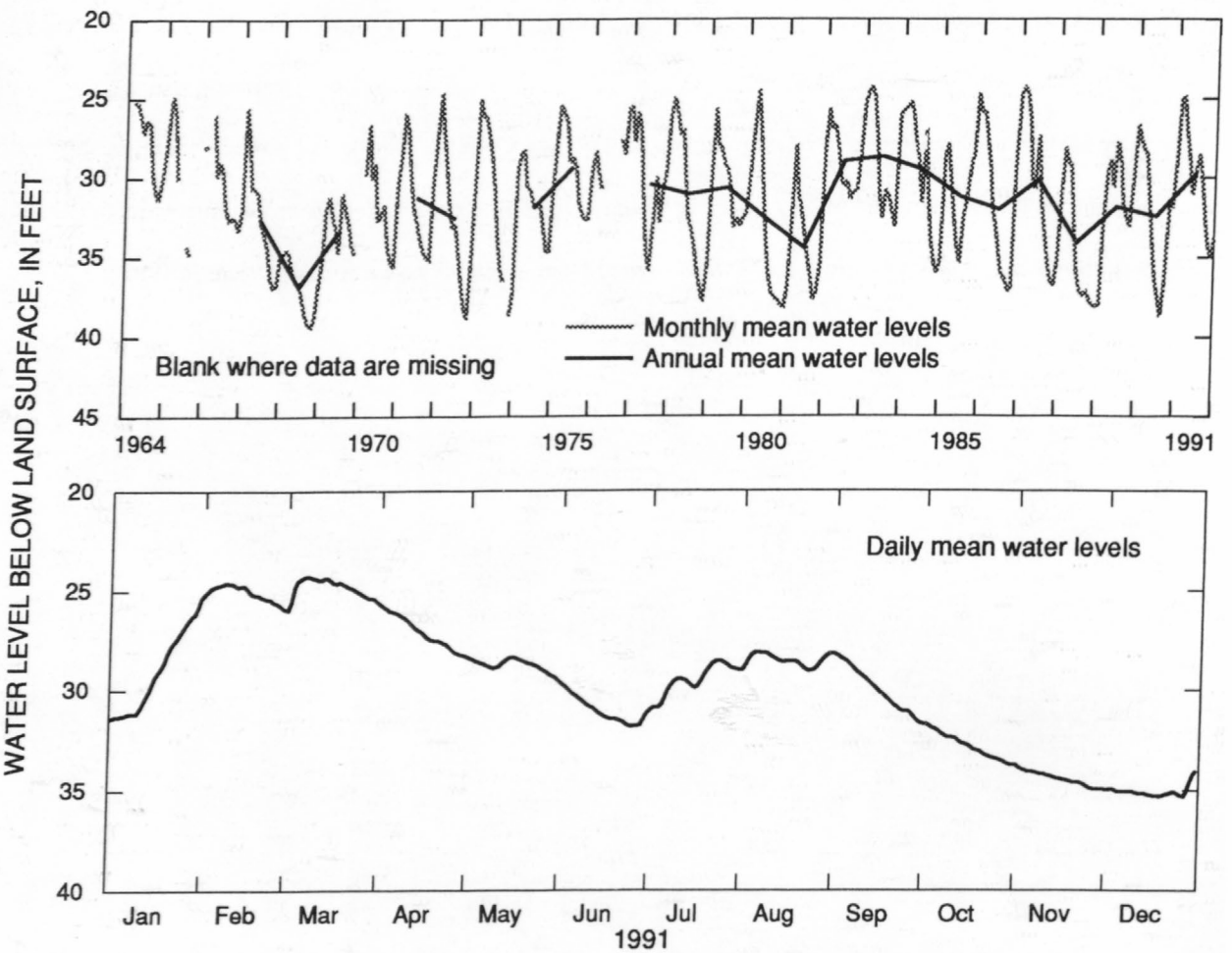
Figure 41.--Water level in observation well 19F039, Lowndes County.

East-central area

The water level in the Upper Floridan aquifer in east-central Georgia is monitored in three wells; data from these wells are summarized in this report (figs. 27; 42 - 44). During 1990, an estimated 11.5 Mgal/d of water was withdrawn from aquifers in this area (Fanning and others, 1992), primarily from the Upper Floridan aquifer. Well 21T001 (fig. 42) in Laurens County is located near the recharge area for the Upper Floridan aquifer, and the water level in this well (fig. 42) responds primarily to seasonal fluctuations in precipitation (R.E. Krause, U.S. Geological Survey, oral commun., 1992). The annual mean water level in this well was about 2.8 ft higher in 1991 than in 1990.

A decline in water levels in Montgomery and Toombs Counties during the past 25 years is shown on the hydrographs for well 25Q001 in Montgomery County (fig. 43) and well 26R001 in Toombs County (fig. 44). The 1991 annual mean water levels in these wells ranged from about 0.7 to 1.8 ft higher than in 1990.

322652083033001 Local number, 21T001.
LOCATION.--Lat 32°27'06", long 83°03'28", Hydrologic Unit 03070102.
Owner: Danny Hogan.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 4 in., depth 123 ft, cased to 89 ft, open hole.
DATUM.--Altitude of land-surface datum is 259 ft.
REMARKS.--Borehole geophysical survey conducted November 1973. Well pumped and sampled by Georgia Geologic Survey, December 19, 1991.
PERIOD OF RECORD.--March 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.62 ft below land-surface datum, January 26, 1987; lowest, 39.58 ft below land-surface datum, November 12, 1968.

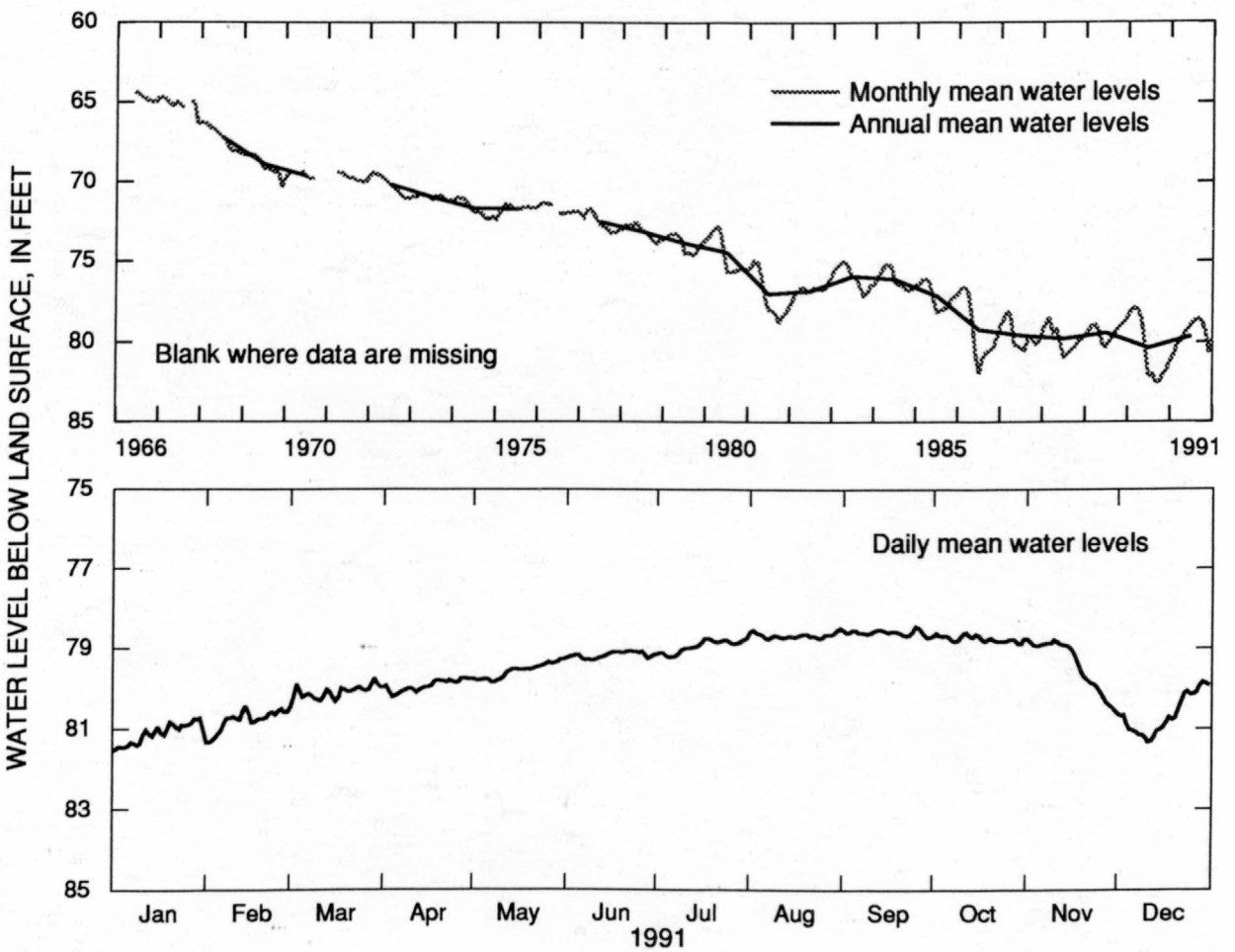


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	29.09	25.07	24.81	27.08	28.76	31.03	29.54	28.54	29.97	32.75	34.40	35.04
LOW	31.37	25.94	25.60	28.34	29.51	31.82	30.91	29.08	31.64	33.70	34.93	35.29
HIGH	25.34	24.58	24.26	25.80	28.36	29.79	28.55	28.12	28.30	31.69	33.83	34.01

CAL YR	1991		MEAN	29.70		HIGH	24.26		LOW	35.29		

Figure 42.--Water level in observation well 21T001, Laurens County.

320226082301101 Local number, 25Q001.
LOCATION.--Lat 32°02'25", long 82°30'05", Hydrologic Unit 03070106.
Owner: Montgomery County Board of Education.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 6 in., depth 536 ft, cased to 421 ft, open hole.
DATUM.--Altitude of land-surface datum is 190 ft.
REMARKS.--Borehole geophysical survey conducted April 22, 1966.
PERIOD OF RECORD.--June 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 64.13 ft below land-surface datum, June 10, 1966; lowest, 82.94 ft below land-surface datum, October 7, 1990.

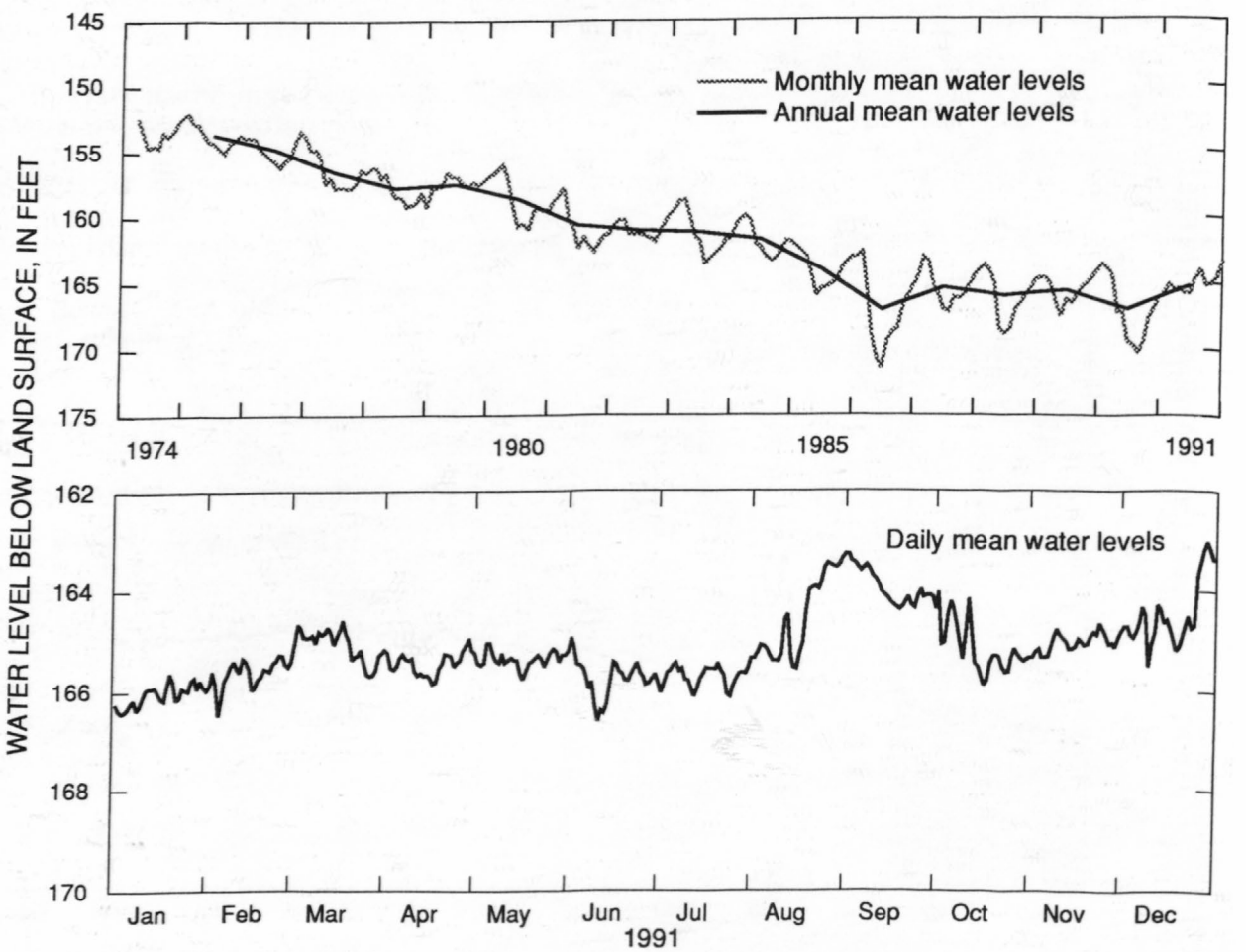


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	81.11	80.79	80.10	79.94	79.57	79.16	78.93	78.66	78.59	78.74	79.38	80.66
LOW	81.50	81.34	80.32	80.21	79.84	79.28	79.20	78.75	78.72	78.88	80.54	81.34
HIGH	80.73	80.43	79.75	79.75	79.26	79.05	78.72	78.49	78.44	78.60	78.79	79.84

CAL YR	1991		MEAN	79.63		HIGH	78.44		LOW	81.54		

Figure 43.--Water level in observation well 25Q001, Montgomery County.

321302082243601 Local number, 26R001.
LOCATION.--Lat 32°13'02", long 82°24'36", Hydrologic Unit 03070107.
Owner: City of Vidalia, well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled municipal supply well, diameter 12 in., depth 1,000 ft, cased to 720 ft, open hole.
DATUM.--Altitude of land-surface datum is 285 ft.
REMARKS.--None.
PERIOD OF RECORD.--April 1974 to current.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 151.64 ft below land-surface datum, April 15, 1974; lowest, 171.94 ft below land-surface datum, July 10, 1986.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	166.06	165.65	165.09	165.44	165.37	165.74	165.72	164.58	163.91	165.10	165.03	164.47
LOW	166.43	166.49	165.70	165.87	165.78	166.63	166.12	165.55	164.38	165.87	165.31	165.50
HIGH	165.63	165.28	164.60	164.96	165.04	164.95	165.44	163.33	163.27	164.01	164.64	163.01

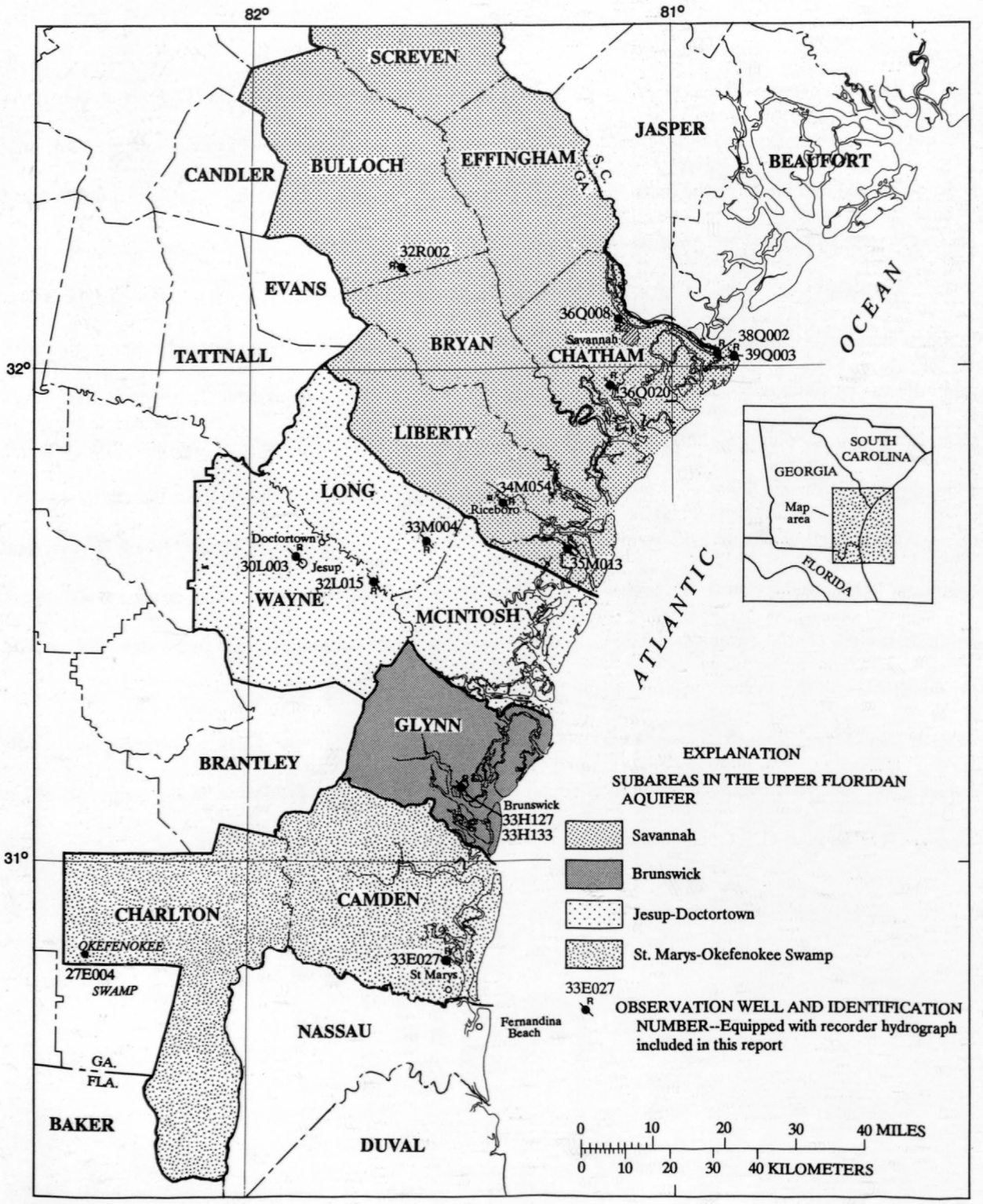
CAL YR	1991		MEAN	165.18		HIGH	163.01		LOW	166.63		

Figure 44.--Water level in observation well 26R001, Toombs County.

Coastal area

The water level in the Upper Floridan aquifer in the coastal area is monitored in 22 wells; data from 14 of these wells are summarized in this report (figs. 45; 46 - 59). Because the Upper Floridan aquifer in this area is deeply buried and far from the outcrop area, the ground-water level is influenced primarily by pumping and not by recharge from local precipitation (Clarke and others, 1990).

In this area and adjacent parts of Florida and South Carolina, the potentiometric surface of the Upper Floridan aquifer is characterized by cones of depression that result from large ground-water withdrawal, primarily in the Savannah, Jesup-Doctortown, Brunswick, and St Marys, Ga.-Fernandina Beach, Fla., areas (R.E. Krause, oral commun., 1992). Pumpage in the coastal area of Georgia in 1990 was about 331 Mgal/d, about 69 percent of which was used for industrial purposes (Fanning and others, 1992). In the coastal area of Georgia, nearly all of the ground-water withdrawal is from the Upper Floridan aquifer (R.E. Krause, oral commun., 1992). In this report, the coastal area is divided into the following four subareas on the basis of major pumping centers (1) the Savannah subarea; (2) the Jesup-Doctortown subarea; (3) the Brunswick subarea; and (4) the St Marys-Okefenokee Swamp subarea (fig. 45). Within a subarea, hydrographs for wells have similar water-level changes. Industrial shutdowns, during which the amount of ground-water withdrawals are greatly reduced, are indicated by sharp water level rises on hydrographs from wells located in the same hydrologic subarea (R.E. Krause, U.S. Geological Survey, oral commun., 1992).



Base from U.S. Geological Survey
State base maps

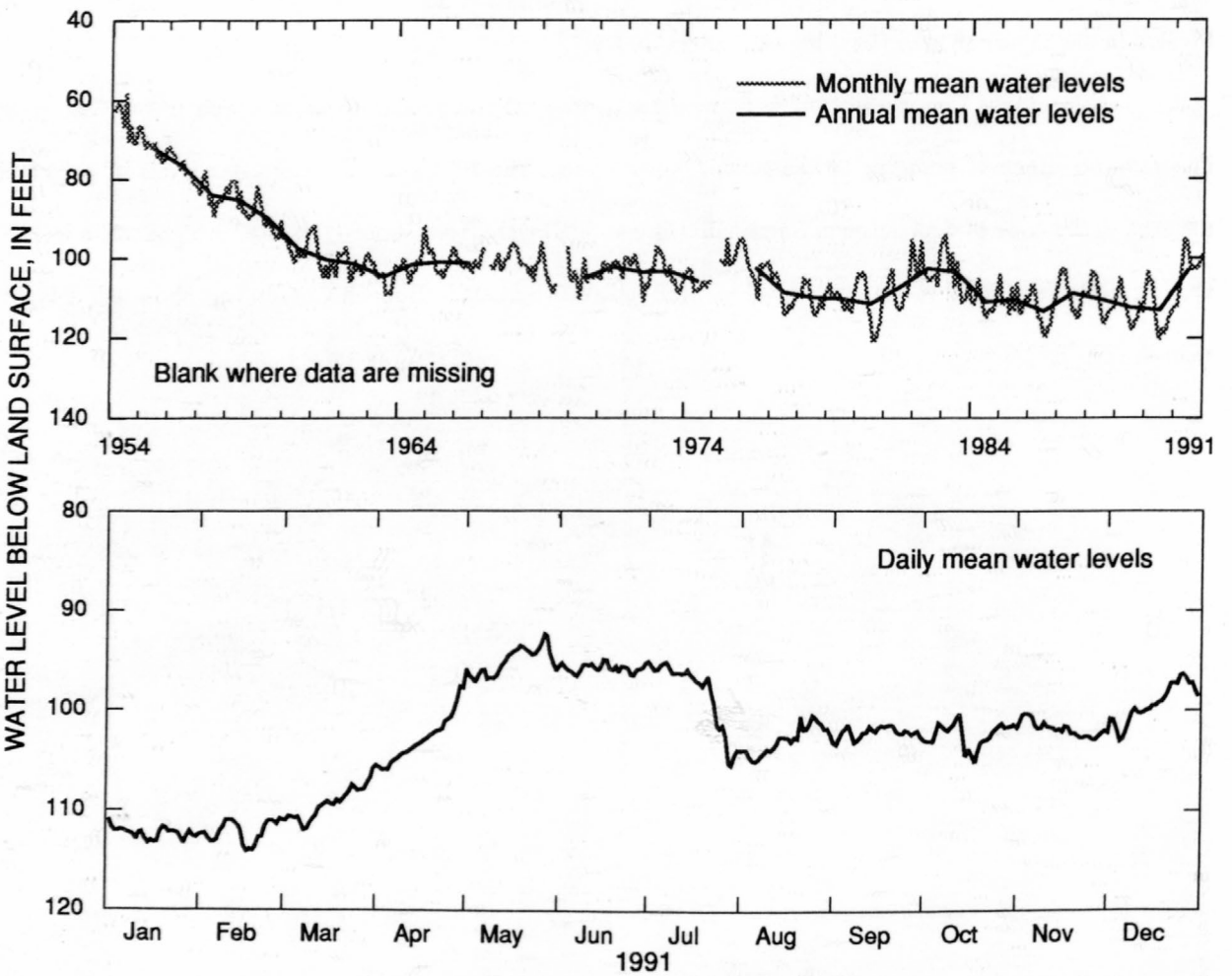
Figure 45.--Subareas and locations of observation wells completed in the Upper Floridan aquifer in the coastal area.

Savannah subarea

The water level in the Upper Floridan aquifer in the Savannah subarea is monitored in 11 wells; data from seven of these wells are summarized in this report (figs. 45, 46 - 52). In this subarea, the water level in the Upper Floridan aquifer mainly is affected by pumping for municipal and industrial uses and as a result of this pumping, a cone of depression has developed in the potentiometric surface at Savannah (R.E. Krause, U.S. Geological Survey, oral commun., 1992). In 1990, withdrawal from the Floridan aquifer system exceeded 132.6 Mgal/d in the Savannah area (Fanning and others, 1992).

Hydrographs for observation wells near the center of pumping in Savannah, and in outlying areas, illustrate the effects of pumping on the ground-water levels. The 1991 annual mean water levels in wells near the area of the cone of depression at Savannah (figs. 46 - 49) were from about 1.9 to 10.2 ft higher than in 1990. During 1991, the annual mean water level in well 32R002 (fig. 50) in Bulloch County was about 0.8 ft higher than in 1990.

320530081085001 Local number, 36Q008.
LOCATION.--Lat 32°05'30", long 81°08'50", Hydrologic Unit 03060204.
Owner: Layne-Atlantic Co.
INSTRUMENTATION.--Analog recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 4 in., depth 406 ft, cased to 250 ft, open hole.
DATUM.--Altitude of land-surface datum is 9.91 ft.
REMARKS.--Water levels for period of missing record, April 7-22, 1991, were estimated.
PERIOD OF RECORD.--February 1954 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.17 ft below land-surface datum, July 11, 1954; lowest, 124.40 ft below land-surface datum, August 30, 1980.

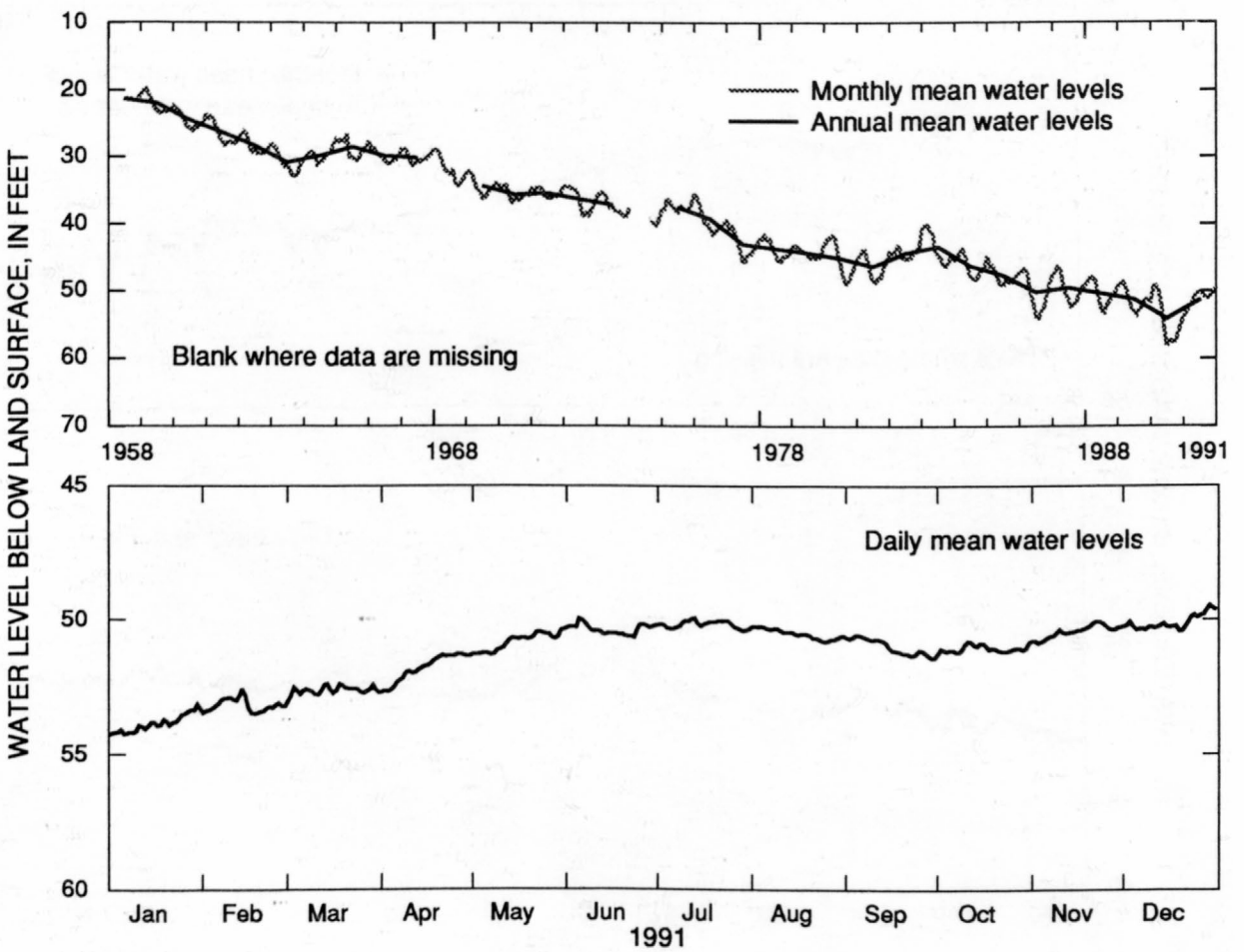


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	112.24	112.16	109.35	102.98	95.09	95.78	98.28	102.97	102.23	102.52	101.92	99.44
LOW	113.22	114.05	111.90	105.93	97.20	96.59	105.50	105.14	103.45	105.25	102.96	103.06
HIGH	110.86	110.81	105.84	97.65	92.39	94.90	95.24	100.58	101.44	100.49	100.40	96.37

CAL YR	1991		MEAN	102.86		HIGH	92.39		LOW	114.05		

Figure 46.--Water level in observation well 36Q008, Chatham County.

320021081124801 Local number, 36Q020.
LOCATION.--Lat 32°00'18", long 81°12'48", Hydrologic Unit 03060204.
Owner: H. J. Morrison.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 3 in., depth 365 ft, cased to 330 ft, open hole.
DATUM.--Altitude of land-surface datum is 13 ft.
REMARKS.--Borehole geophysical survey, May 7, 1985. Water levels for periods of missing record, January 6-28, May 25 to June 23, and July 11-15, were estimated.
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, recorded, 58.56 ft below land-surface datum, July 12, 1990, but may have been lower during period of estimated record from July 13-22, 1990.

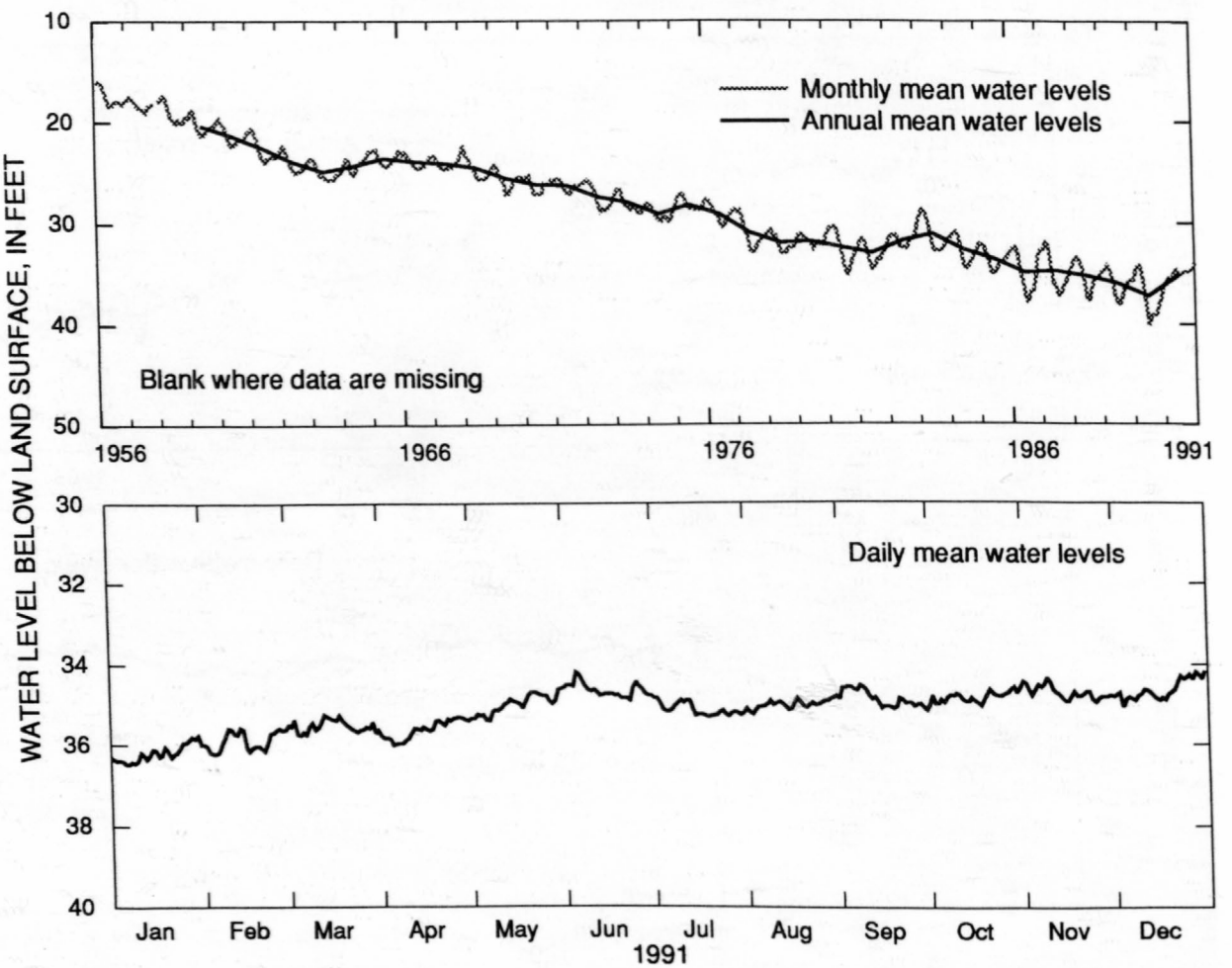


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	53.86	53.19	52.65	51.81	50.83	50.35	50.16	50.50	50.98	51.08	50.44	50.11
LOW	54.24	53.53	52.87	52.68	51.31	50.66	50.39	50.81	51.42	51.22	50.88	50.42
HIGH	53.15	52.59	52.42	51.27	50.34	49.94	49.93	50.23	50.55	50.82	50.06	49.47

CAL YR	1991		MEAN	51.32		HIGH	49.47		LOW	54.26		

Figure 47.--Water level in observation well 36Q020, Chatham County.

320202080541201 Local number, 38Q002.
LOCATION.--Lat 32°02'01", long 80°54'11", Hydrologic Unit 03060204.
Owner: U.S. Department of the Interior, National Park Service, test well 6.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Borehole geophysical survey conducted June 16, 1961.
PERIOD OF RECORD.--February 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.00 ft below land-surface datum, March 5, 1956; lowest, 40.69 ft below land-surface datum, July 16, 1990.

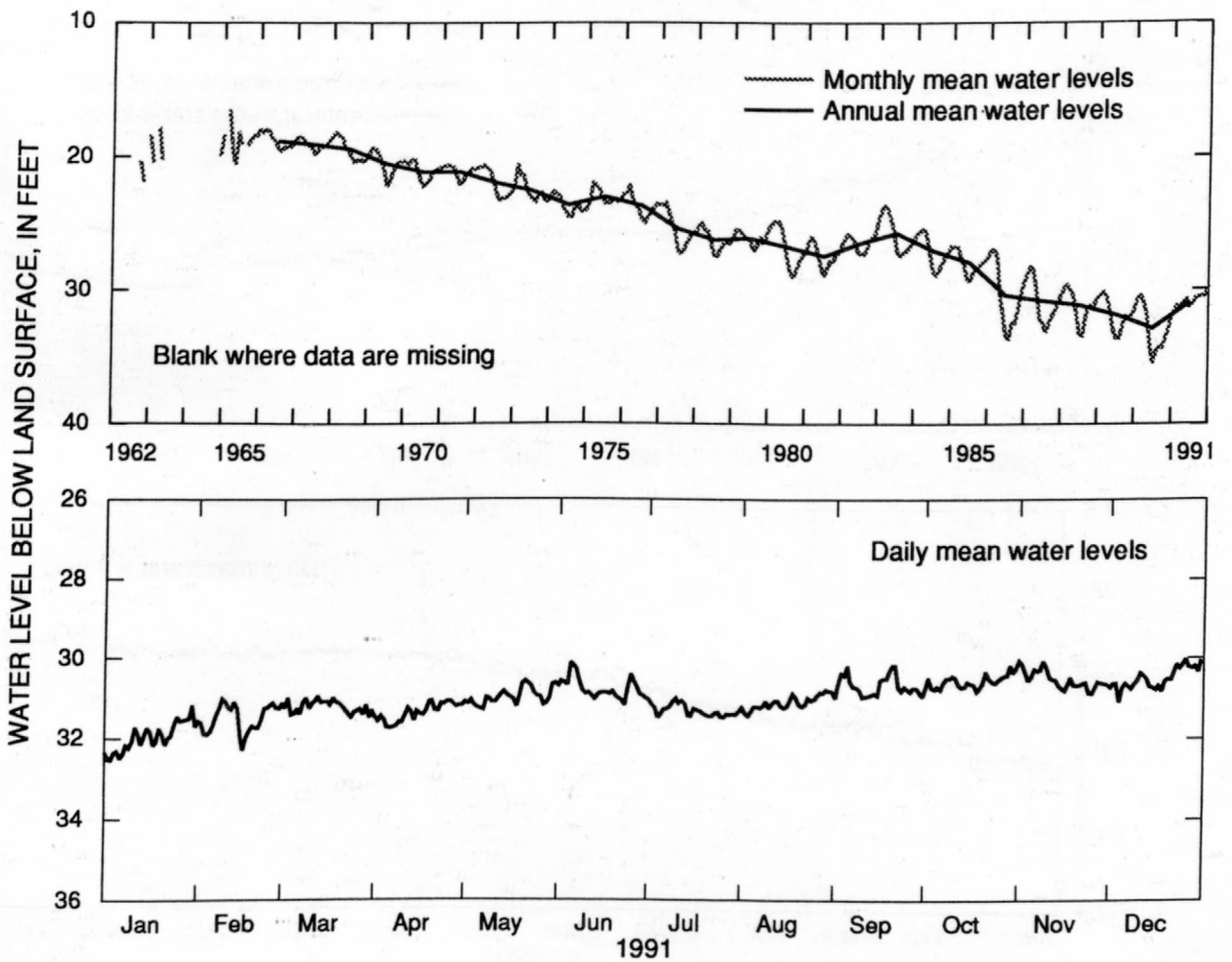


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	36.19	35.89	35.53	35.62	35.00	34.65	35.15	35.02	34.87	34.81	34.70	34.63
LOW	36.46	36.22	35.76	36.01	35.41	34.91	35.32	35.27	35.14	35.03	34.94	35.07
HIGH	35.76	35.57	35.25	35.31	34.61	34.21	34.84	34.80	34.53	34.56	34.33	34.17

CAL YR	1991		MEAN	35.17		HIGH	34.17		LOW	36.46		

Figure 48.--Water level in observation well 38Q002, Chatham County.

320122080510204 Local number, 39Q003.
LOCATION.--Lat 32°01'22", long 80°51'01", Hydrologic Unit 03060204.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Borehole geophysical survey conducted January 24, 1962. Water levels for period of missing record, September 19-22, were estimated.
PERIOD OF RECORD.--May 1962 to current year; continuous record, September 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.80 ft below land-surface datum, April 11, 1963; lowest, 36.07 ft below land-surface datum, July 11-12, 1990.

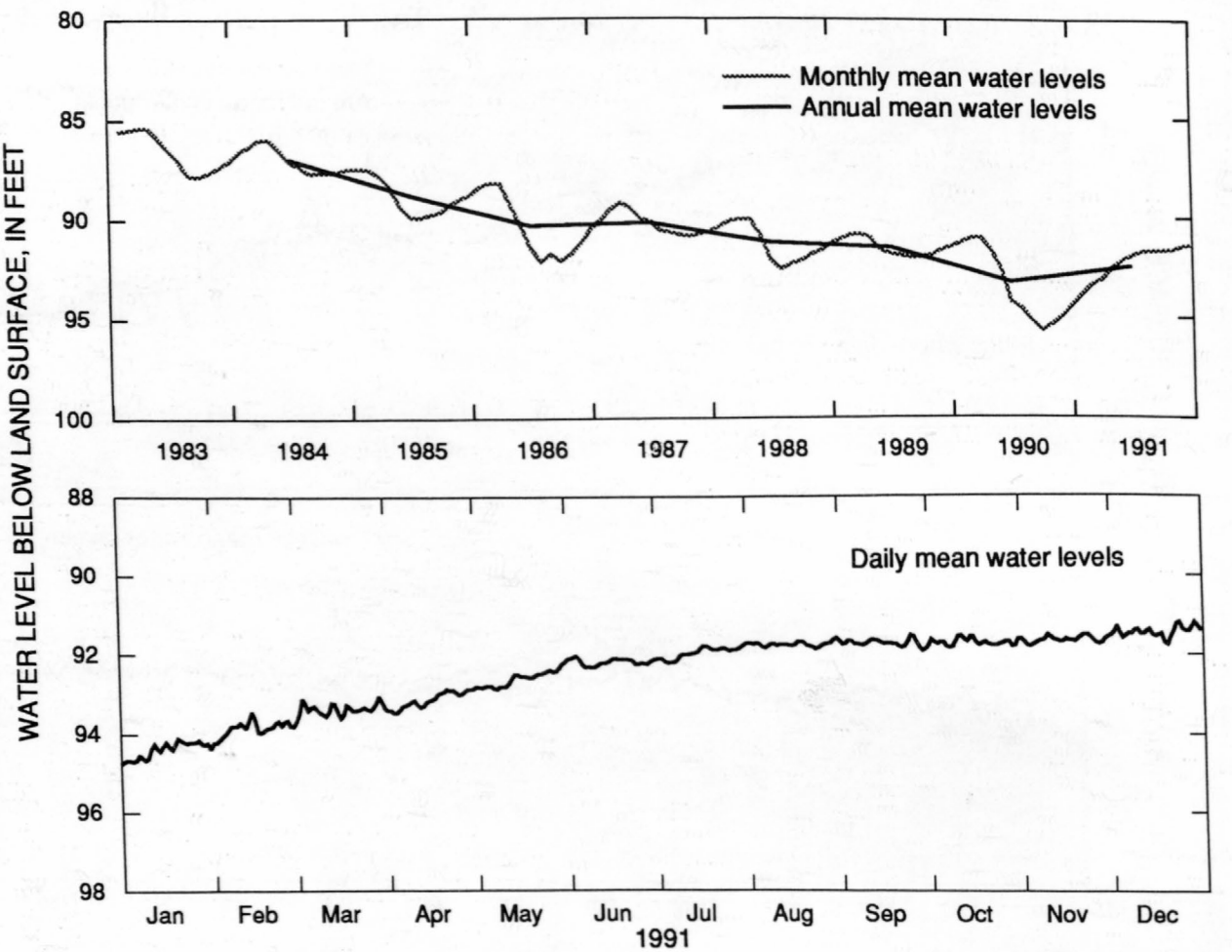


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	31.96	31.51	31.23	31.37	30.96	30.74	31.29	31.08	30.67	30.57	30.52	30.50
LOW	32.53	32.30	31.51	31.76	31.28	31.14	31.46	31.43	30.96	30.82	30.88	31.09
HIGH	31.17	31.01	30.96	31.07	30.56	30.11	30.98	30.78	30.17	30.18	30.08	30.03

CAL YR	1991		MEAN	31.03		HIGH	30.03		LOW	32.53		

Figure 49.--Water level in observation well 39Q003, Chatham County.

321240081411501 Local number, 32R002.
LOCATION.--Lat 32°12'40", long 81°41'15", Hydrologic Unit 03060202.
Owner: Georgia Geologic Survey, Bulloch South test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 804 ft, cased to 420 ft, open hole.
DATUM.--Altitude of land-surface datum is 120 ft.
REMARKS.--Borehole geophysical survey and well sounded August 1982. Water levels for periods of missing record, January 20-21, January 27-31, February 3-8, and July 1-24, were estimated.
PERIOD OF RECORD.--February 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 85.08 ft below land-surface datum, April 24, 1983; lowest, 95.94 ft below land-surface datum, October 8, 1990.

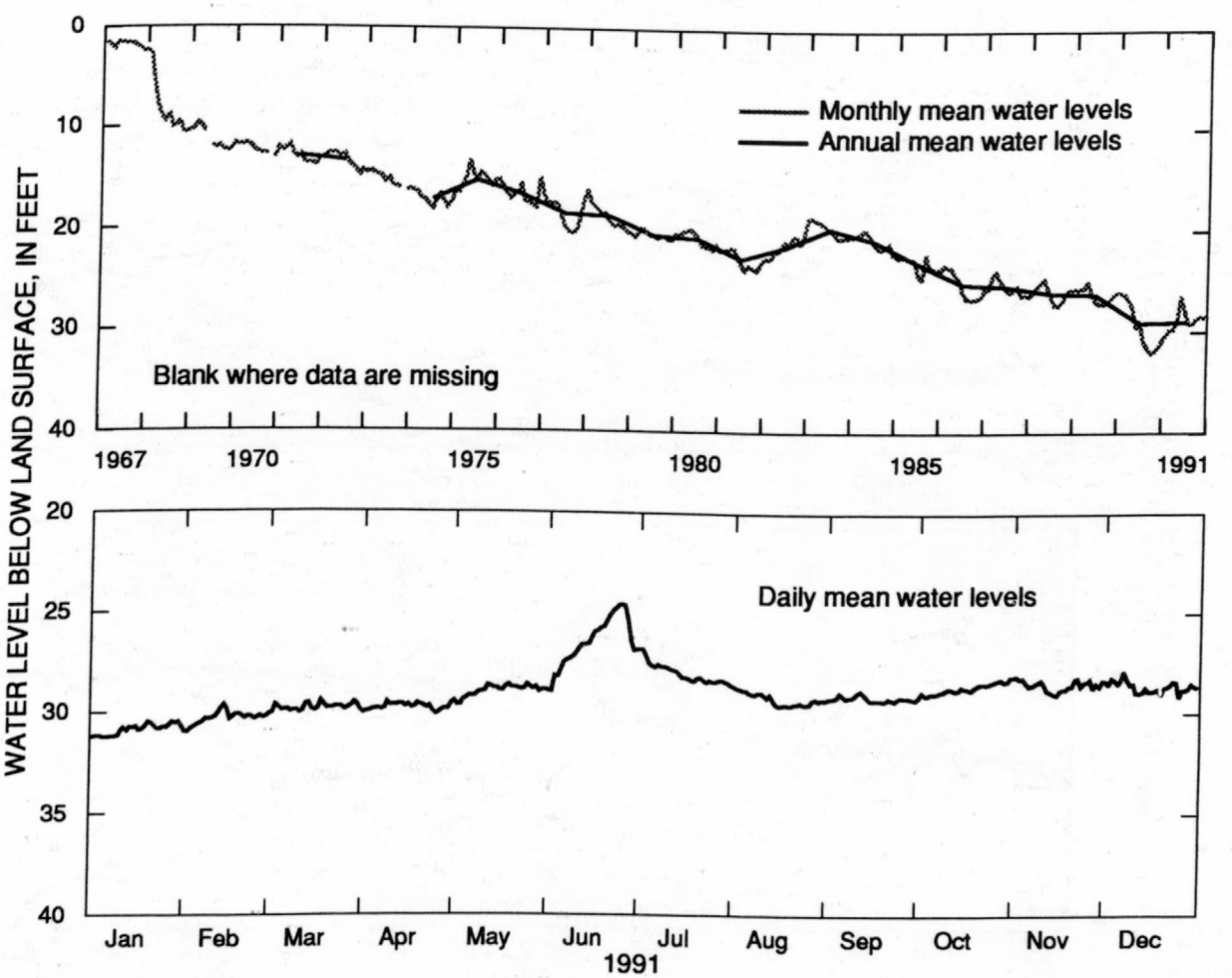


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	94.38	93.83	93.35	93.12	92.59	92.17	91.94	91.71	91.67	91.65	91.60	91.42
LOW	94.69	94.20	93.58	93.46	92.87	92.31	92.19	91.82	91.85	91.78	91.74	91.73
HIGH	94.09	93.42	93.04	92.86	92.18	92.02	91.72	91.55	91.47	91.48	91.46	91.18

CAL YR	1991		MEAN	92.44		HIGH	91.18		LOW	94.74		

Figure 50.--Water level in observation well 32R002, Bulloch County.

314343081251901 Local number, 34M054.
LOCATION.--Lat 31°43'43", long 81°25'19", Hydrologic Unit 03060204.
Owner: U.S. Geological Survey, test well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Well pumped July 11, 1979; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 15, 1976. Water levels for periods of missing record, May 9-24, June 4-23, July 5-21, and September 15 to October 27, were estimated.
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, 32.34 ft below land-surface datum, November 14, 1990.

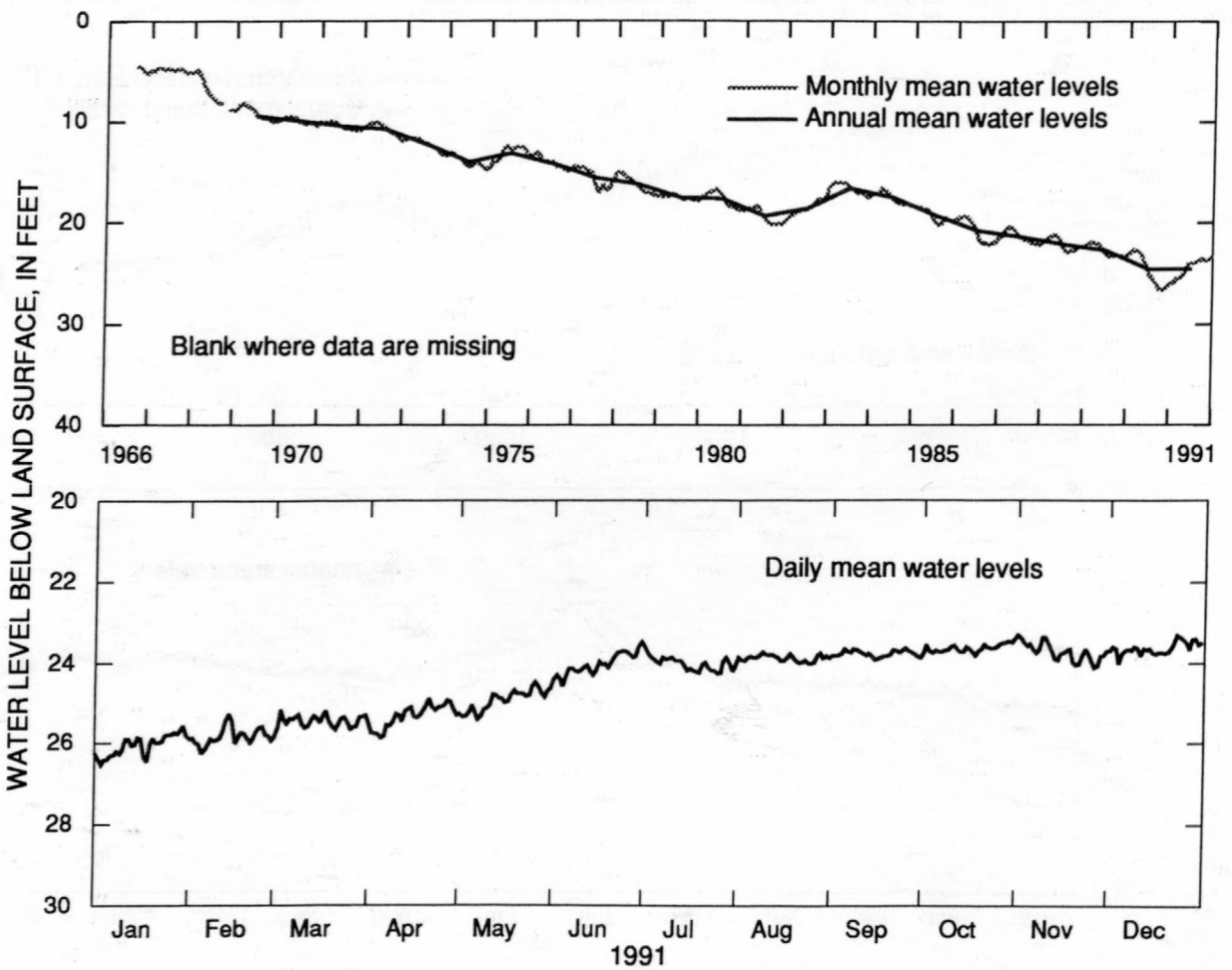


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	30.83	30.29	29.77	29.75	28.93	26.44	27.96	29.21	29.17	28.68	28.52	28.63
LOW	31.20	30.93	30.01	30.07	29.60	28.91	28.55	29.58	29.33	29.04	29.05	29.17
HIGH	30.43	29.62	29.41	29.49	28.59	24.53	26.77	28.71	28.82	28.14	28.11	27.87

CAL YR	1991		MEAN	29.01		HIGH	24.53		LOW	31.20		

Figure 51.--Water level in observation well 34M054, Liberty County.

313823081154201 Local number, 35M013.
LOCATION.--Lat 31°38'23", long 81°15'42", Hydrologic Unit 03060204.
Owner: U.S. Department of the Interior, Fish and Wildlife Service.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Well pumped August 3, 1976; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 16, 1976. Water levels for period of missing record, February 7-21, August 27 to September 3, were estimated.
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, 26.88 ft below land-surface datum, November 14, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	26.05	25.83	25.46	25.33	24.94	24.06	24.05	23.89	23.76	23.61	23.69	23.61
LOW	26.53	26.25	25.67	25.87	25.42	24.60	24.29	24.03	23.92	23.80	24.09	23.99
HIGH	25.57	25.27	25.17	24.89	24.50	23.50	23.78	23.74	23.62	23.39	23.33	23.29

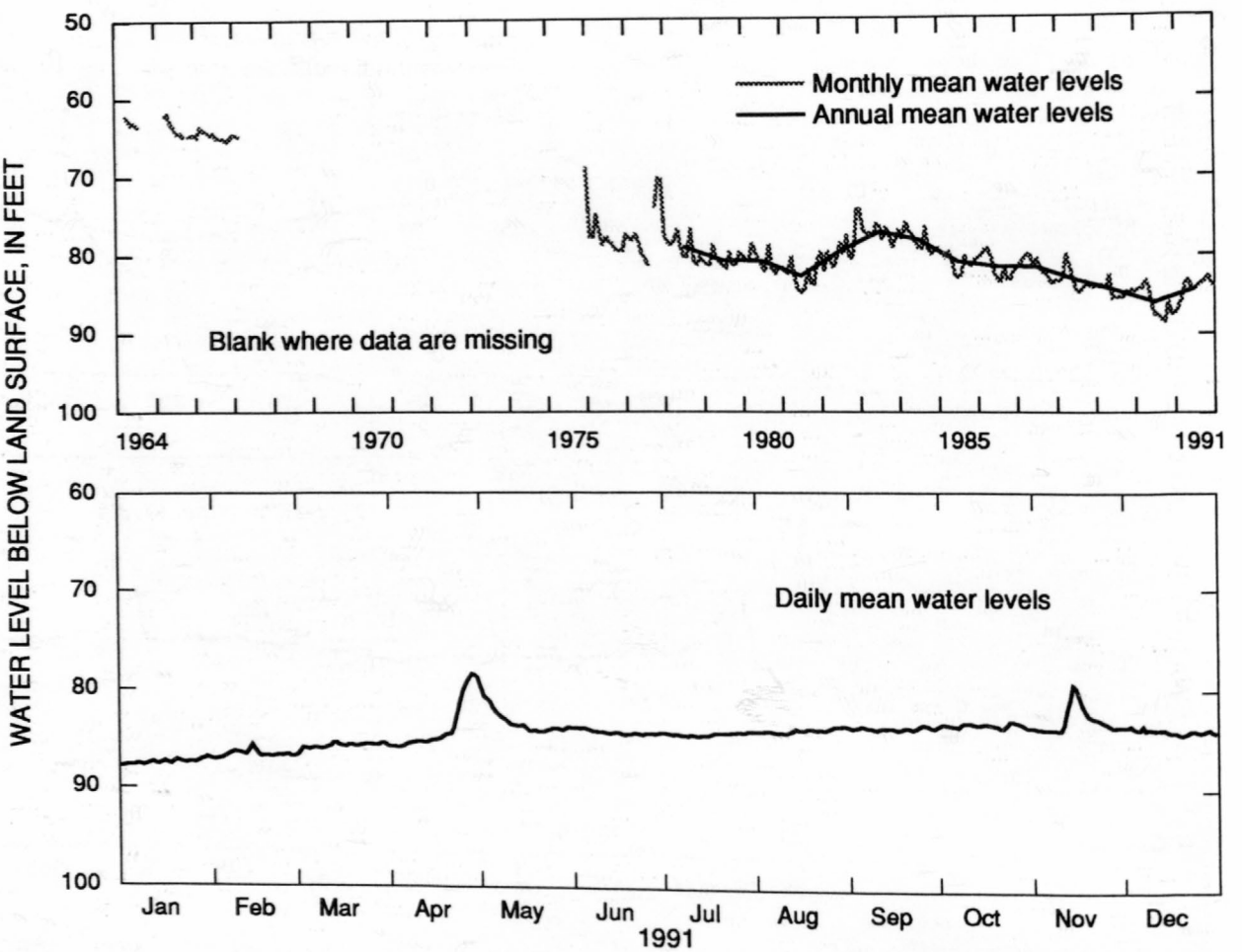
CAL YR	1991		MEAN	24.52		HIGH	23.28		LOW	26.53		

Figure 52.--Water level in observation well 35M013, McIntosh County.

Jesup-Doctortown subarea

The water level in the Upper Floridan aquifer in the Jesup-Doctortown subarea is monitored in three wells, all of which are summarized in this report (figs. 45; 53 - 55). In this area, water levels in wells tapping the aquifer are affected mainly by industrial pumping at Doctortown, near Jesup (R.E. Krause, U.S. Geological Survey, oral commun., 1992). In 1991, pumpage averaged about 71.3 Mgal/d at Doctortown (Fanning and others, 1992). The 1991 mean water levels in the three wells were from about 0.8 to 1.7 ft higher than in 1990.

313701081543501 Local number, 30L003.
LOCATION.--Lat 31°37'01", long 81°54'34", Hydrologic Unit 03070106.
Owner: City of Jesup Housing Authority.
INSTRUMENTATION.--Analog recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 4 in., depth 584 ft, cased to 472 ft, open hole.
DATUM.--Altitude of land-surface datum is 107 ft.
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, 88.91 ft below land-surface datum, October 7, 1990.

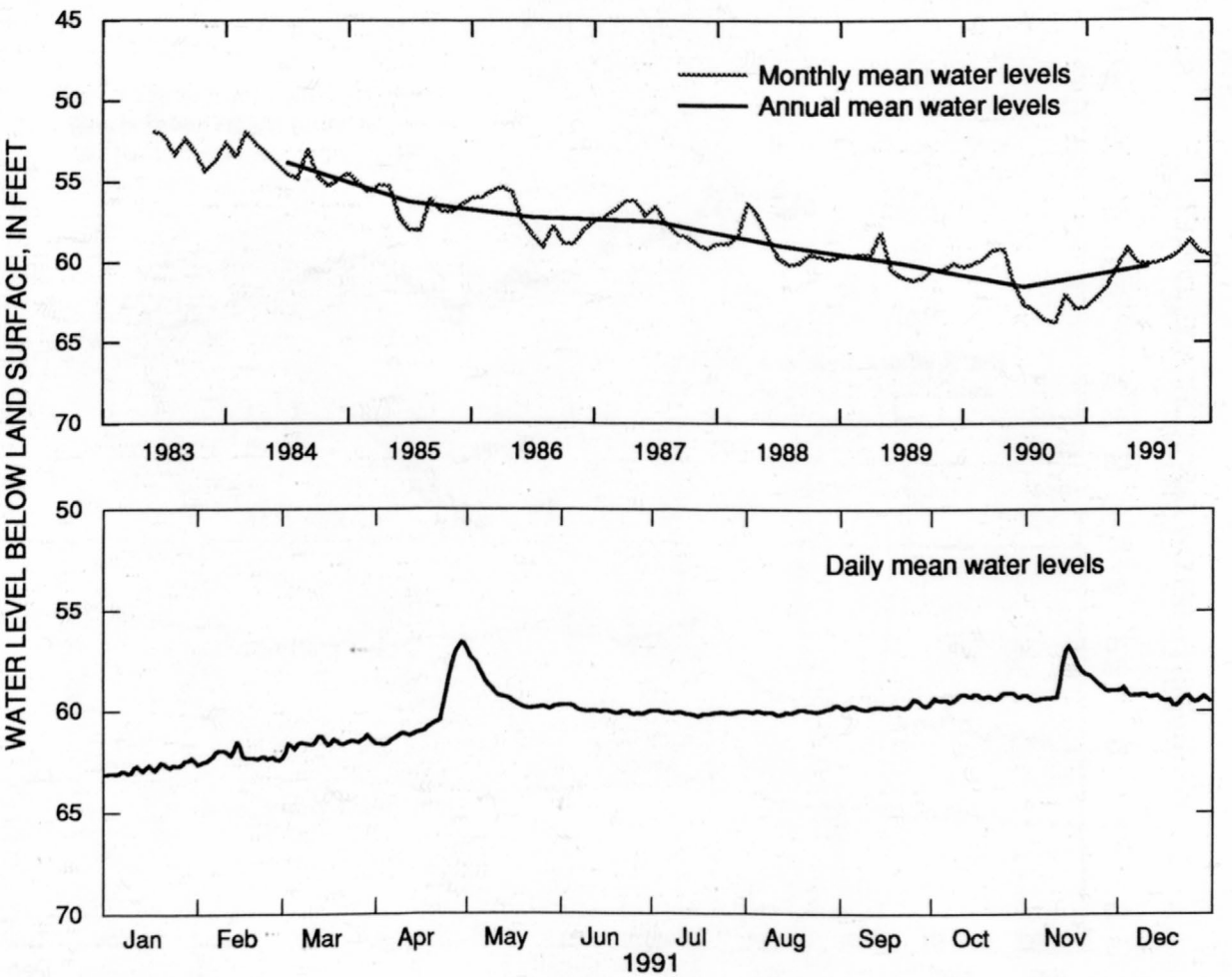


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	87.43	86.62	85.77	83.78	83.28	84.28	84.43	83.97	83.71	83.35	82.76	83.85
LOW	87.77	87.06	86.30	85.85	84.25	84.52	84.66	84.29	83.90	83.66	83.87	84.26
HIGH	86.85	85.62	85.40	78.53	80.76	83.88	84.14	83.52	83.34	82.96	79.30	83.38

CAL YR	1991		MEAN	84.43		HIGH	78.53		LOW	87.79		

Figure 53.--Water level in observation well 30L003, Wayne County.

313253081433502 Local number, 32L015.
LOCATION.--Lat 31°32'52", long 81°43'36", Hydrologic Unit 03070106.
Owner: Georgia Geologic Survey, Gardi test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 750 ft, cased to 545 ft, open hole.
DATUM.--Altitude of land-surface datum is 74 ft.
REMARKS.--Borehole geophysical survey conducted April 20, 1983.
PERIOD OF RECORD.--April 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.12 ft below land-surface datum, March 19, 1984; lowest, 64.05 ft below land-surface datum, October 7-8, 1990.

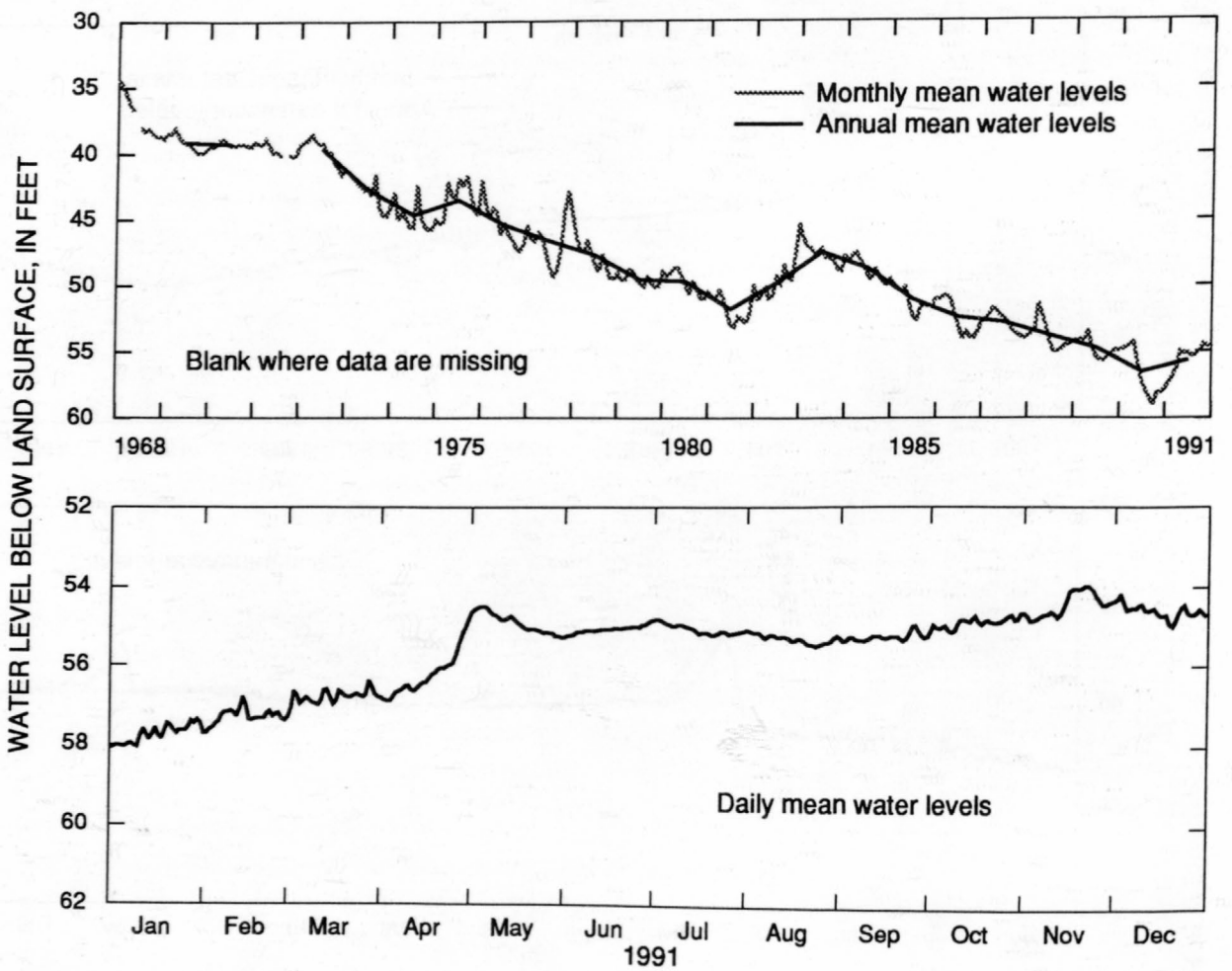


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	62.78	62.22	61.58	60.23	59.14	59.98	60.08	59.99	59.77	59.30	58.61	59.32
LOW	63.08	62.57	62.04	61.66	59.88	60.15	60.26	60.17	59.91	59.57	59.47	59.74
HIGH	62.31	61.51	61.19	56.59	57.29	59.69	59.97	59.70	59.42	59.10	56.78	58.84

CAL YR	1991		MEAN	60.24		HIGH	56.59		LOW	63.10		

Figure 54.--Water level in observation well 32L015, Wayne County.

313845081361701 Local number, 33M004.
LOCATION.--Lat 31°38'54", long 81°36'04", Hydrologic Unit 03070106.
Owner: U.S. Geological Survey, test well 3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan 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.
REMARKS.--Well pumped and sounded June 17, 1976, to depth of 861 ft; water-quality sample collected. Borehole geophysical survey conducted July 28, 1976. Water levels for periods of missing record, June 18-25 and August 9-23, were estimated.
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, 59.00 ft below land-surface datum, October 8, 1990.



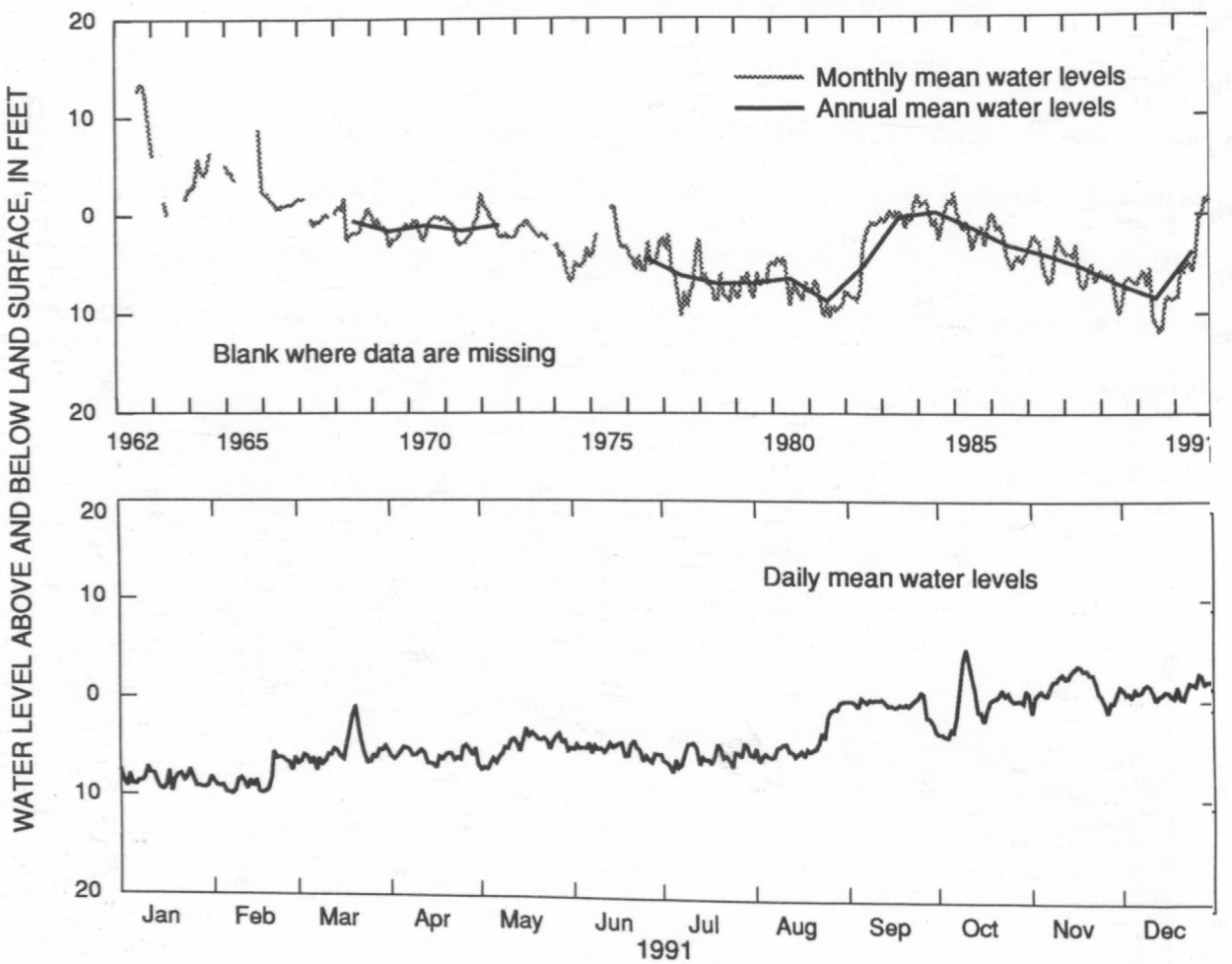
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	57.74	57.30	56.81	56.26	54.92	55.09	55.09	55.33	55.27	54.91	54.44	54.59
LOW	58.04	57.70	57.07	56.89	55.29	55.25	55.24	55.53	55.39	55.16	54.86	54.99
HIGH	57.36	56.81	56.40	54.88	54.51	54.87	54.85	55.16	54.98	54.67	53.96	54.16
CAL YR	1991		MEAN	55.64		HIGH	53.96		LOW	58.06		

Figure 55.--Water level in observation well 33M004, Long County.

Brunswick subarea

The water level in the Upper Floridan aquifer in the Brunswick subarea is monitored in six wells, two of which are summarized in this report (figs. 45; 56 and 57). In this subarea, water levels in wells tapping this aquifer primarily are affected by industrial pumping, which averaged about 84.9 Mgal/d in 1990 (Fanning and others, 1992). This pumping has resulted in the development of a cone of depression centered at Brunswick (Milby, 1991, p. 44). The water-level response to pumping is illustrated in the hydrographs for wells 33H127 (fig. 56) tapping the lower water-bearing zone of the Upper Floridan aquifer, and well 33H133 (fig. 57) tapping the upper water-bearing zone of the Upper Floridan aquifer. In 1991, a partial industrial shutdown, during which the major ground-water user temporarily ceased pumping, is indicated by a sharp water-level rise on both hydrographs in March and October (R.E. Krause, U.S. Geological Survey, oral commun., 1992). The annual mean water levels in wells 33H127 (fig. 56) and 33H133 (fig. 57) were about 4.7 and 5.0 ft higher in 1991 than in 1990, respectively.

311007081301701 Local number, 33H127.
LOCATION.--Lat 31°10'06", long 81°30'16", Hydrologic Unit 03070203.
Owner: U.S. Geological Survey, test well 3.
INSTRUMENTATION.--Analog recorder.
AQUIFER.--Upper Floridan aquifer; lower water-bearing zone.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 1,002 ft, cased to 823 ft, open hole.
DATUM.--Altitude of land-surface datum is 6.2 ft.
REMARKS.--Well pumped and sampled for analysis of chloride concentration semi-annually. Water levels for periods of missing record, March 19-26, August 26 to September 23, September 28 to October 11, November 13-25, and December 29-31, were estimated.
PERIOD OF RECORD.--August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 14.00 ft above land-surface datum, October 9, 1962; lowest, 13.22 ft below land-surface datum, July 9, 1990.



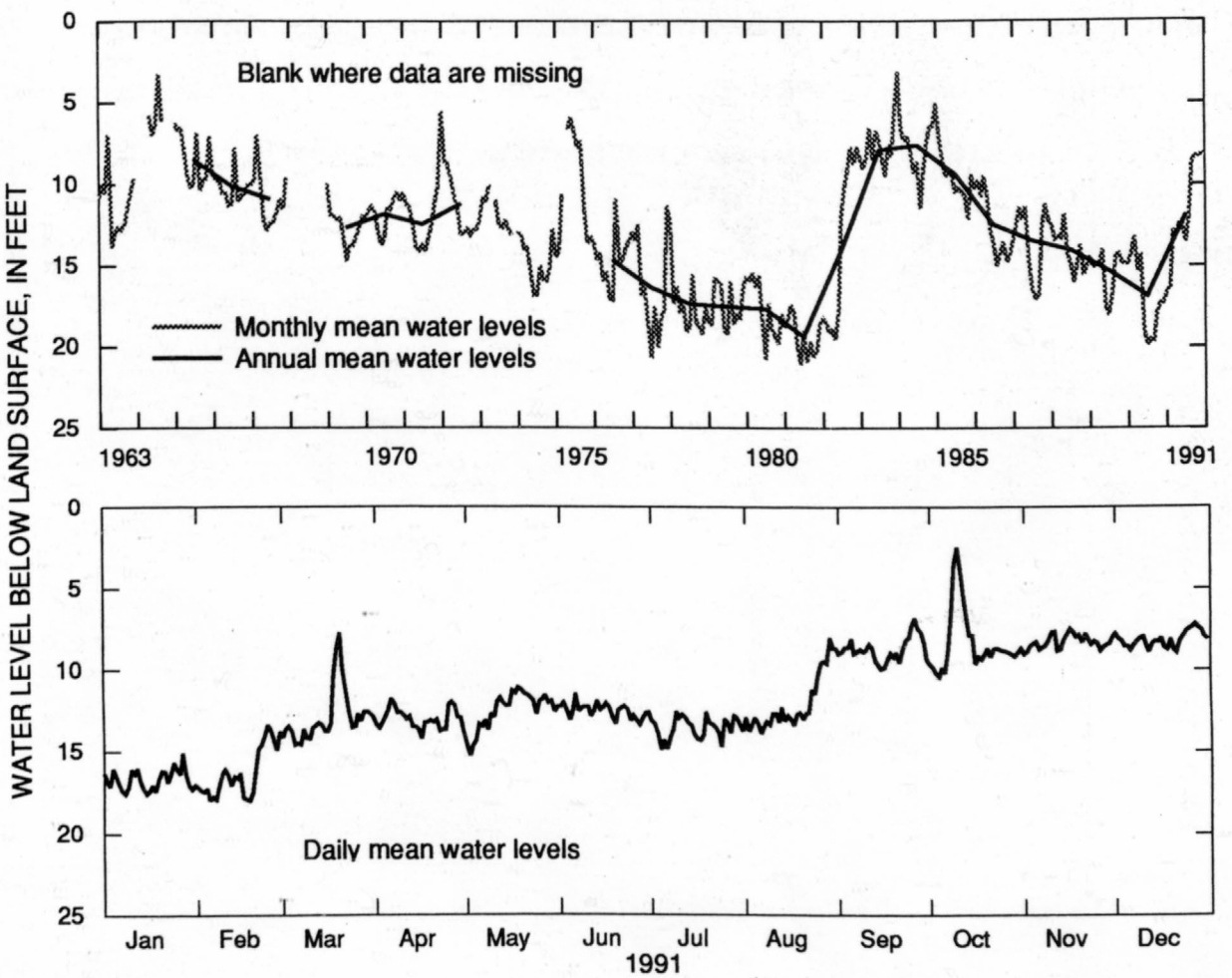
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	8.46	8.29	5.51	5.85	4.90	5.15	5.74	4.09	0.40	0.05	-1.59	-1.23
LOW	9.58	9.88	7.42	7.12	7.20	6.37	7.40	6.26	3.08	3.55	1.10	-0.15
HIGH	7.10	5.57	0.98	4.80	3.05	4.20	4.37	0.10	-0.86	-5.20	-3.60	-2.77

CAL YR	1991		MEAN	3.78		HIGH	-5.20		LOW	9.88		

[Negative value indicates water level above land surface]

Figure 56.--Water level in observation well 33H127, Glynn County.

311007081301702 Local number, 33H133.
LOCATION.--Lat 31°10'08", long 81°30'16", Hydrologic Unit 03070203.
Owner: U.S. Geological Survey, test well 6.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer; upper water-bearing zone.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 790 ft, cased to 520 ft, open hole.
DATUM.--Altitude of land-surface datum is 6.7 ft.
REMARKS.--Well pumped and sampled for analysis of chloride concentration semi-annually. Borehole geophysical survey conducted September 26, 1977. Water levels for period of missing record, September 25 to October 11, were estimated.
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.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	16.67	16.29	12.86	13.03	12.46	12.50	13.55	12.03	8.68	8.26	8.27	8.15
LOW	17.56	18.01	14.58	14.20	15.25	13.34	14.88	13.88	9.89	10.37	8.85	8.95
HIGH	15.13	13.37	7.74	11.76	11.06	11.46	12.53	7.99	6.79	2.49	7.46	7.20

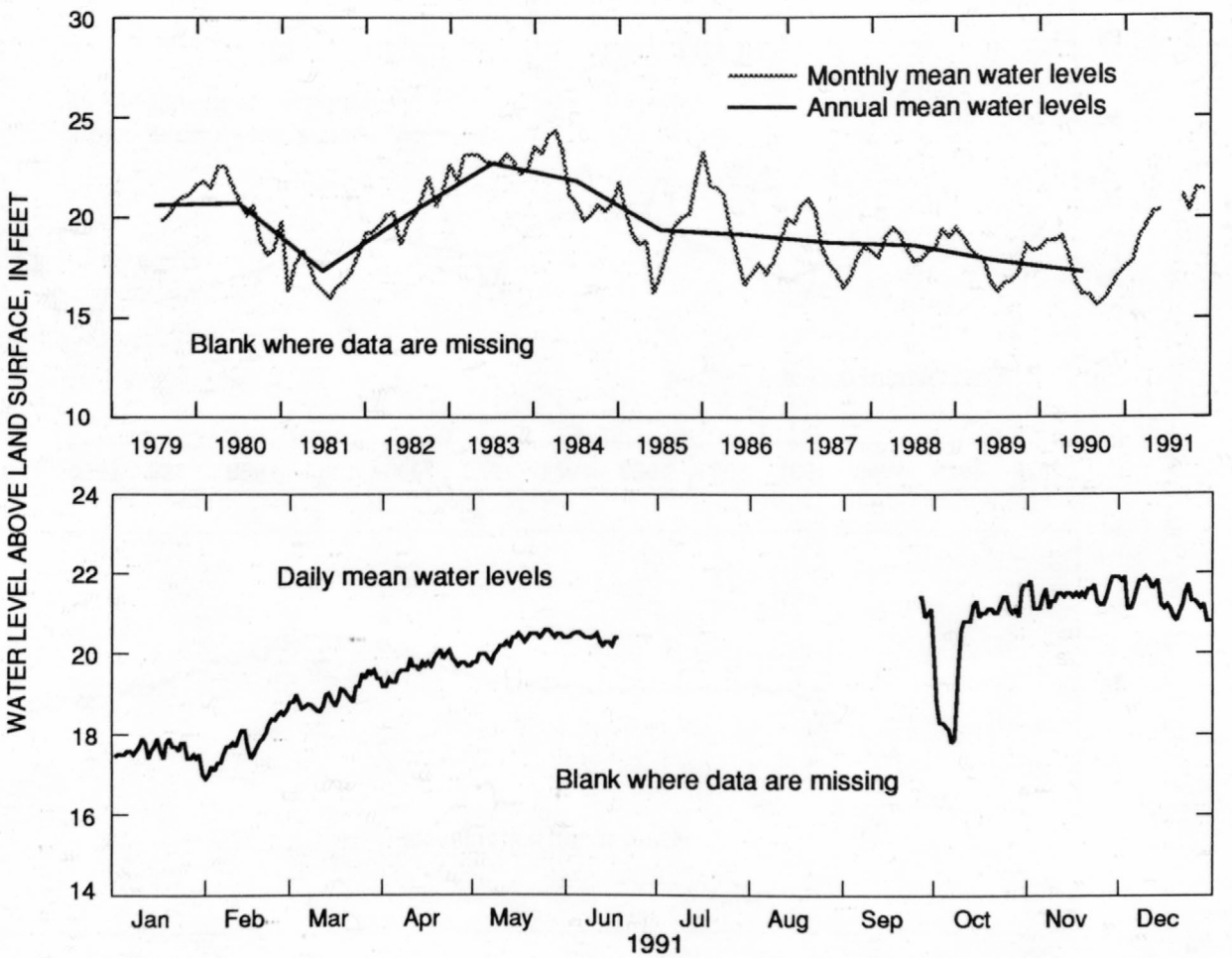
CAL YR	1991		MEAN	11.87		HIGH	2.49		LOW	18.01		

Figure 57.--Water level in observation well 33H133, Glynn County.

St Marys-Okefenokee Swamp subarea

The water level in the Upper Floridan aquifer in the St Marys-Okefenokee Swamp subarea is monitored in two wells, both of which are summarized in this report (figs. 45; 58 and 59). Water levels in wells tapping the aquifer in this subarea are affected by industrial pumping that averaged about 42 Mgal/d in 1990 at St Marys, Ga. (Fanning and others, 1992), and about 37 Mgal/d in 1985 at Fernandina Beach, Fla. (Marella, 1986). Pumping in these areas has resulted in the formation of a cone of depression centered at Fernandina Beach, Fla., and to a lesser extent at St Marys, Ga. (R.E. Krause, U.S. Geological Survey, oral commun., 1992). The 1991 mean water levels in well 33E027 (fig. 58) at Kings Bay and well 27E004 (fig. 59) in western Charlton County were about 2.5 ft and 3.3 ft higher than in 1990, respectively.

304756081311101 Local number, 33E027.
LOCATION.--Lat 30°47'56", long 81°31'11", Hydrologic Unit 03070203.
Owner: U.S. Department of the Navy, Kings Bay test well 1.
INSTRUMENTATION.--Basic data recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled test well, diameter 8 in., depth 1,306 ft, cased to 555 ft, backfilled to 990 ft, open hole.
DATUM.--Altitude of land-surface datum is 10.0 ft.
REMARKS.--Borehole geophysical survey conducted February 9, 1979. Water levels for periods of missing record, February 18-26, March 4-18, and June 2-10, were estimated. Water levels for period, June 19 to September 25, are missing.
PERIOD OF RECORD.--August 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.71 ft above land-surface datum, March 28, 1984, and March 17, 1983; lowest, 13.90 ft above land-surface datum, June 10-11, 1985.



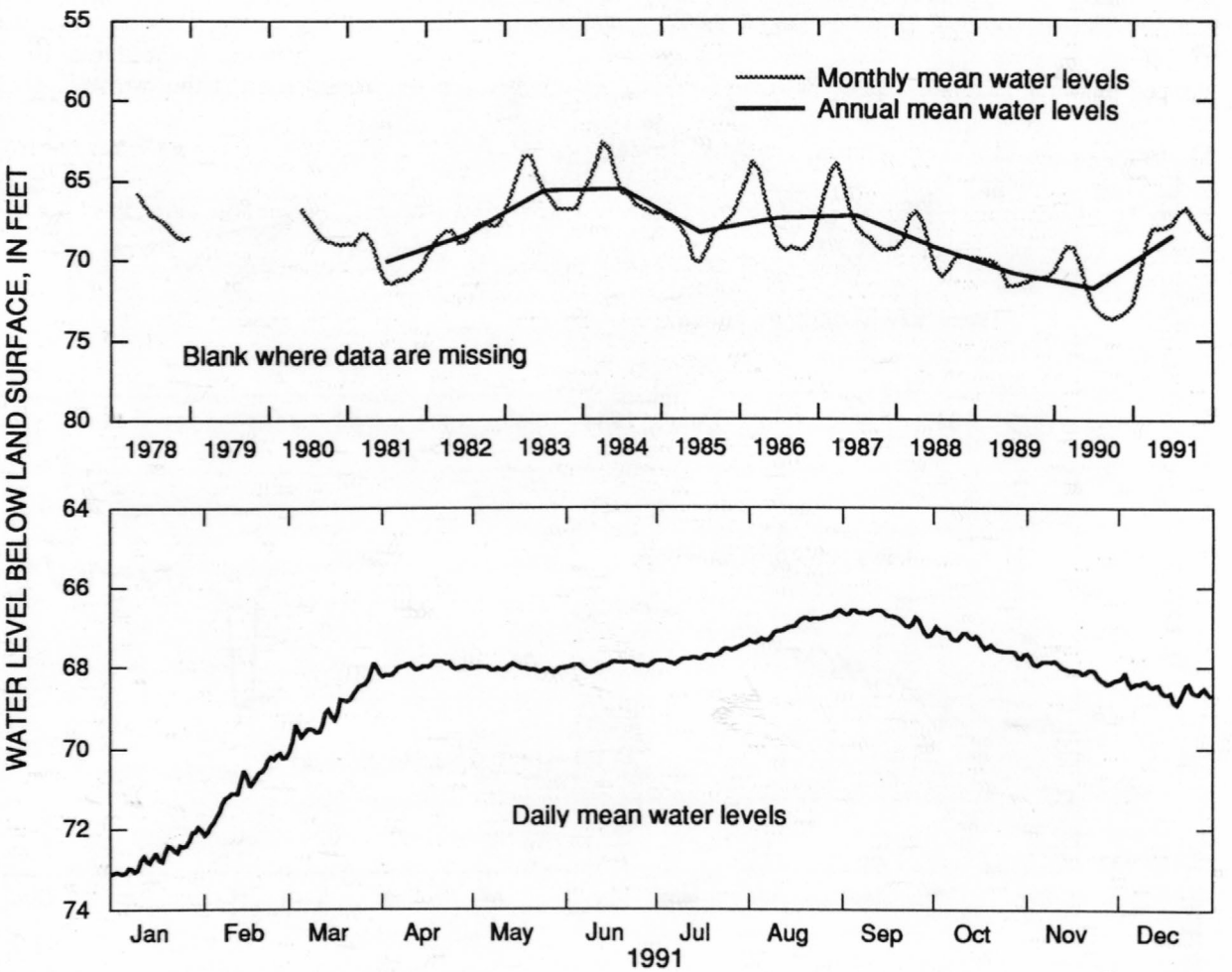
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	-17.59	-17.80	-19.00	-19.70	-20.28	------	------	------	------	-20.35	-21.45	-21.37
LOW	-17.00	-17.00	-18.58	-19.20	-19.80	------	------	------	------	-17.80	-21.10	-20.80
HIGH	-17.90	-18.60	-19.60	-20.10	-20.60	------	------	------	------	-21.70	-21.90	-21.90

CAL YR	1991		MEAN	-19.69		HIGH	-21.90		LOW	-16.90		

[Negative value indicates water level above land surface]

Figure 58.--Water level in observation well 33E027, Camden County.

304942082213801 Local number, 27E004.
LOCATION.--Lat 30°49'43", long 82°21'38", Hydrologic Unit 03110201.
Owner: U.S. Geological Survey, test well OK-9.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Upper Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 700 ft, cased to 498 ft, open hole.
DATUM.--Altitude of land-surface datum is 116 ft.
REMARKS.--Well drilled in May 1978 to replace USGS test well OK-8 (27E002).
PERIOD OF RECORD.--June 14, 1978 to January 26, 1979; January 1, 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 62.30 ft below land-surface datum, May 9, 1984; lowest, 73.91 ft below land-surface datum, October 7-8, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	72.68	70.94	69.01	68.00	68.04	67.97	67.73	67.00	66.78	67.39	68.05	68.51
LOW	73.11	72.09	69.83	68.19	68.14	68.14	67.94	67.42	67.23	67.77	68.39	68.89
HIGH	71.96	70.11	67.90	67.86	67.92	67.87	67.42	66.59	66.59	66.99	67.76	68.12

CAL YR	1991		MEAN	68.49		HIGH	66.59		LOW	73.12		

Figure 59.--Water level in observation well 27E004, Charlton County.

Lower Floridan aquifer

Brunswick area

The water level in the Lower Floridan aquifer is monitored in five wells in the Brunswick area, two of which are summarized in this report (figs. 60; 61 and 62). Water levels in wells tapping the Lower Floridan aquifer in this area mainly are influenced by withdrawal from the Upper Floridan aquifer (R.E. Krause, U.S. Geological Survey, oral commun., 1992). This response is shown on hydrographs for wells 34H391 (fig. 61) and 33J044 (fig. 62). A partial industrial shutdown in March and October during which a major ground-water user stopped pumping from the Upper Floridan aquifer, resulted in sharp water-level rises in the two wells (R.E. Krause, U.S. Geological Survey, oral commun., 1992). The 1991 mean water level in these wells ranged from 3.1 to 3.6 ft higher than in 1990, respectively. The water-level rises reversed the general water-level declines that began in 1983, similar to that observed in the Upper Floridan aquifer (figs. 55 and 56).

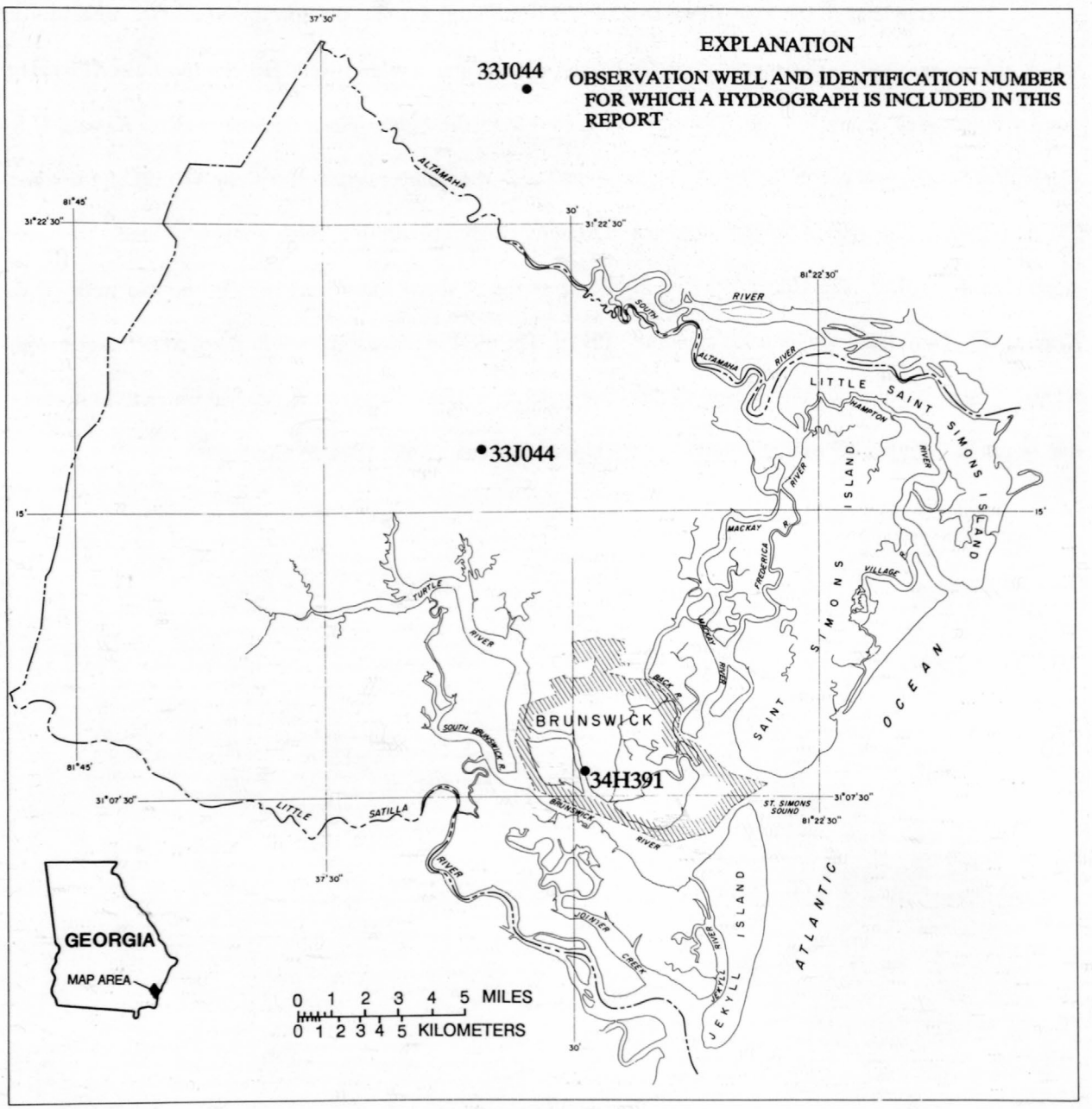
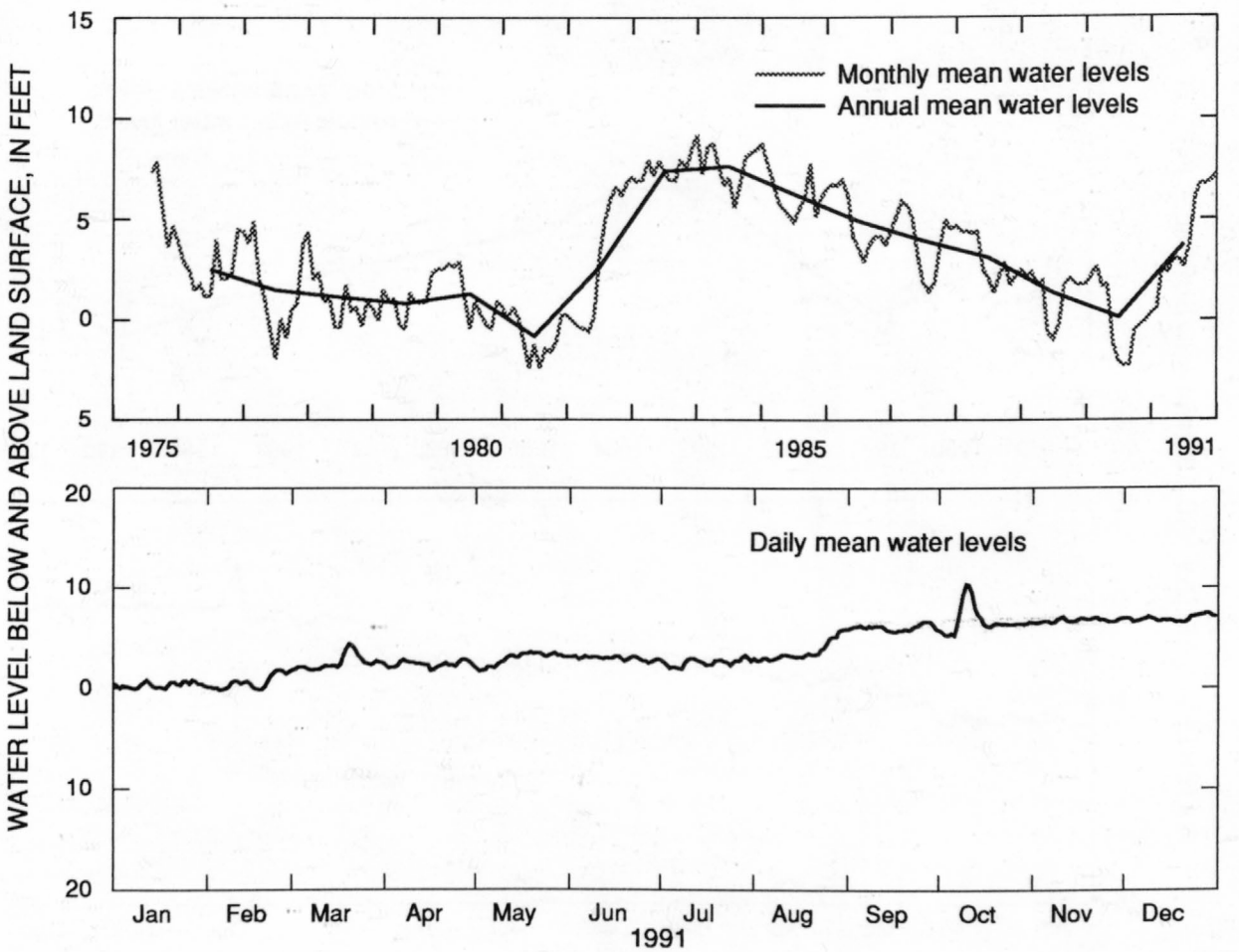


Figure 60.--Locations of observation wells completed in the Lower Floridan aquifer.

310818081294201 Local number, 34H391.
LOCATION.--Lat 31°08'18", long 81°29'42", Hydrologic Unit 03070203.
Owner: U.S. Geological Survey, test well 16.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Lower Floridan aquifer.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 1,150 ft, cased to 1,070 ft, open hole.
DATUM.--Altitude of land-surface datum is 7.13 ft.
REMARKS.--Well pumped and sampled for analysis of chloride concentration semi-annually.
PERIOD OF RECORD.--August 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 11.65 ft above land-surface datum, October 13-14, 1985; lowest, 2.96 ft below land-surface datum, July 27, 1977.



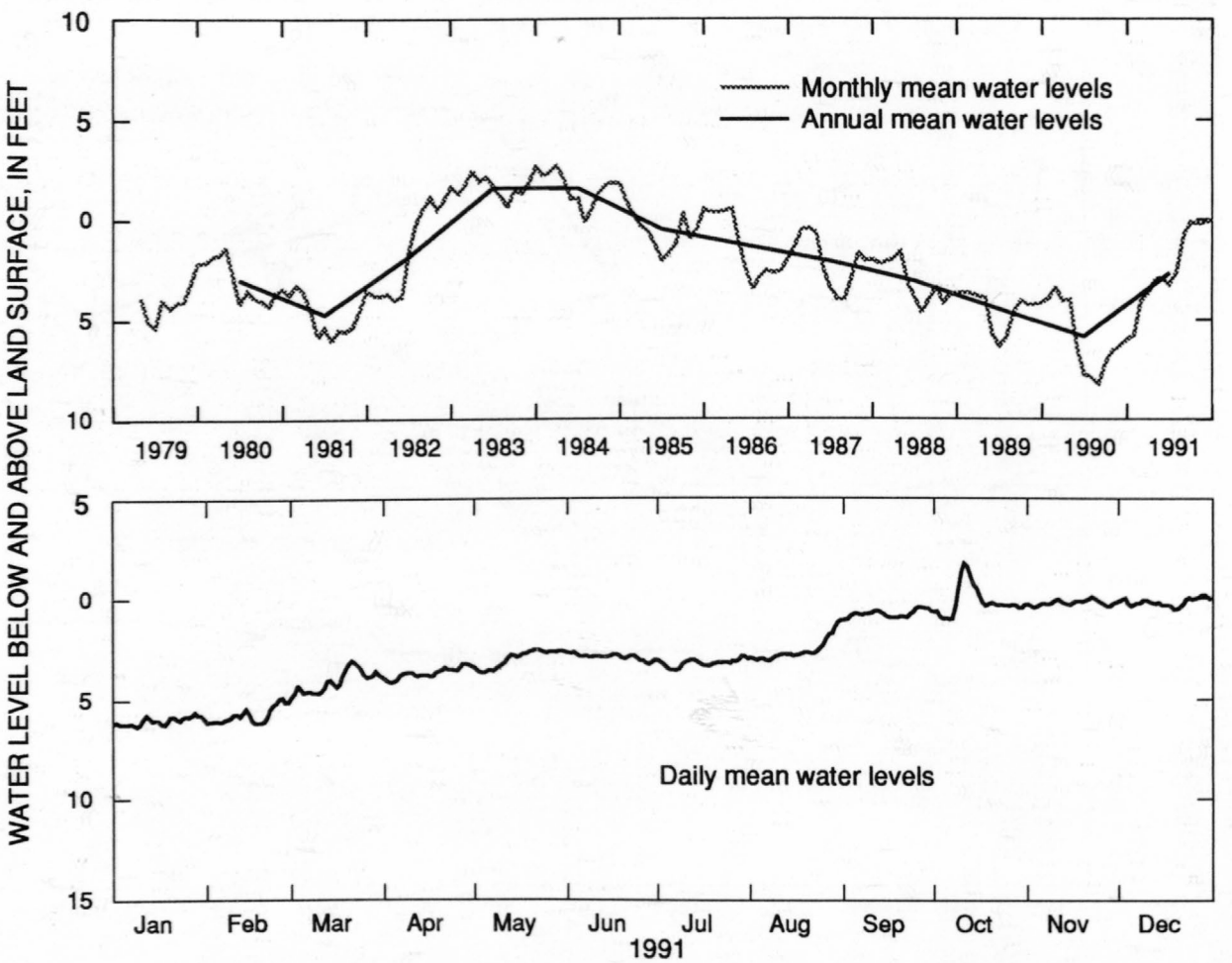
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	-0.35	-0.59	-2.52	-2.37	-2.91	-2.99	-2.62	-3.68	6.05	-6.74	-6.69	-6.85
LOW	0.07	0.14	-1.79	-1.74	-1.67	-2.53	-1.95	-2.78	-5.62	-5.23	-6.43	-6.48
HIGH	-0.82	-1.84	-4.40	-2.88	-3.54	-3.21	-3.33	-5.88	-6.62	-10.37	-7.06	-7.40

CAL YR	1991		MEAN	-3.71		HIGH	-10.37		LOW	0.14		

[Negative value indicates water level above land surface]

Figure 61.--Water level in observation well 34H391, Glynn County.

311633081324001 Local number, 33J044.
LOCATION.--Lat 31°16'33", long 81°32'40", Hydrologic Unit 03070203.
Owner: Georgia Pacific Co., USGS test well 27.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Lower Floridan aquifer.
WELL CHARACTERISTICS.--Drilled unused oil-test well converted to observation well, diameter 9 in., depth 2,260 ft, cased to 1,079 ft, open hole.
DATUM.--Altitude of land-surface datum is 20 ft.
REMARKS.--This is the Sterling oil-test well.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.09 ft above land-surface datum, October 13, 1985; lowest, 8.44 ft below land-surface datum, September 19, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	5.98	5.74	4.06	3.68	2.97	2.92	3.24	2.60	0.80	0.15	0.23	0.17
LOW	6.31	6.14	4.68	4.15	3.67	3.27	3.61	3.13	1.09	1.07	0.47	0.55
HIGH	5.59	4.91	3.07	3.21	2.54	2.67	2.89	1.12	0.44	-1.77	-0.06	-0.21

CAL YR	1991	MEAN	2.70	HIGH	-1.77	LOW	6.31

[Negative value indicates water level above land surface]

Figure 62.--Water level in observation well 33J044, Glynn County.

Claiborne Aquifer

The water level in the Claiborne aquifer is monitored in 21 wells; data from eight of these wells are summarized in this report (figs. 63-71). The water level in the aquifer is mainly affected by precipitation and by local and regional pumping (Hicks and others, 1981). During 1985, the aquifer supplied about 62 Mgal/d, mainly for municipal, industrial, and agricultural uses (Pierce and Kundell, 1990, p. 219). The water level generally is highest following the winter and spring rainy seasons, and lowest in the fall following the summer irrigation season.

Water-level measurements made during October 1991 from 85 wells tapping the Claiborne aquifer were used to construct a potentiometric-surface map (fig. 63). A cone of depression is centered at Albany, and is the result of pumping in that area. The configuration of the water-level surface showed little change from that of 1990 (Milby and others, 1991, p. 91).

The annual mean water levels in six of the eight wells were higher in 1991 than in 1990 (figs. 64 - 71). Water levels in the eight wells ranged from 0.4 ft lower to 5.9 ft higher in 1991.

EXPLANATION

—— 100 — — WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Hachures indicate depressions. Contour interval 50 feet. Datum is sea level

DATA POINT

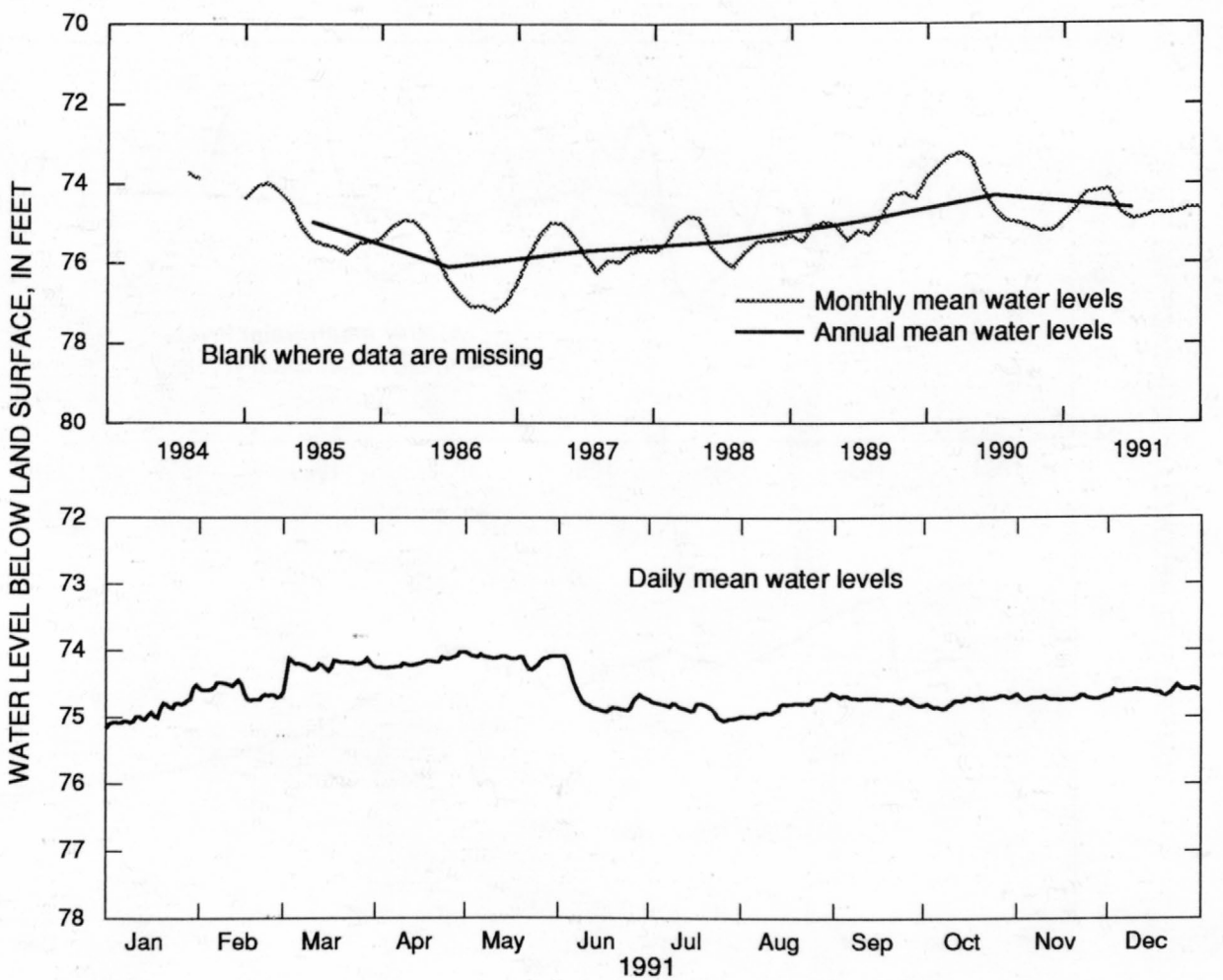
• Ground water--Altitude of water level in well

▲ Surface water--Location where stream and water-table altitudes are coincident. Altitude of stream surface is extrapolated from topographic contour map

R 12L019 Observation well and identification number for which a hydrograph is included in this report

Figure 63.--Water level and locations of observation wells completed in the Claiborne aquifer, November 1991.

312827084551503 Local number, 06K010.
LOCATION.--Lat 31°28'24", long 84°55'09", Hydrologic Unit 03130004.
Owner: Georgia Geologic Survey, Kolomoki Mounds State Park test well 3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 140 ft, cased to 120 ft, screen to 140 ft.
DATUM.--Altitude of land-surface datum is 310 ft.
REMARKS.--Well pumped and redeveloped August 8, 1989.
PERIOD OF RECORD.--August 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.11 ft below land-surface datum, April 3, 1990; lowest, 77.35 ft below land-surface datum, November 14, 1986.

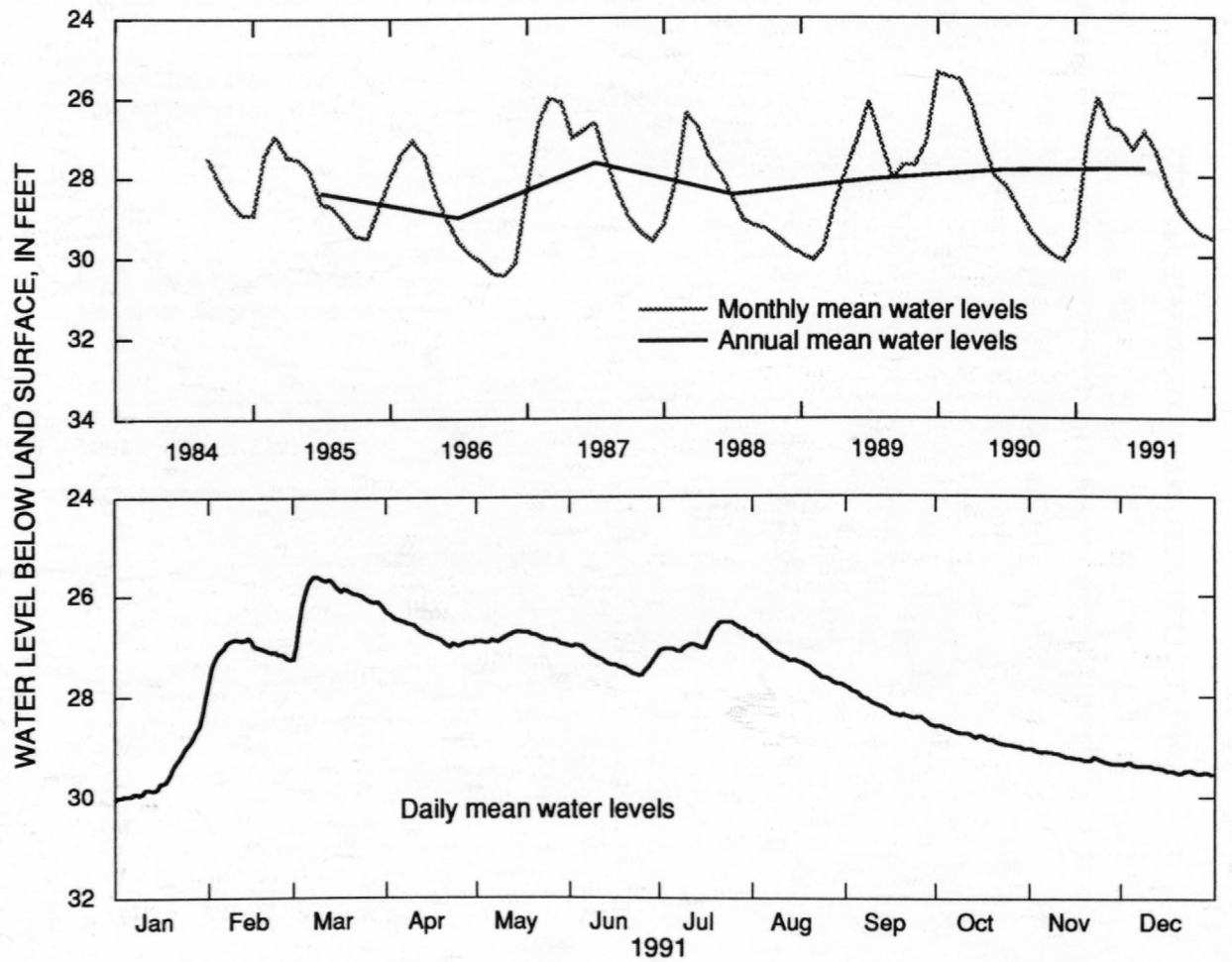


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	74.92	74.61	74.22	74.18	74.13	74.69	74.88	74.84	74.73	74.75	74.71	74.61
LOW	75.10	74.75	74.34	74.26	74.29	74.92	75.05	74.99	74.83	74.87	74.74	74.69
HIGH	74.52	74.44	74.12	74.02	74.05	74.09	74.77	74.64	74.68	74.68	74.67	74.53

CAL YR	1991		MEAN	74.61		HIGH	74.02		LOW	75.15		

Figure 64.--Water level in observation well 06K010, Early County.

313953084361201 Local number, 09M009.
LOCATION.--Lat 31°39'52", long 84°36'10", Hydrologic Unit 03130009.
Owner: C.T. Martin, test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 94 ft, cased to 77 ft, screen to 94 ft.
DATUM.--Altitude of land-surface datum is 322 ft.
REMARKS.--Well pumped and redeveloped August 8, 1989.
PERIOD OF RECORD.--September 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.98 ft below land-surface datum, January 12, 1990; lowest, 30.50 ft below land-surface datum, November 3, 1986.

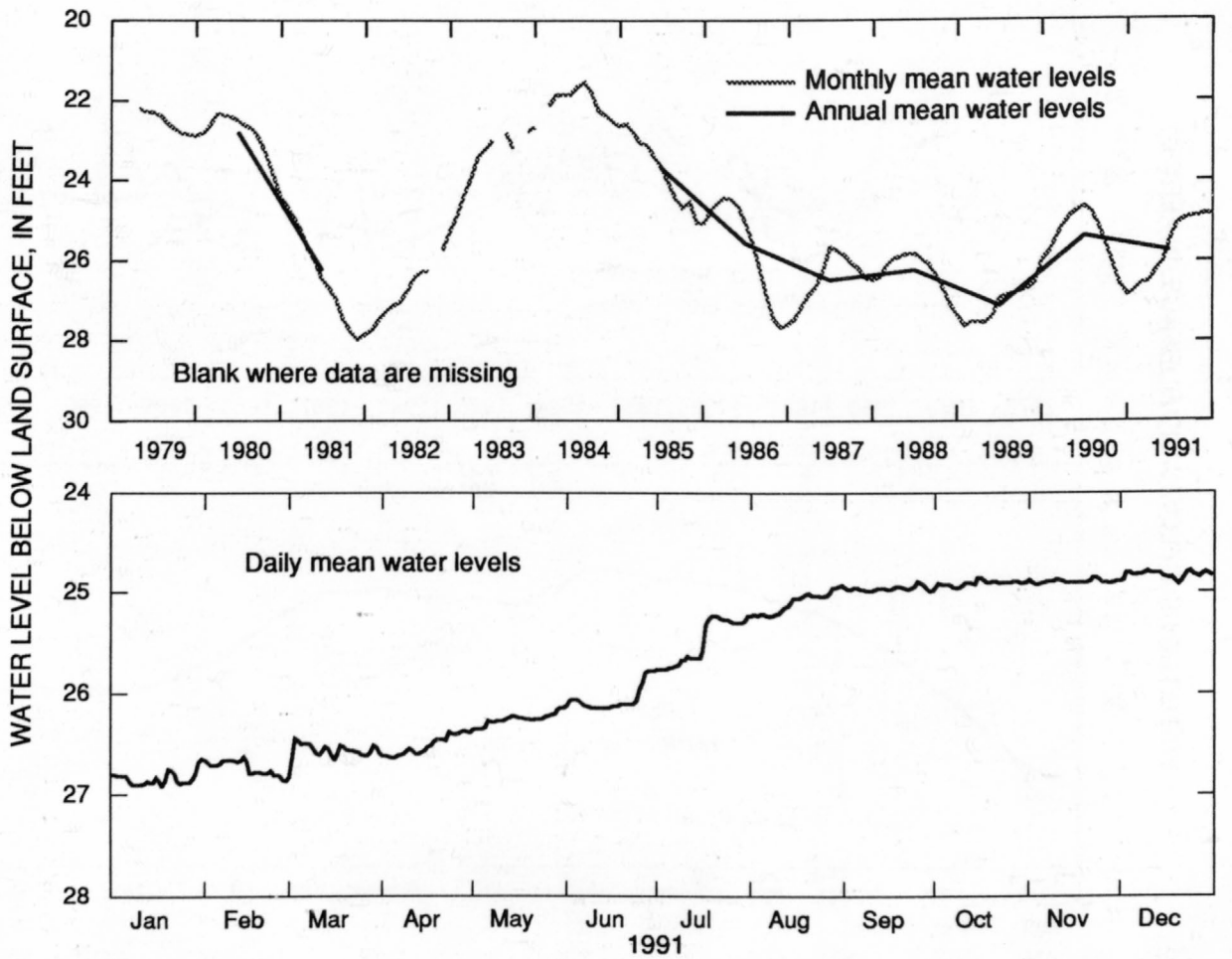


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	29.49	27.08	26.00	26.74	26.85	27.31	26.87	27.34	28.25	28.83	29.21	29.44
LOW	30.01	27.44	26.97	27.01	26.99	27.60	27.12	27.78	28.59	29.04	29.34	29.55
HIGH	27.98	26.84	25.61	26.37	26.71	26.99	26.55	26.82	27.85	28.59	29.05	29.31

CAL YR	1991		MEAN	27.79		HIGH	25.61		LOW	30.06		

Figure 65.--Water level in observation well 09M009, Randolph County.

312654084210102 Local number, 11K002.
LOCATION.--Lat 31°26'54", long 84°21'01", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 11.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 320 ft, cased to 300 ft, screen to 320 ft.
DATUM.--Altitude of land-surface datum is 183.5 ft.
REMARKS.--Borehole geophysical survey conducted March 11, 1980.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.11 ft below land-surface datum, June 1, 1979; lowest, 28.04 ft below land-surface datum, December 24, 1981.

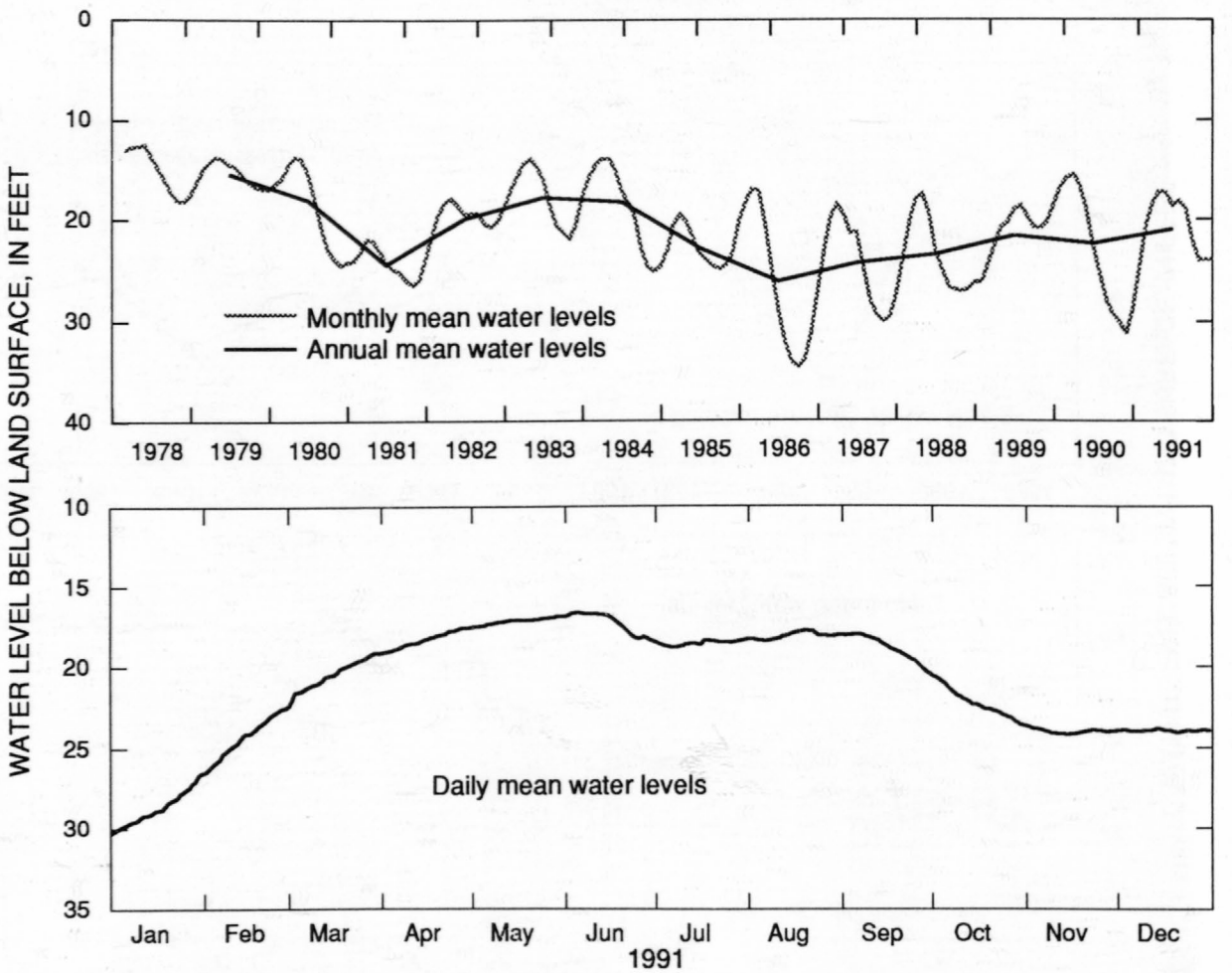


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	26.84	26.74	26.57	26.52	26.25	26.05	25.49	25.10	24.96	24.91	24.89	24.83
LOW	26.92	26.87	26.66	26.64	26.35	26.14	25.76	25.24	24.99	24.96	24.92	24.92
HIGH	26.65	26.63	26.45	26.37	26.14	25.77	25.23	24.93	24.89	24.85	24.85	24.79

CAL YR	1991		MEAN	25.76		HIGH	24.79		LOW	26.92		

Figure 66.--Water level in observation well 11K002, Dougherty County.

313530084203202 Local number, 11L001.
LOCATION.--Lat 31°35'30", long 84°20'34", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 4.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 251 ft, cased to 233 ft, screen to 251 ft.
DATUM.--Altitude of land-surface datum is 220 ft.
REMARKS.--Well pumped and redeveloped August 14, 1988. Water levels for period of missing record, January 1-7, were estimated.
PERIOD OF RECORD.--March 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.11 ft below land-surface datum, June 5-6, 1978; lowest, 34.75 ft below land-surface datum, October 19-20, 1986.



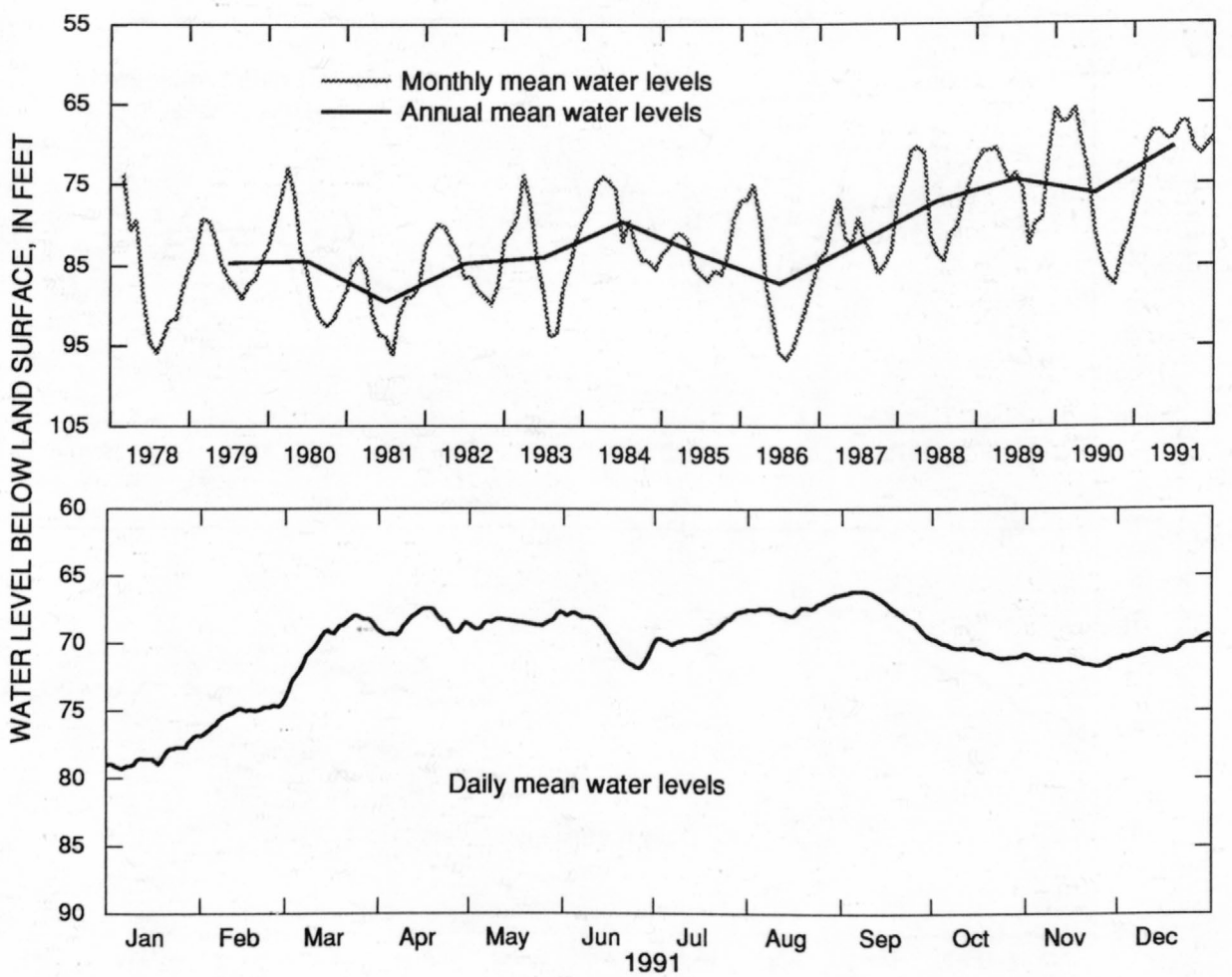
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	28.71	24.33	20.48	18.33	17.19	17.32	18.60	18.15	18.88	22.24	23.95	23.91
LOW	30.16	26.37	21.99	19.12	17.53	18.47	18.84	18.46	20.48	23.60	24.12	24.03
HIGH	26.53	22.52	19.16	17.59	16.90	16.68	18.38	17.80	18.02	20.66	23.72	23.79

CAL YR	1991		MEAN	21.00		HIGH	16.68		LOW	30.27 *		

[* Estimated value]
may have been lower during period of missing record

Figure 67.--Water level in observation well 11L001, Dougherty County.

313534084103001 Local number, 12L019.
LOCATION.--Lat 31°35'36", long 84°10'30", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 5.
INSTRUMENTATION.--Basic data recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 257 ft, cased to 241 ft, screen to 257 ft.
DATUM.--Altitude of land-surface datum is 198 ft.
REMARKS.--Well pumped and redeveloped August 15, 1988. Water levels for periods of missing record, January 1-17, January 28 to February 13, February 18-26, and May 20-23, were estimated.
PERIOD OF RECORD.--March 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 63.61 ft below land-surface datum, April 4, 1990; lowest, 99.53 ft below land-surface datum, August 1-2, 1978.

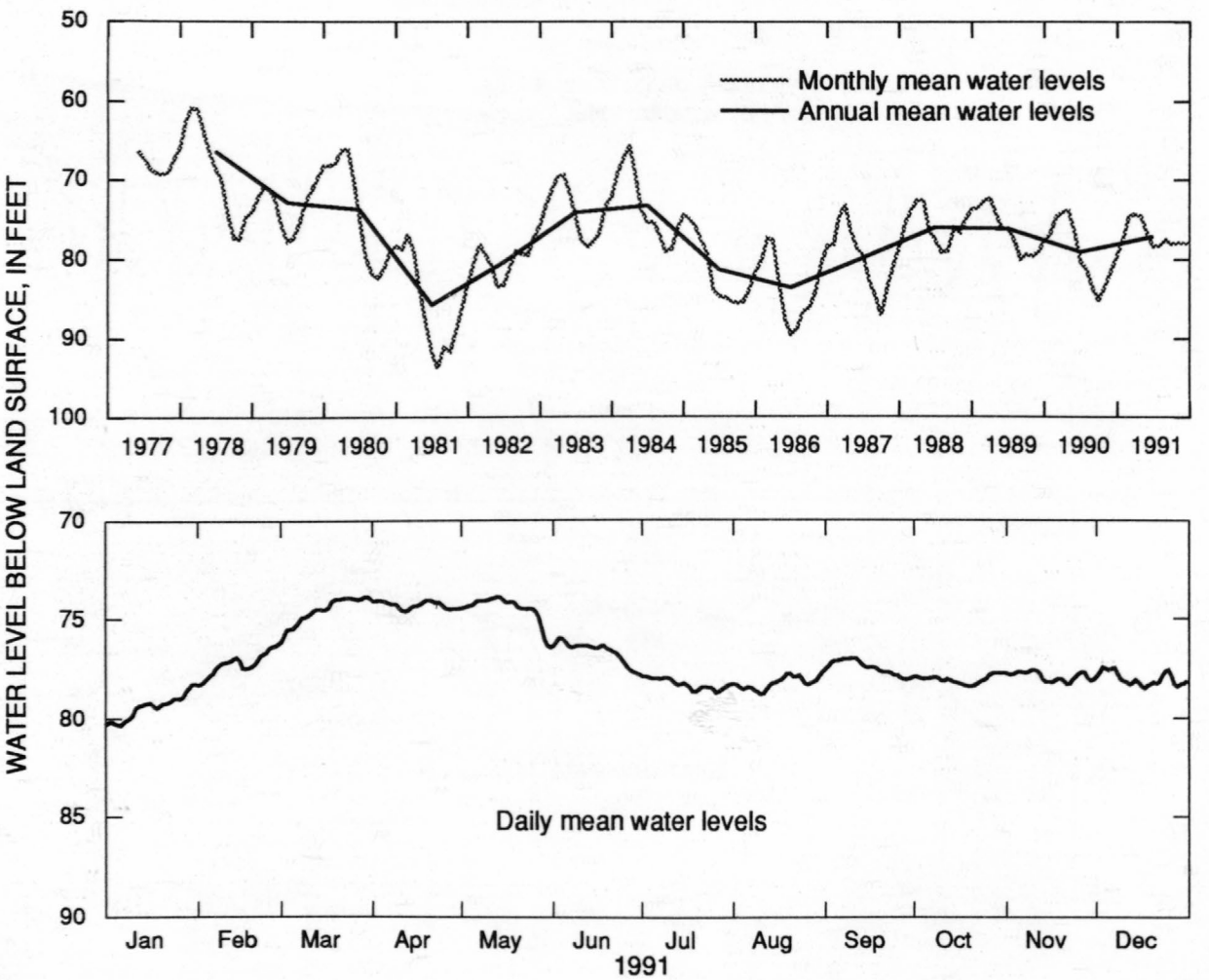


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	78.36	75.27	69.78	68.47	68.43	69.55	69.16	67.34	67.31	70.55	71.29	70.40
LOW	79.28	76.77	73.46	69.34	68.93	71.81	70.09	67.95	69.59	71.11	71.67	71.06
HIGH	76.83	74.45	67.91	67.39	67.66	67.70	67.58	66.40	66.11	69.73	70.90	69.39

CAL YR	1991		MEAN	70.47		HIGH	66.11		LOW	79.28		

Figure 68.--Water level in observation well 12L019, Dougherty County.

313105084064301 Local number, 13L011.
LOCATION.--Lat 31°31'05", long 84°06'43", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 2.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 418 ft, cased to 398 ft, screen to 418 ft.
DATUM.--Altitude of land-surface datum is 195 ft.
Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.
REMARKS.--Well pumped and redeveloped August 16, 1988.
PERIOD OF RECORD.--June 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 60.01 ft below land-surface datum, April 5, 1978; lowest, 95.00 ft below land-surface datum, August 9-11, 1981.

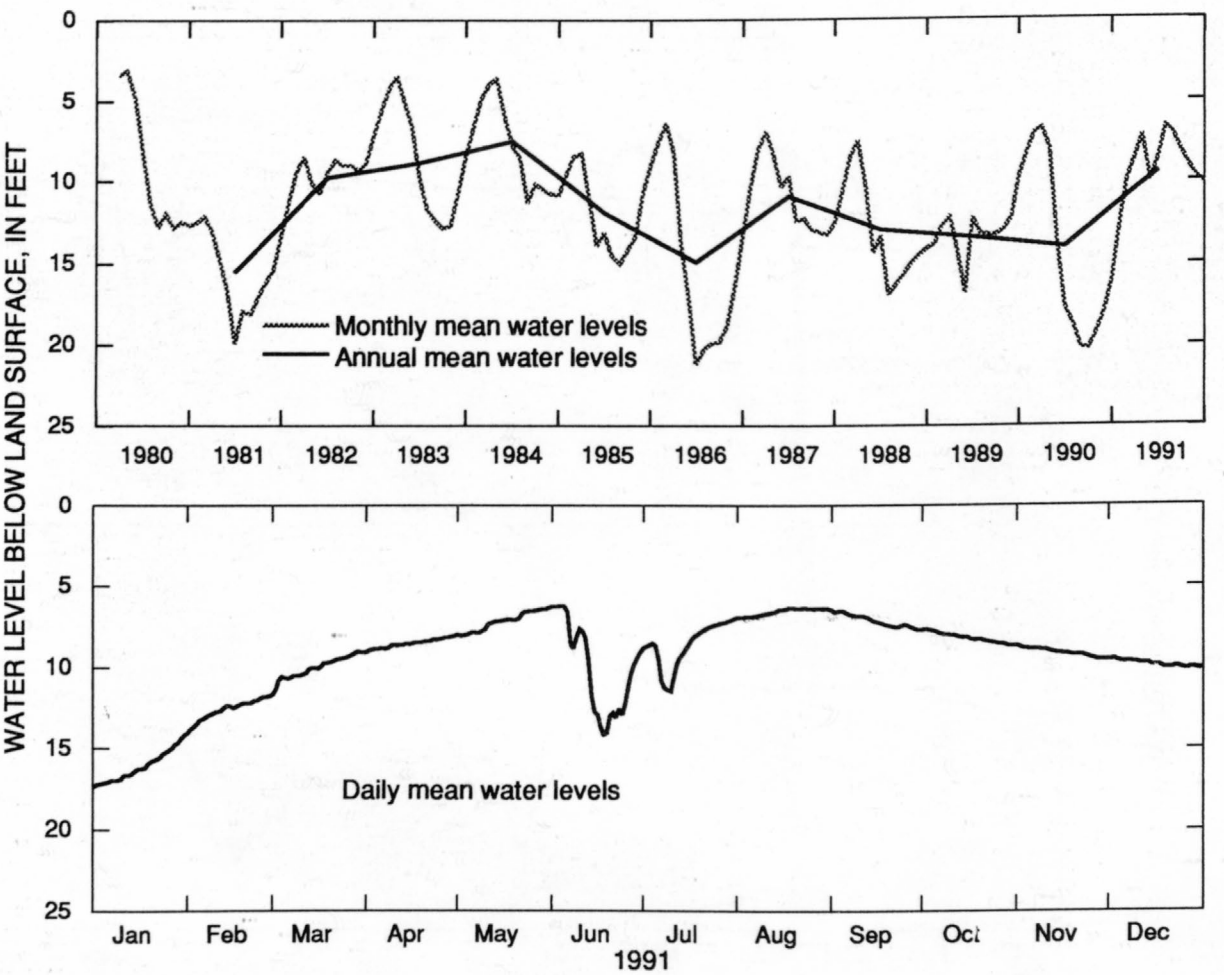


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	79.41	77.23	74.57	74.32	74.54	76.69	78.34	78.27	77.49	78.06	77.90	77.99
LOW	80.35	78.27	75.84	74.65	76.48	77.86	78.78	78.85	78.07	78.41	78.28	78.46
HIGH	78.22	76.28	73.89	74.09	73.92	76.03	77.95	77.69	77.01	77.72	77.56	77.43

CAL YR	1991		MEAN	77.07		HIGH	73.89		LOW	80.35		

Figure 69.--Water level in observation well 13L011, Dougherty County.

314330084005401 Local number, 13M005.
LOCATION.--Lat 31°43'30", long 84°00'54", Hydrologic Unit 03130006.
Owner: U.S. Geological Survey, test well DP-7.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 345 ft, cased to 330 ft, screen to 345 ft.
DATUM.--Altitude of land-surface datum is 230 ft.
REMARKS.--Borehole geophysical survey conducted March 16, 1982.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.89 ft below land-surface datum, May 29, 1980; lowest, 23.37 ft below land-surface datum July 28, 1981.

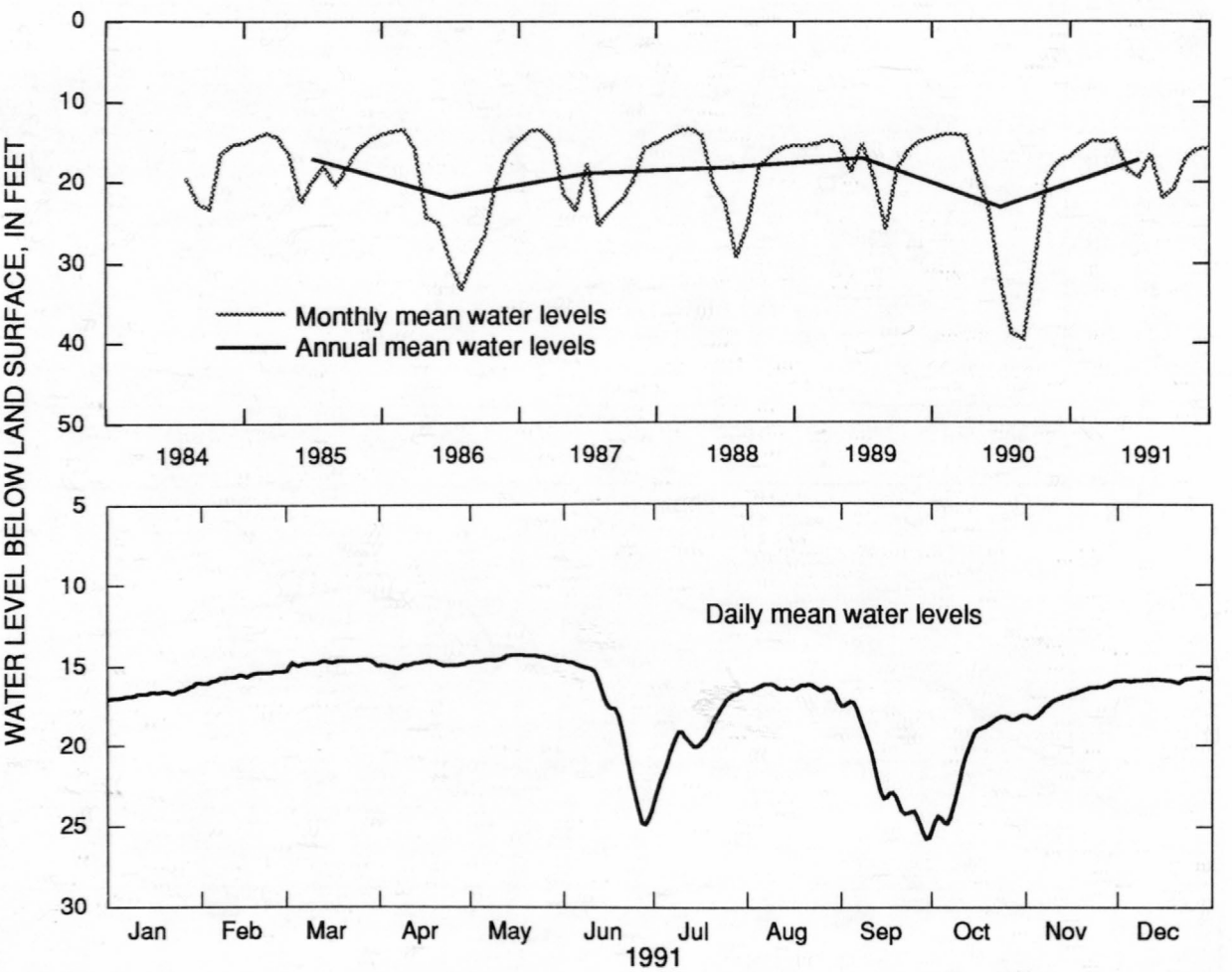


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	16.11	12.58	9.95	8.49	7.16	10.03	8.59	6.56	7.12	8.18	9.10	9.84
LOW	17.21	13.81	11.30	8.88	8.02	14.11	11.43	6.92	7.70	8.67	9.52	10.14
HIGH	14.18	11.72	8.98	8.02	6.34	6.20	6.98	6.31	6.53	7.63	8.72	9.49

CAL YR	1991		MEAN	9.46		HIGH	6.20		LOW	17.32		

Figure 70.--Water level in observation well 13M005, Worth County.

315731083542302 Local number, 14P015.
LOCATION.--Lat 31°57'31", long 83°54'23", Hydrologic Unit 03130006.
Owner: Georgia Geologic Survey, Veterans Memorial State Park test well 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.-- Claiborne.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 340 ft, cased to 240 ft, screen to 340 ft.
DATUM.--Altitude of land-surface datum is 252 ft.
REMARKS.--Aquifer test conducted on April 22, 1982. Well Pumped and sampled by Georgia Geologic Survey, March 22, 1989.
PERIOD OF RECORD.--August 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.97 ft below land-surface datum, March 9, 1987; lowest, 42.09 ft below land-surface datum, September 2, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	16.67	15.61	14.76	14.92	14.56	18.47	19.30	16.49	21.84	20.65	17.00	15.87
LOW	17.01	16.05	14.97	15.16	14.77	24.93	22.89	17.33	25.76	24.83	18.34	16.04
HIGH	16.02	15.31	14.58	14.71	14.33	14.80	16.65	16.24	17.34	18.16	15.99	15.70

CAL YR	1991		MEAN	17.18		HIGH	14.33		LOW	25.76		

Figure 71.--Water level in observation well 14P015, Crisp County.

Clayton Aquifer

The water level in the Clayton aquifer is monitored in 12 wells; data from seven of these wells are summarized in this report (figs. 72-79). Water levels in wells tapping the aquifer are affected by seasonal variations in local and regional pumping (Hicks and others, 1981). During 1985, the aquifer supplied more than 33 Mgal/d, mainly for agricultural use (Pierce and Kundell, 1990, p. 219).

Annual mean water levels in five of the seven wells monitored were higher in 1991 (figs. 73 - 79). Water levels in the seven wells ranged from 2.2 ft lower to 15.4 ft higher. A record low daily mean water level was recorded in well 11K005 (fig. 78) in January that was 0.1 ft lower than the previous record low. Water levels measured in 71 wells tapping the Clayton aquifer during October 1991 were used to construct a potentiometric-surface map (fig. 72). The configuration of the water-level surface showed little change in most of the area since 1990.

EXPLANATION

——100 — — WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Hachures indicate depressions. Contour interval, in feet, is variable. Datum is sea level

DATA POINT

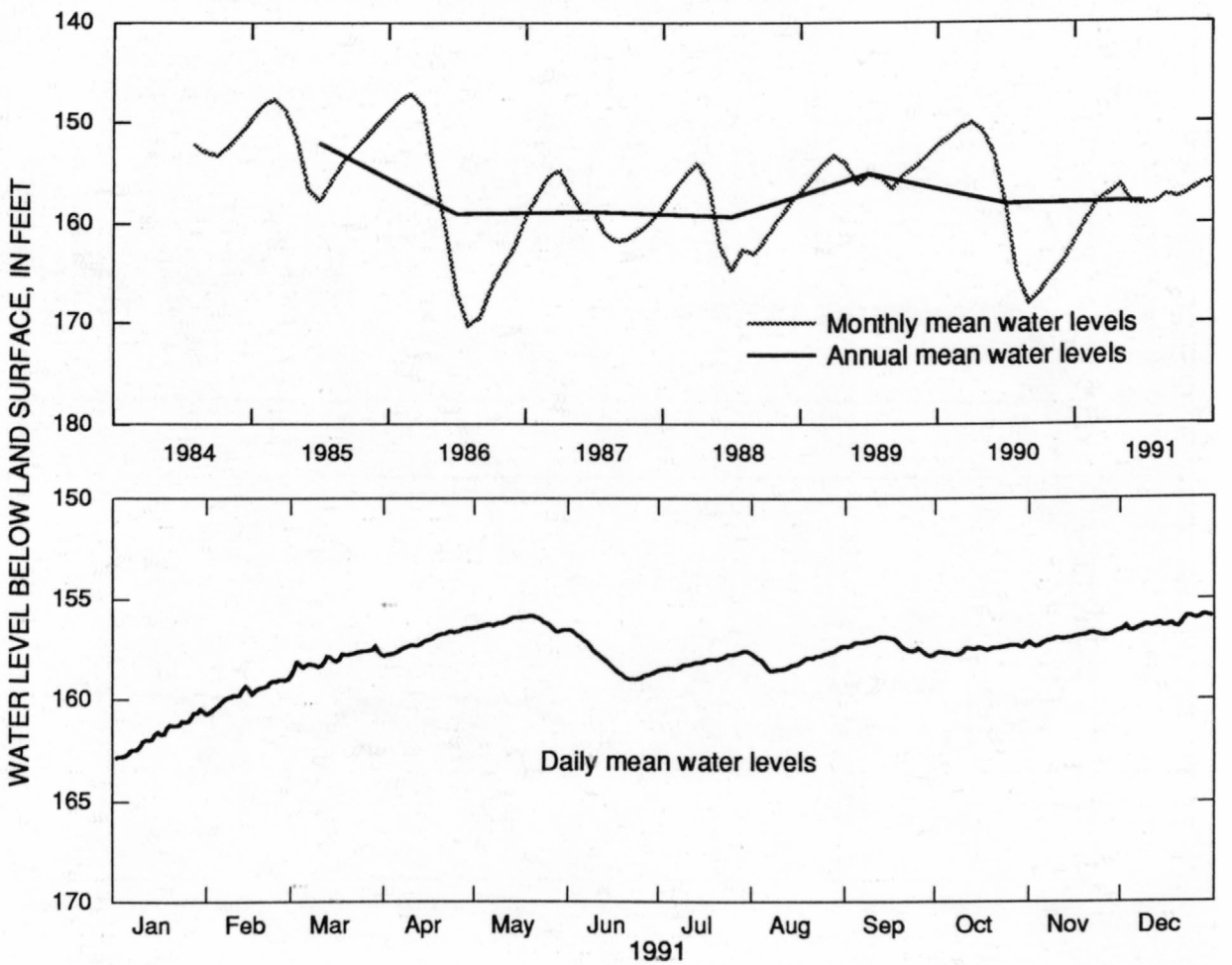
• Ground water--Altitude of water level in well

▲ Surface water--Location where stream and water-table altitudes are coincident. Altitude of stream surface is extrapolated from topographic contour map

06K009 Observation well and identification number for which a hydrograph is included in this report

Figure 72.--Water level and locations of observation wells completed in the Clayton aquifer, November 1991.

312827084551501 Local number, 06K009.
LOCATION.--Lat 31°28'24", long 84°55'12", Hydrologic Unit 03130004.
Owner: Georgia Geologic Survey, Kolomoki Mounds State Park test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 612 ft, cased to 491 ft, open hole.
DATUM.--Altitude of land-surface datum is 310 ft.
REMARK.--Borehole geophysical survey conducted November 20, 1979. Aquifer test conducted May 19, 1982. Well pumped and redeveloped August 8, 1989.
PERIOD OF RECORD.--1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 146.62 ft below land-surface datum, April 3, 1986; lowest, 171.38 ft below land-surface datum, August 22, 1986.

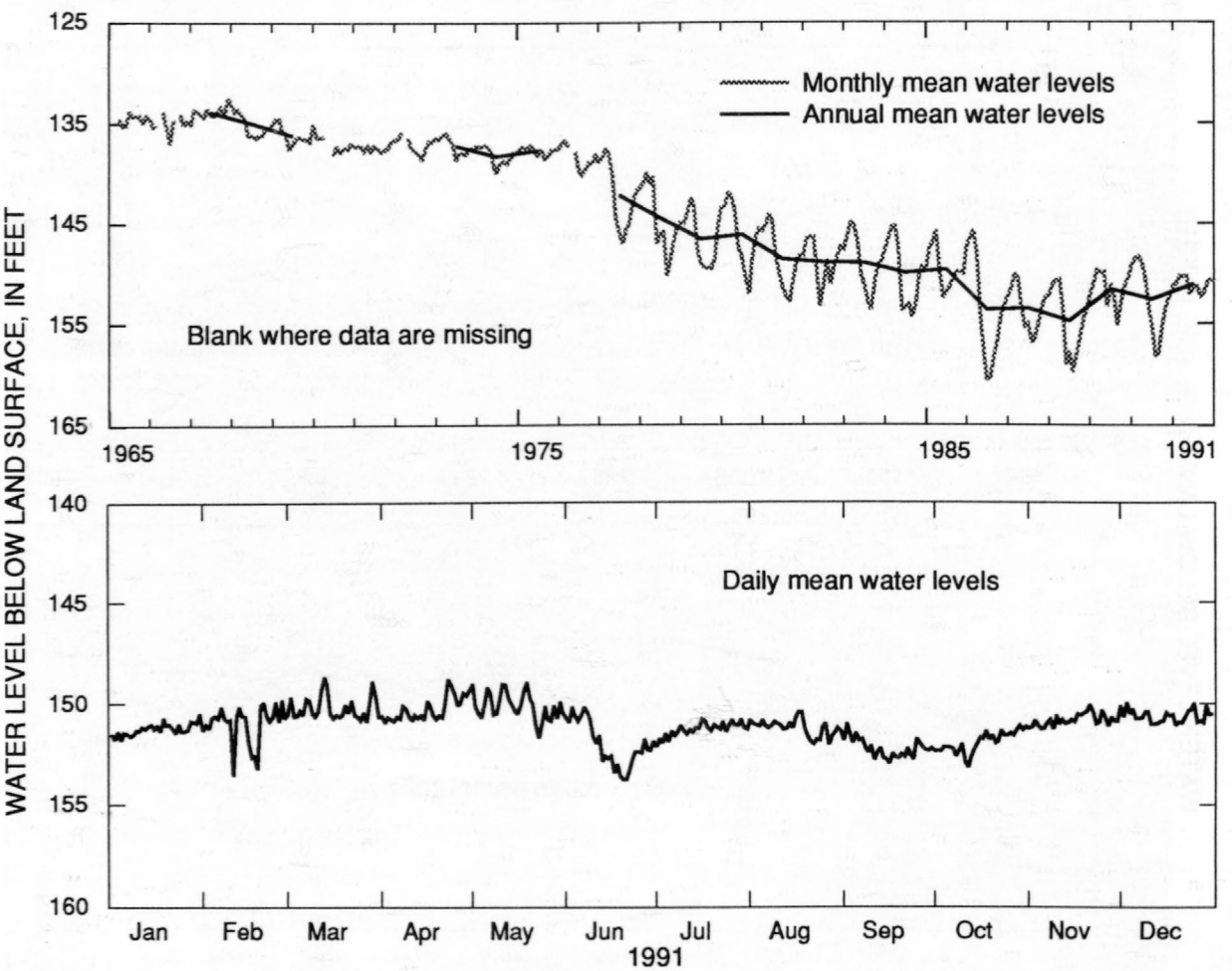


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	161.75	159.66	157.93	157.03	156.14	158.05	158.08	158.01	157.24	157.47	156.89	156.19
LOW	162.87	160.66	158.44	157.74	156.58	158.99	158.50	158.56	157.81	157.74	157.33	156.57
HIGH	160.47	158.99	157.31	156.40	155.79	156.52	157.55	157.30	156.82	157.22	156.57	155.78

CAL YR	1991		MEAN	157.86		HIGH	155.78		LOW	162.92		

Figure 73.--Water level in observation well 06K009, Early County.

314602084473701 Local number, 07N001.
LOCATION.--Lat 31°46'09", long 84°47'43", Hydrologic Unit 03110204.
Owner: City of Cuthbert.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled unused municipal well, diameter 8 in., depth 372 ft, casing depth unknown.
DATUM.--Altitude of land-surface datum is 460 ft.
REMARKS.--Well pumped and redeveloped August 8, 1989. Well near city wells.
PERIOD OF RECORD.--1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 132.0 ft below land-surface datum, December 10, 1967; lowest, 162.08 ft below land-surface datum, August 4, 1986.

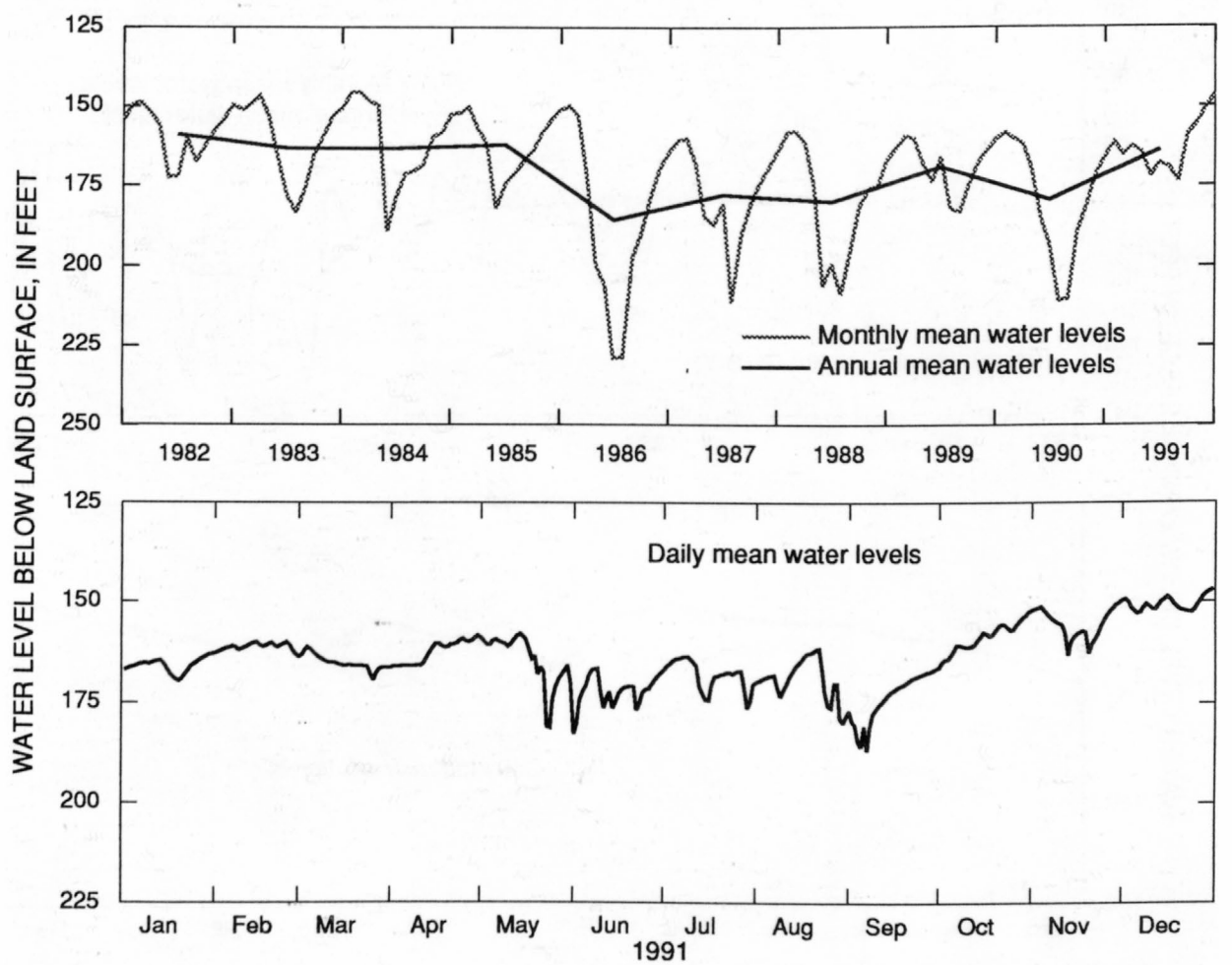


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	151.25	151.00	150.23	150.30	150.16	152.04	151.32	151.23	152.24	151.93	150.80	150.59
LOW	151.81	153.58	150.93	150.96	151.73	153.78	152.00	152.06	152.99	153.18	151.24	151.04
HIGH	150.48	149.85	148.73	148.86	149.00	150.20	150.82	150.42	150.98	151.06	150.02	149.94

CAL YR	1991		MEAN	151.09		HIGH	148.73		LOW	153.78		

Figure 74.--Water level in observation well 07N001, Randolph County.

314611084310301 Local number, 09N001.
LOCATION.--Lat 31°46'09", long 84°31'07", Hydrologic Unit 03130009.
Owner: Bill Newman.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 6 in., depth 433 ft, cased to 333 ft, open hole.
DATUM.--Altitude of land-surface datum is 348 ft.
REMARKS.--Borehole geophysical survey conducted July 31, 1953. Well pumped and redeveloped August 9, 1989. Water levels for periods of missing record, July 20 to August 7 and August 30 to September 29, were estimated.
PERIOD OF RECORD.--1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 144.06 ft below land-surface datum, May 16, 1984; lowest, 241.61 ft below land-surface datum, July 21, 1986.

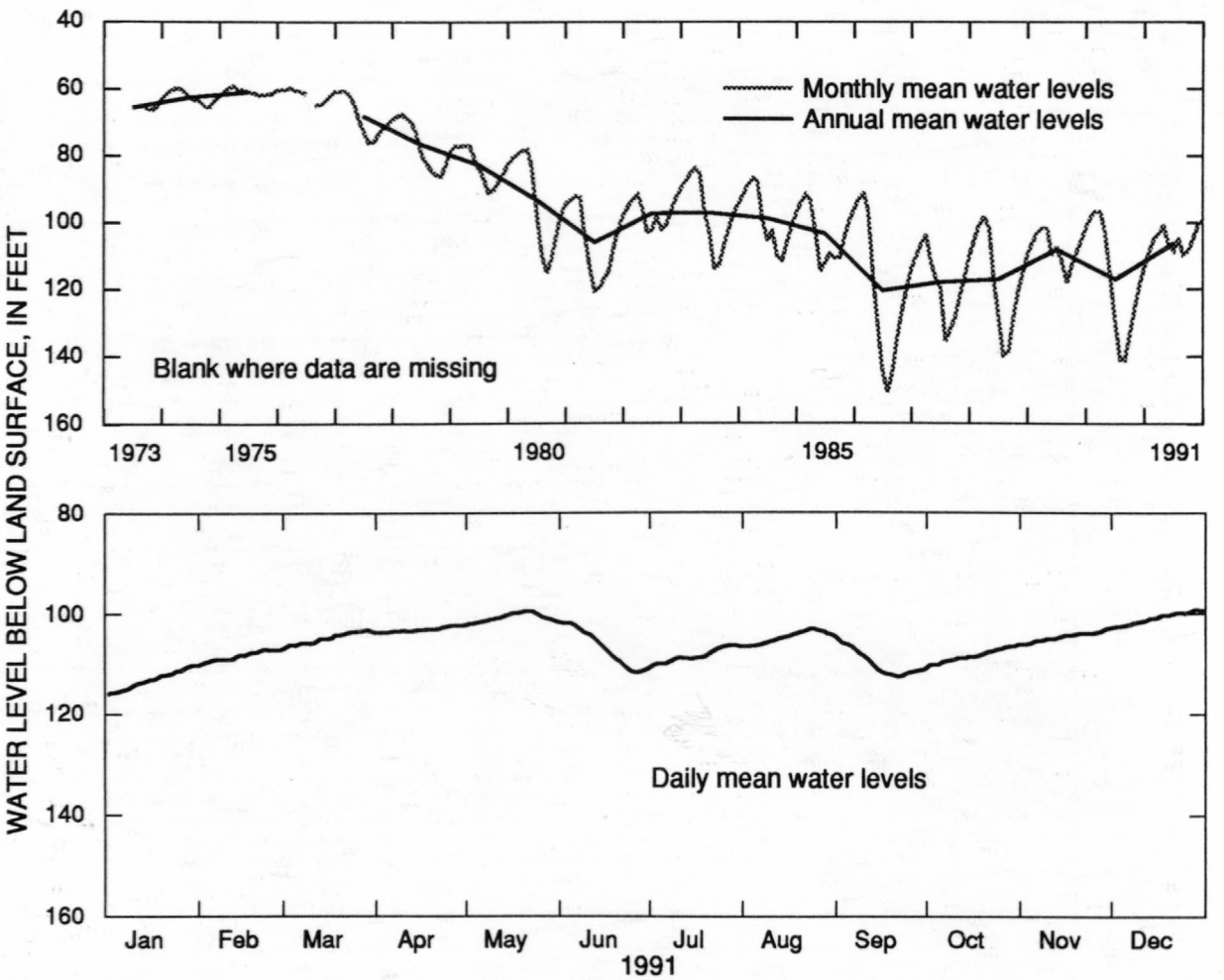


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	165.90	161.26	165.21	162.62	164.17	172.00	167.91	169.09	173.78	158.94	155.57	150.62
LOW	169.53	163.02	169.50	166.09	181.09	179.80	176.29	179.89	186.90	165.09	163.17	153.02
HIGH	162.92	160.08	161.40	158.40	157.89	166.40	163.31	161.46	166.52	152.71	150.24	146.92

CAL YR	1991		MEAN	163.92		HIGH	146.92		LOW	186.90		

Figure 75.--Water level in observation well 09N001, Terrell County.

313532084203501 Local number, 11L002.
LOCATION.--Lat 31°35'32", long 84°20'35", Hydrologic Unit 03130008.
Owner: Georgia Geologic Survey, Albany Nursery.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
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.
REMARKS.--Well pumped and redeveloped August 14, 1988. Borehole geophysical survey conducted June 3, 1975. Water levels for periods of missing record, March 30 to April 21 and May 24-26, were estimated.
PERIOD OF RECORD.--1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 58.90 ft below land-surface datum, April 29, 1975; lowest, 152.61 ft below land-surface datum, August 23, 1986.

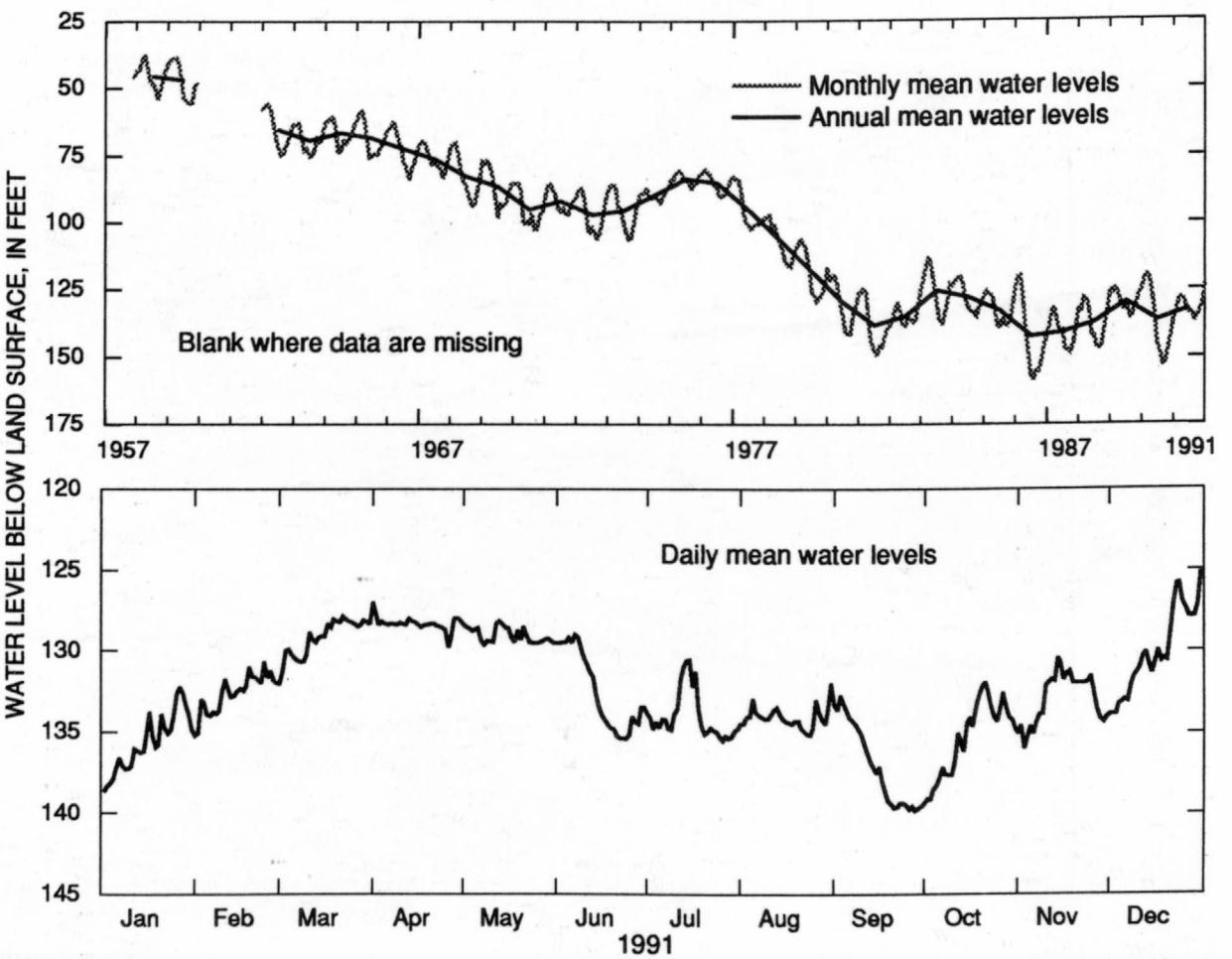


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	113.16	108.39	104.85	103.14	100.77	106.80	108.48	104.75	109.84	108.42	104.55	100.80
LOW	115.87	109.94	106.63	103.74	102.03	111.76	110.49	106.56	112.61	110.35	106.12	102.57
HIGH	110.19	107.11	103.23	102.32	99.53	101.80	106.30	103.03	105.45	106.24	102.81	99.15

CAL YR	1991		MEAN	106.14		HIGH	99.15		LOW	116.11		

Figure 76.--Water level in observation well 11L002, Dougherty County.

313554084062501 Local number, 13L002.
LOCATION.--Lat 31°35'51", long 84°06'24", Hydrologic Unit 03130008.
Owner: Albany Water, Gas, and Light Commission, Turner City 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 12 in., depth 760 ft, cased to 713 ft, open hole.
DATUM.--Altitude of land-surface datum is 212.84 ft.
REMARKS.--Well pumped and sounded to a depth of 760 ft, June 21, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted March 17, 1977. Water levels for periods of missing record, January 1-7, Febuary 2-20, March 18-20, 24, 26-30, April 4-5, 8, 10-11, 14-18, 22-25, 30, and May 2-5, were estimated. Well pumped and sampled by Georgia Geologic Survey, December 10, 1991.
PERIOD OF RECORD.-- 1957 to 1959; 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 38.19 ft below land-surface datum, April 1, 1959; lowest, 160.88 ft below land-surface datum. July 26, 1986.

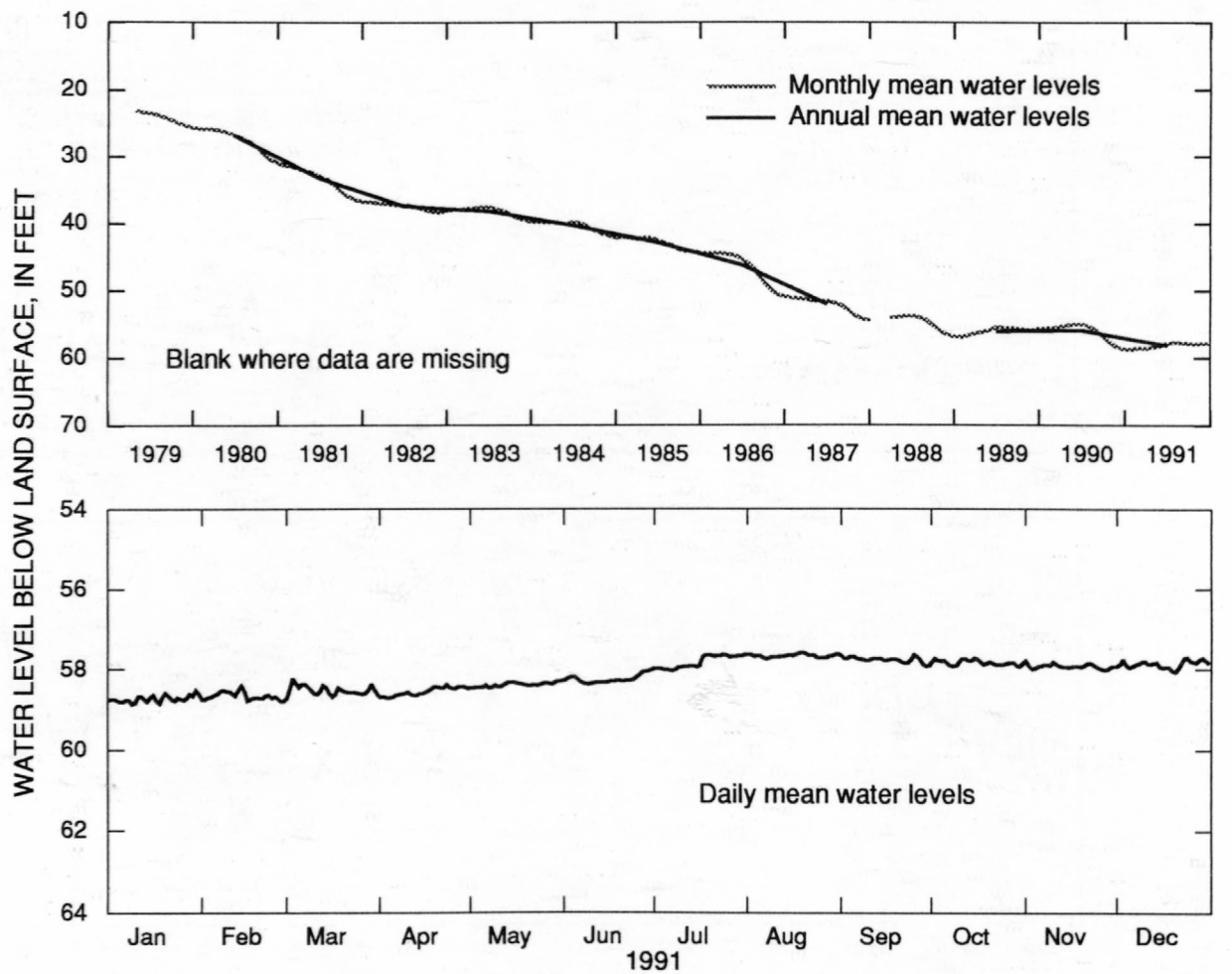


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	135.72	132.60	129.19	128.36	129.05	132.45	134.01	134.11	137.04	135.35	132.92	130.08
LOW	138.61	135.05	131.26	129.81	129.64	135.38	135.52	135.15	139.82	139.14	135.99	133.84
HIGH	132.20	130.71	127.87	127.79	128.17	129.03	130.59	131.96	132.72	131.90	130.44	125.15

CAL YR	1991		MEAN	132.57		HIGH	125.15		LOW	139.82		

Figure 77.--Water level in observation well 13L002, Dougherty County.

312654084210103 Local number, 11K005.
LOCATION.--Lat 31°26'54", long 84°21'01", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 12.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 690 ft, cased to 630 ft, open hole.
DATUM.--Altitude of land-surface datum is 183 ft.
REMARKS.--Borehole geophysical survey conducted March 14, 1979.
PERIOD OF RECORD.--1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.03 ft below land-surface datum, May 24, 1979; lowest, 58.86 ft below land-surface datum, January 9, 1991.

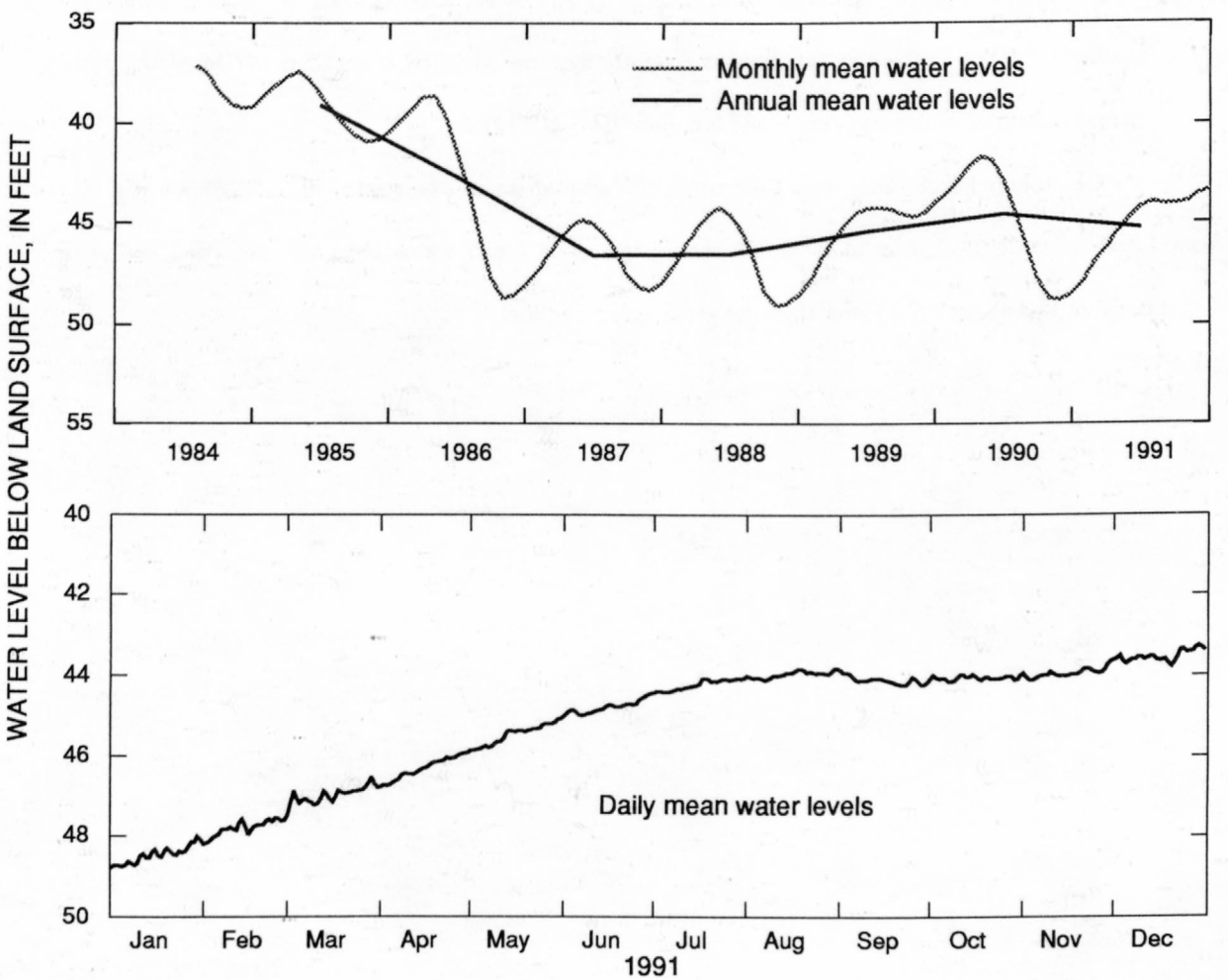


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	58.73	58.67	58.53	58.57	58.40	58.27	57.84	57.69	57.78	57.84	57.92	57.86
LOW	58.86	58.81	58.70	58.73	58.47	58.38	58.05	57.77	57.93	57.93	58.01	58.06
HIGH	58.52	58.41	58.24	58.40	58.30	58.02	57.65	57.61	57.66	57.73	57.83	57.70

CAL YR	1991		MEAN	58.17		HIGH	57.61		LOW	58.86		

Figure 78.--Water level in observation well 11K005, Dougherty County.

315731083542301 Local number, 14P014.
LOCATION.--Lat 31°57'31", long 83°54'23", Hydrologic Unit 03130006.
Owner: Georgia Geologic Survey, Veterans Memorial Park test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Clayton.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 550 ft, cased to 500 ft, open hole.
DATUM.--Altitude of land-surface datum is 252 ft.
REMARKS.--Well pumped May 20, 1982. Borehole geophysical survey conducted February 22, 1982.
PERIOD OF RECORD.--1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.16 ft below land-surface datum, September 2, 1984; lowest, 49.26 ft below land-surface datum, November 29, 1988.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	48.48	47.81	46.97	46.30	45.44	44.76	44.21	43.95	44.09	44.05	43.94	43.54
LOW	48.76	48.18	47.23	46.74	45.83	44.96	44.39	44.11	44.22	44.14	44.11	43.78
HIGH	48.01	47.56	46.51	45.89	45.03	44.41	44.05	43.81	43.91	43.96	43.66	43.28

CAL YR	1991		MEAN	45.28		HIGH	43.28		LOW	48.78		

Figure 79.--Water level in observation well 14P014, Crisp County.

Cretaceous Aquifers and Aquifer Systems

Water levels in Cretaceous aquifers and aquifer systems are monitored in nine wells, seven of which are summarized in this report (figs. 80 - 87). The Cretaceous aquifers and aquifer systems include the Providence aquifer in southwestern Georgia and the Dublin, the Midville, and the Dublin-Midville aquifer systems in the northeastern part of the Coastal Plain. Water levels in these aquifers and aquifer systems are influenced by variations in precipitation and pumping (J.S. Clarke, U.S. Geological Survey, oral commun., 1992). During 1985, the Cretaceous aquifers and aquifer systems supplied more than 147 Mgal/d, mainly for municipal and industrial purposes (Pierce and Kundell, 1990, p. 219).

In Chattahoochee County near Columbus, the annual mean water level in well 06S001 (fig. 81), was about 1.3 ft lower in 1991 than in 1990. A record low daily mean water level was recorded in the well in November that was about 0.5 ft lower than the previous record low.

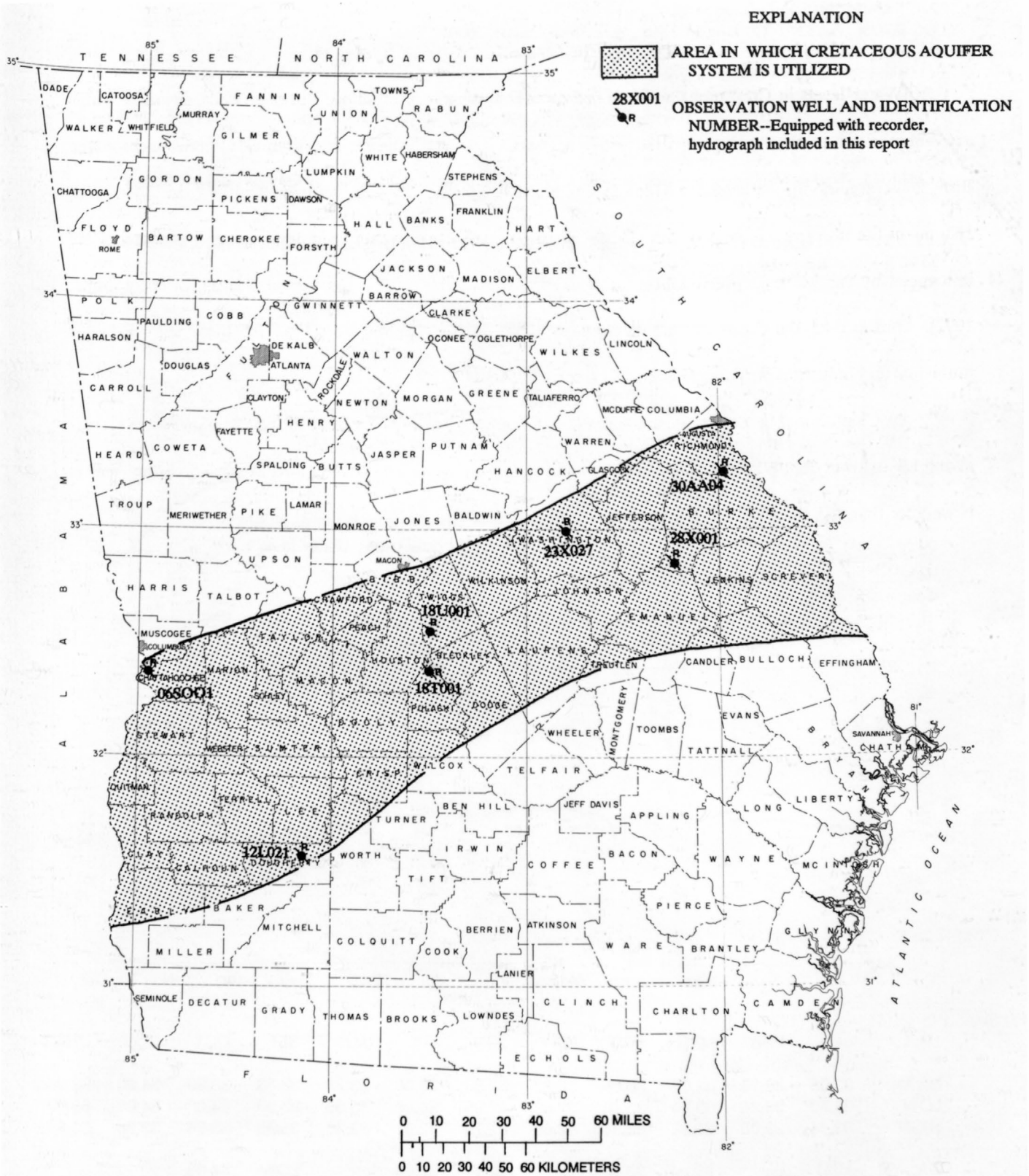
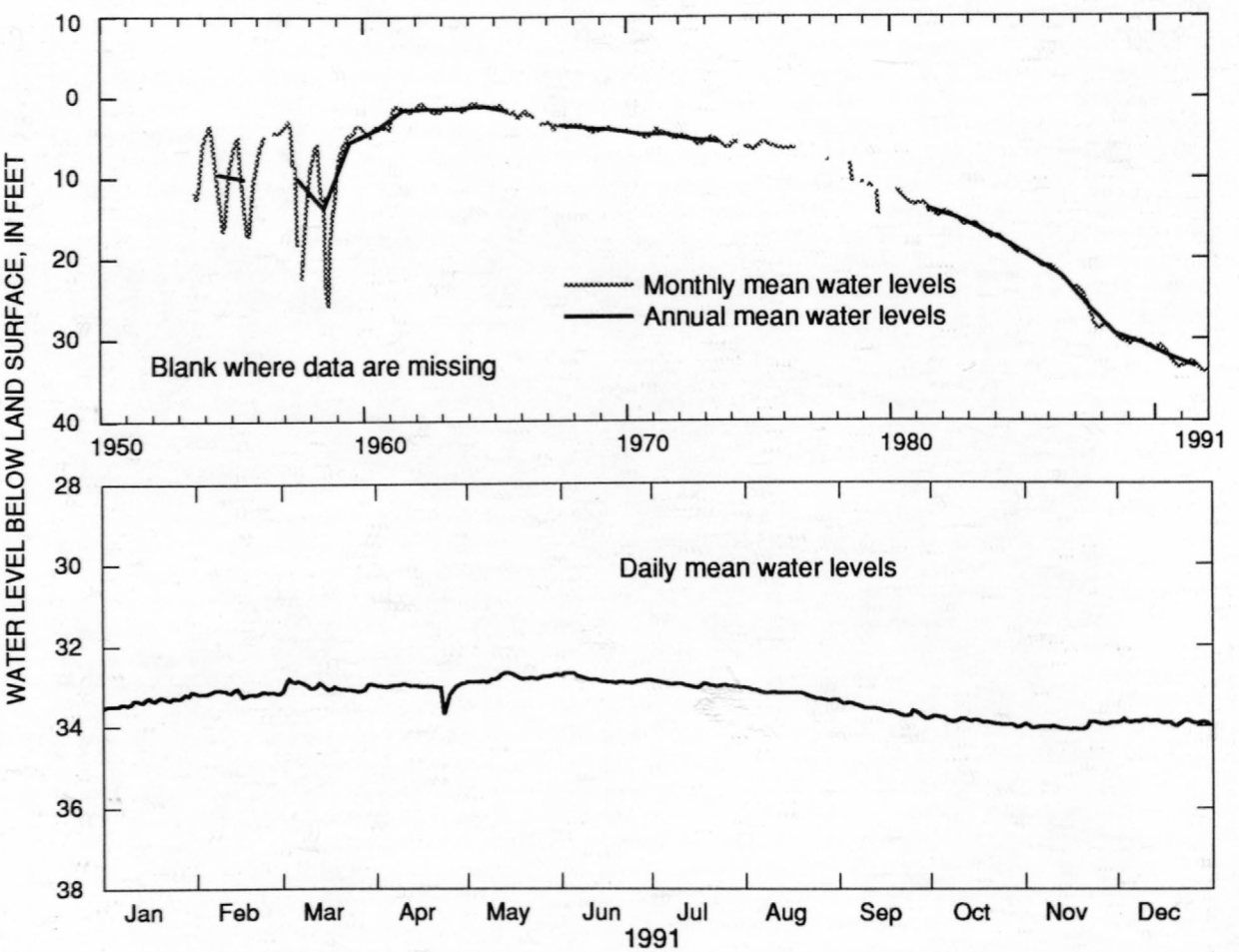


Figure 80.--Locations of observation wells completed in Cretaceous aquifers and aquifer systems.

322036084590301 Local number, 06S001.
LOCATION.--Lat 32°20'31", long 84°59'10", Hydrologic Unit 03130003.
Owner: U.S. Army, Fort Benning.
INSTRUMENTATION.--Digital recorder.
AQUIFER.-- Cretaceous (Blufftown, Eutaw, and Tuscaloosa Formations).
WELL CHARACTERISTICS.--Drilled unused supply well, diameter 12 in., depth 568 ft, screened intervals 215-220 ft, 230-235 ft, 280-290 ft, and 540-550 ft.
DATUM.--Altitude of land-surface datum is 255 ft.
REMARKS.--Well pumped and redeveloped August 7, 1989. Well pumped and sampled by Georgia Geologic Survey November 29-30, 1989.
PERIOD OF RECORD.--1950 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.37 ft below land-surface datum, April 10, 1964; lowest, 34.08 ft below land-surface datum, November 19, 1991.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	33.35	33.16	33.02	33.05	32.82	32.86	33.00	33.24	33.63	33.90	34.00	33.90
LOW	33.50	33.26	33.14	33.72	32.93	32.96	33.08	33.39	33.83	34.02	34.08	33.99
HIGH	33.14	33.06	32.82	32.94	32.69	32.70	32.91	33.10	33.45	33.76	33.88	33.83

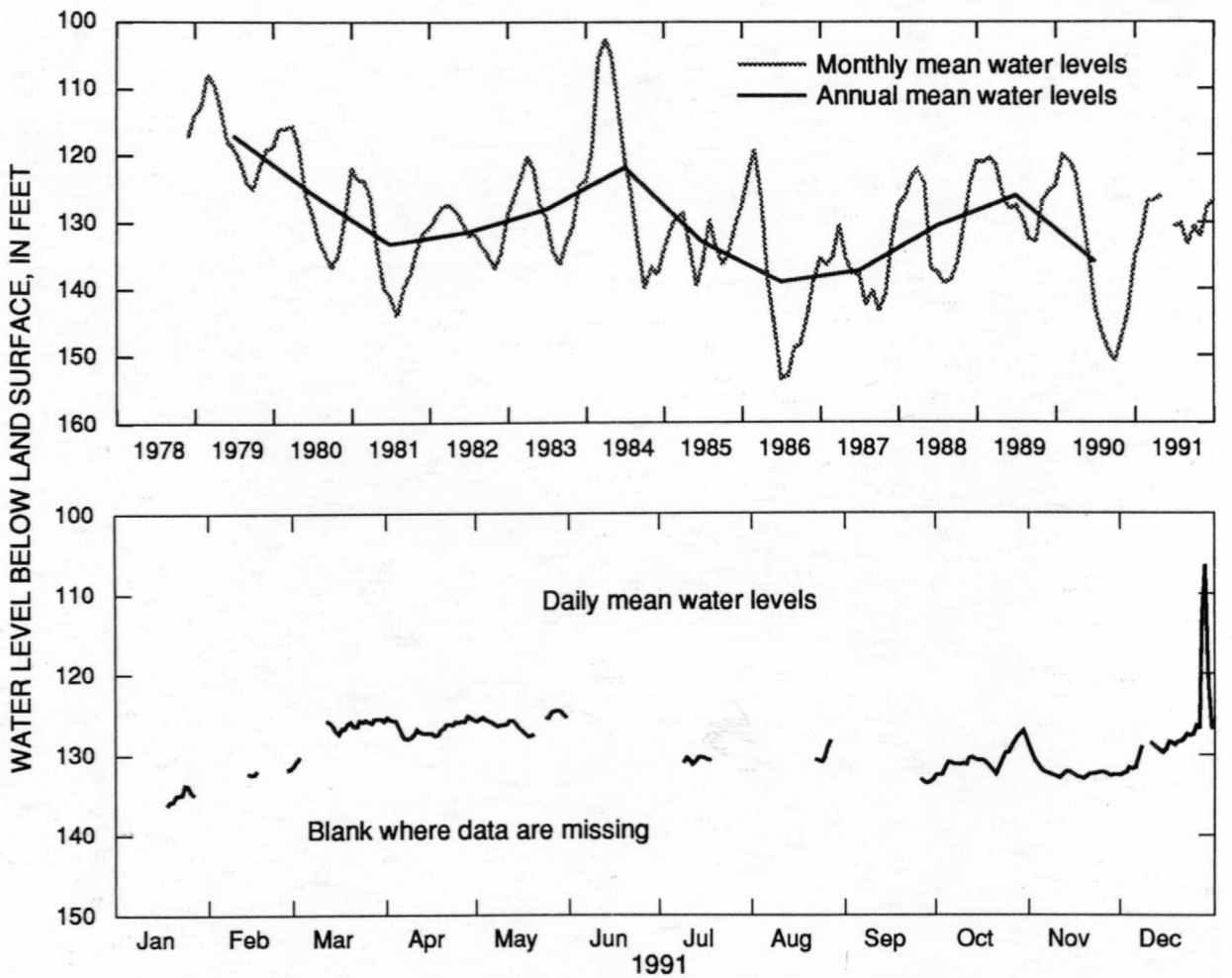
CAL YR	1991		MEAN	33.33		HIGH	32.69		LOW	34.08		

Figure 81.--Water level in observation well 06S001, Chattahoochee County.

Providence aquifer

The water level in the Providence aquifer in the Albany area is monitored in one well (figs. 80 and 82). The aquifer supplied about 9 Mgal/d for municipal, industrial, and agricultural uses in southwestern Georgia during 1980 (Clarke and others, 1983). In 1991, the annual mean water level in this well 12L021 (fig. 82) was about 6.9 ft higher than in 1990.

313534084103003 Local number, 12L021.
LOCATION.--Lat 31°35'37", long 84°10'29", Hydrologic Unit 03130008.
Owner: U.S. Geological Survey, test well 10.
INSTRUMENTATION.--Basic data recorder.
AQUIFER.--Providence.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 834 ft, cased to 810 ft, screen to 830 ft.
DATUM.--Altitude of land-surface datum is 198 ft.
REMARKS.--Borehole geophysical survey conducted October 26, 1978. Well pumped and sampled by Georgia Geologic Survey, October 24, 1989. Water levels for periods, January 1-17, January 28 to February 13, February 18-26, March 4-11, May 21-23, June 1 to July 8, July 19 to August 21 and August 28 to September 25, are missing.
PERIOD OF RECORD.--December 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 101.59 ft below land-surface datum, April 26, 1984; lowest, 156.36 ft below land-surface datum, July 26, 1986.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	------	------	------	126.67	126.01	------	------	------	------	130.56	132.12	127.53
LOW	------	------	------	128.05	127.75	------	------	------	------	132.50	132.93	132.24
HIGH	------	------	------	125.23	124.60	------	------	------	------	127.09	129.96	106.40

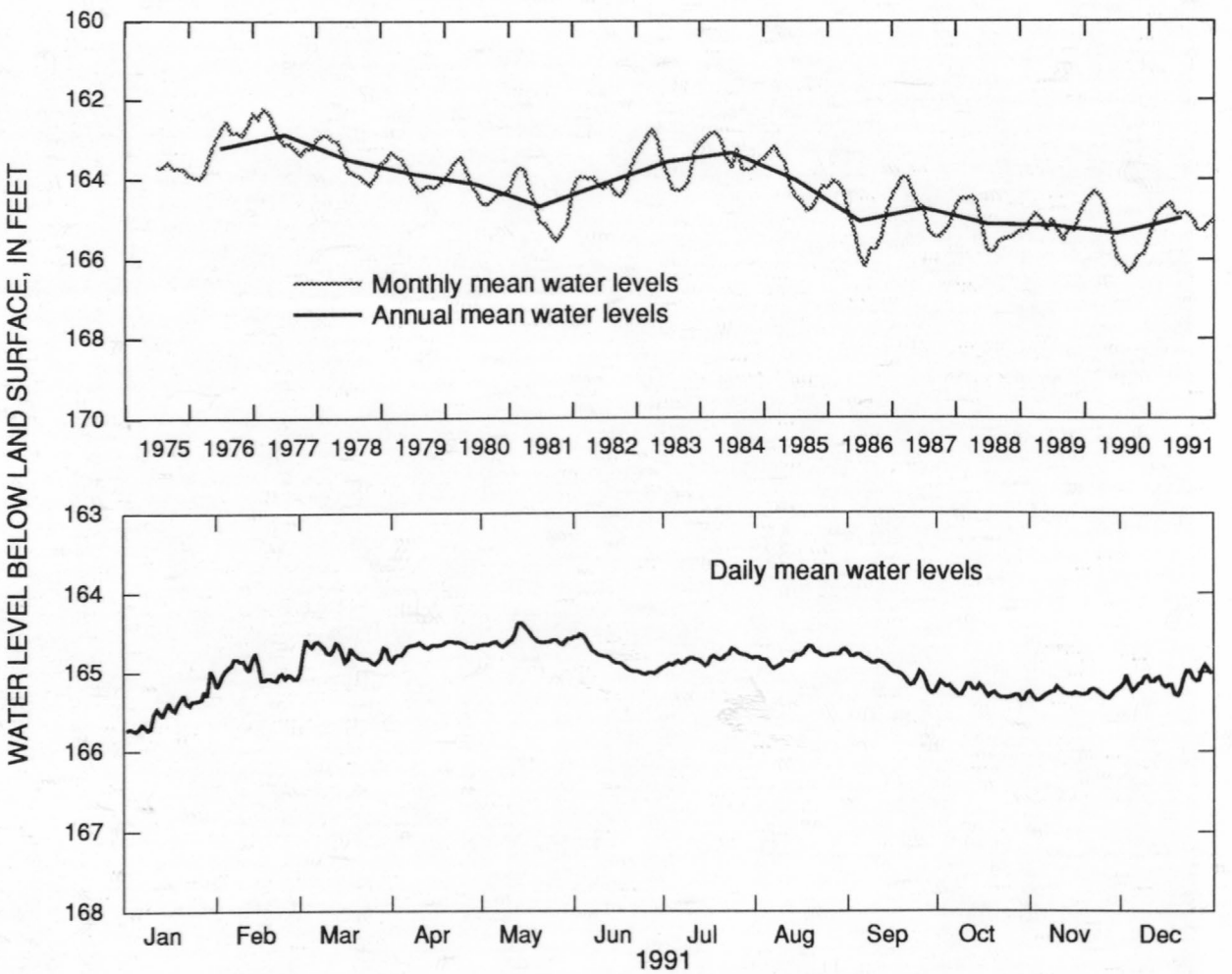
CAL YR 1991 MEAN 128.58 HIGH 106.40 LOW 136.21*
[* may have been lower during period of missing record]

Figure 82.--Water level in observation well 12L021, Dougherty County.

Dublin aquifer system

The water level in the Dublin aquifer system is monitored in one well in southern Twiggs County (figs. 80 and 83). In this area, water levels in wells tapping the aquifer are affected by precipitation and by pumping in eastern Houston and western Twiggs Counties (Clarke and others, 1985a), where pumpage exceeded 41 Mgal/d in 1990 (Fanning and others, 1992). The annual mean water level in well 18U001 (fig. 83) was about 0.4 ft higher in 1991 than in 1990.

323302083263401 Local number, 18U001.
LOCATION.--Lat 32°33'02", long 83°26'34", Hydrologic Unit 03070104.
Owner: Georgia Kraft, U.S. Geological Survey, test well 3.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Dublin aquifer system.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 616 ft, cased to 586 ft, screen to 616 ft.
DATUM.--Altitude of land-surface datum is 442 ft.
REMARKS.--Water-quality analysis June 10, 1975.
PERIOD OF RECORD.--July 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 162.0 ft below land-surface datum, April 4, 1977; lowest, 166.44 ft below land-surface datum, October 3, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	165.48	165.00	164.76	164.68	164.59	164.85	164.84	164.82	164.98	165.25	165.27	165.11
LOW	165.75	165.14	164.90	164.80	164.68	165.04	164.93	164.97	165.27	165.36	165.36	165.30
HIGH	164.98	164.75	164.58	164.61	164.38	164.53	164.71	164.68	164.78	165.12	165.18	164.91

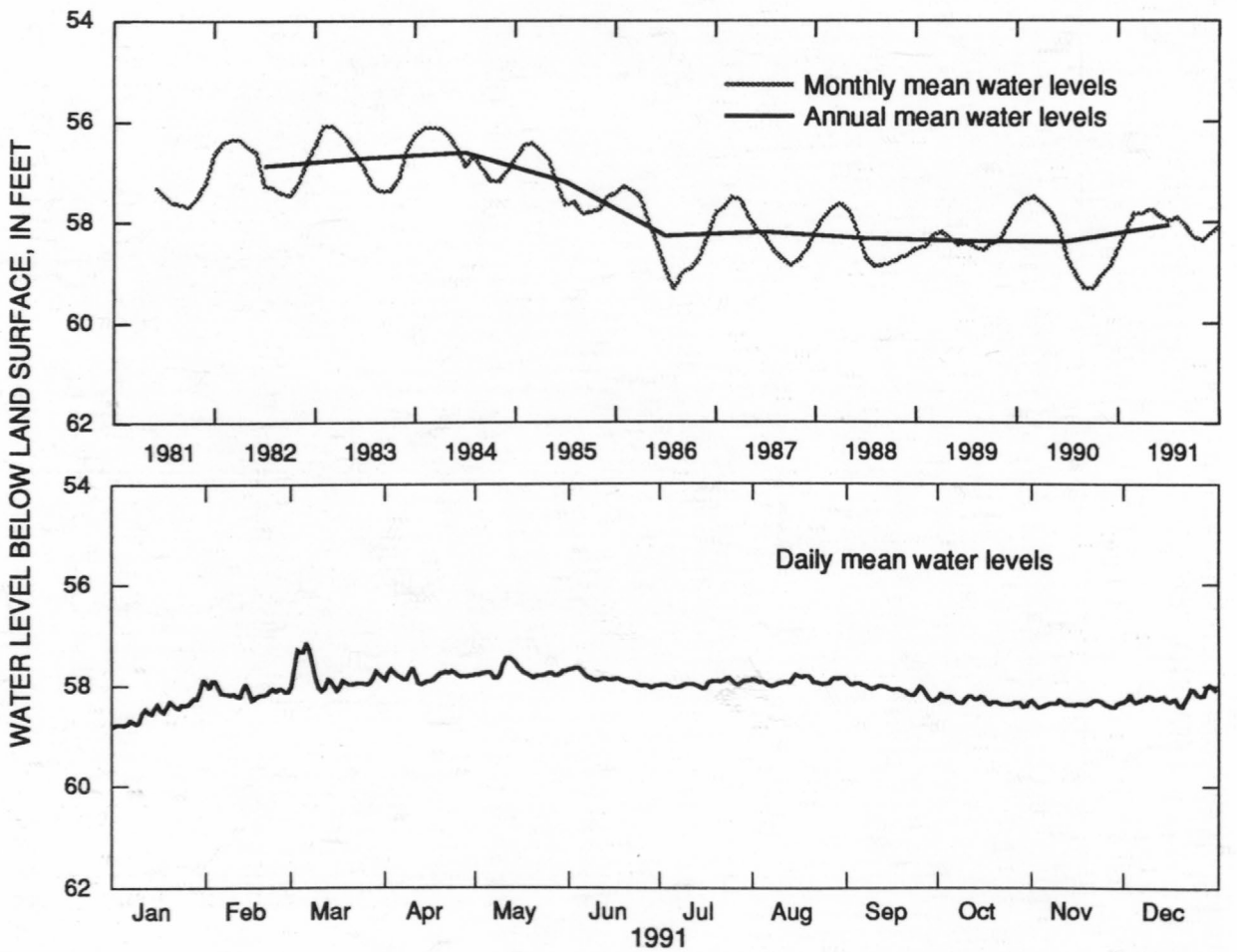
CAL YR	1991		MEAN	164.97		HIGH	164.38		LOW	165.77		

Figure 83.--Water level in observation well 18U001, Twiggs County.

Midville aquifer system

The water level in the Midville aquifer system is affected mainly by regional pumping (Clarke and others, 1985a). The water level is monitored in four wells in east-central Georgia (figs.80; 84 and 85); data from two of these wells, 18T001 (fig. 84) and 28X001 (fig. 85), are summarized in this report. In 1991, the annual mean water level in these wells ranged from 0.5 ft lower to about 0.3 ft higher than in 1990, respectively.

322245083290101 Local number, 18T001.
LOCATION.--Lat 32°22'45", long 83°29'01", Hydrologic Unit 03070104.
Owner: U.S. Geological Survey, Arrowhead test well 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Midville aquifer system.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 1,555 ft, cased to 970 ft, screened intervals, 970-980 ft, 1,110-1,130 ft, and 1,270-1,280 ft.
DATUM.--Altitude of land-surface datum is 334 ft.
REMARKS.--Borehole geophysical survey conducted January 28 and April 15, 1981. Water-quality analysis May 12, 1981.
PERIOD OF RECORD.-- June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 55.48 ft below land-surface datum, April 12, 1983; lowest, 59.52 ft below land-surface datum, October 7-8, 1990.

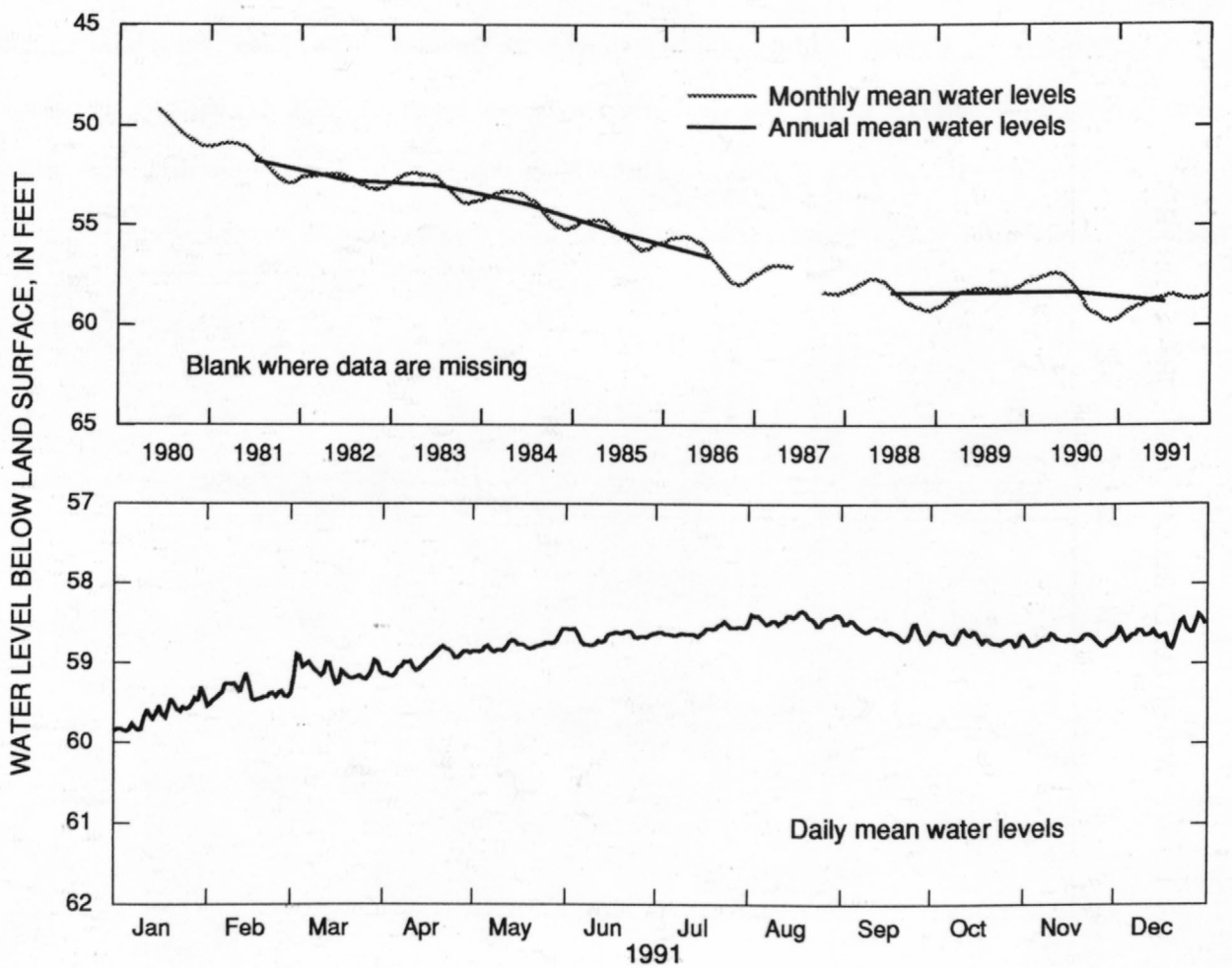


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	58.50	58.12	57.82	57.82	57.73	57.88	57.97	57.91	58.07	58.30	58.35	58.22
LOW	58.79	58.29	58.10	57.98	57.86	58.05	58.06	58.02	58.30	58.41	58.43	58.41
HIGH	57.88	57.91	57.15	57.66	57.46	57.65	57.86	57.79	57.95	58.17	58.28	57.98

CAL YR	1991		MEAN	58.06		HIGH	57.15		LOW	58.83		

Figure 84.--Water level in observation well 18T001, Pulaski County.

325232082131501 Local number, 28X001.
LOCATION.--Lat 32°52'32", long 82°13'15", Hydrologic Unit 03060201.
Owner: U.S. Geological Survey, Midville Experiment Station 1.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Midville aquifer system.
WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 1,045 ft, cased to 1,025 ft, screen to 1,045 ft.
DATUM.--Altitude of land-surface datum is 269 ft.
REMARKS.--Borehole geophysical survey conducted March 8 and April 22, 1980. Water-quality analyses May 23, 1980.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.07 ft below land-surface datum, June 4, 1980; lowest, 59.91 ft below land-surface datum, November 30, 1990.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	59.64	59.37	59.10	58.97	58.78	58.66	58.59	58.44	58.59	58.68	58.70	58.60
LOW	59.85	59.51	59.25	59.16	58.86	58.77	58.66	58.52	58.73	58.78	58.78	58.80
HIGH	59.30	59.13	58.89	58.79	58.57	58.57	58.47	58.34	58.46	58.57	58.62	58.38

CAL YR	1991		MEAN	58.84		HIGH	58.34		LOW	59.85		

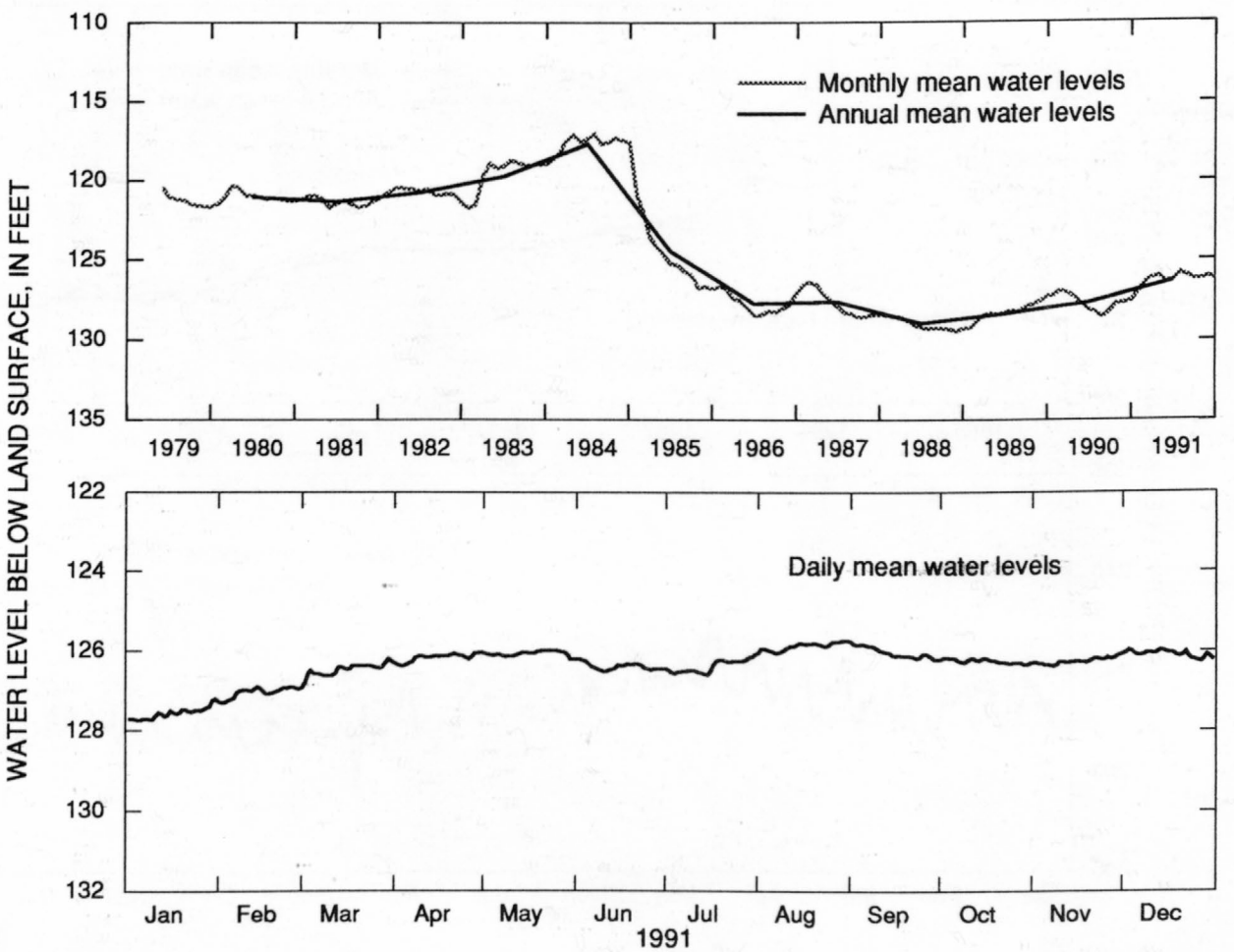
Figure 85.--Water level in observation well 28X001, Burke County.

Dublin-Midville aquifer system

The water level in the Dublin-Midville aquifer system is monitored in two wells, both of which are included in this report (figs. 80; 86 and 87). Water levels in wells tapping the Dublin-Midville aquifer system in Richmond County are influenced mainly by precipitation and by local pumping (Gorday, 1985, p. 28). The annual mean water level in well 30AA04 (fig. 86), near McBean in southern Richmond County, was about 1.3 ft higher in 1991 than in 1990.

At Sandersville, Washington County, the water level in the Dublin-Midville aquifer system is influenced primarily by local pumping (J.S. Clarke, U.S. Geological Survey, oral commun., 1992). During 1991, the annual mean water level in well 23X027 (fig. 87) was about 1.2 ft lower than in 1990. A record low daily mean water level was recorded in this well in August that was about 1.1 ft lower than the previous record low.

331711081573701 Local number, 30AA04.
LOCATION.--Lat 33°15'25", long 81°57'47", Hydrologic Unit 03060106.
Owner: Richmond County water system, USGS McBean 2.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Dublin-Midville aquifer system.
WELL CHARACTERISTICS.--Drilled unused municipal well, diameter 6 in., depth 496 ft, cased to 174 ft, screened intervals, 174-192 ft, 299-319 ft, 341-372 ft, and 393-434 ft.
DATUM.--Altitude of land-surface datum is 293 ft.
REMARKS.--Borehole geophysical survey conducted October 23, 1967. Water-quality sample collected November 26, 1967.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 116.70 ft below land-surface datum, May 30, 1984; lowest, 129.61 ft below land-surface datum, August 28, 1988.

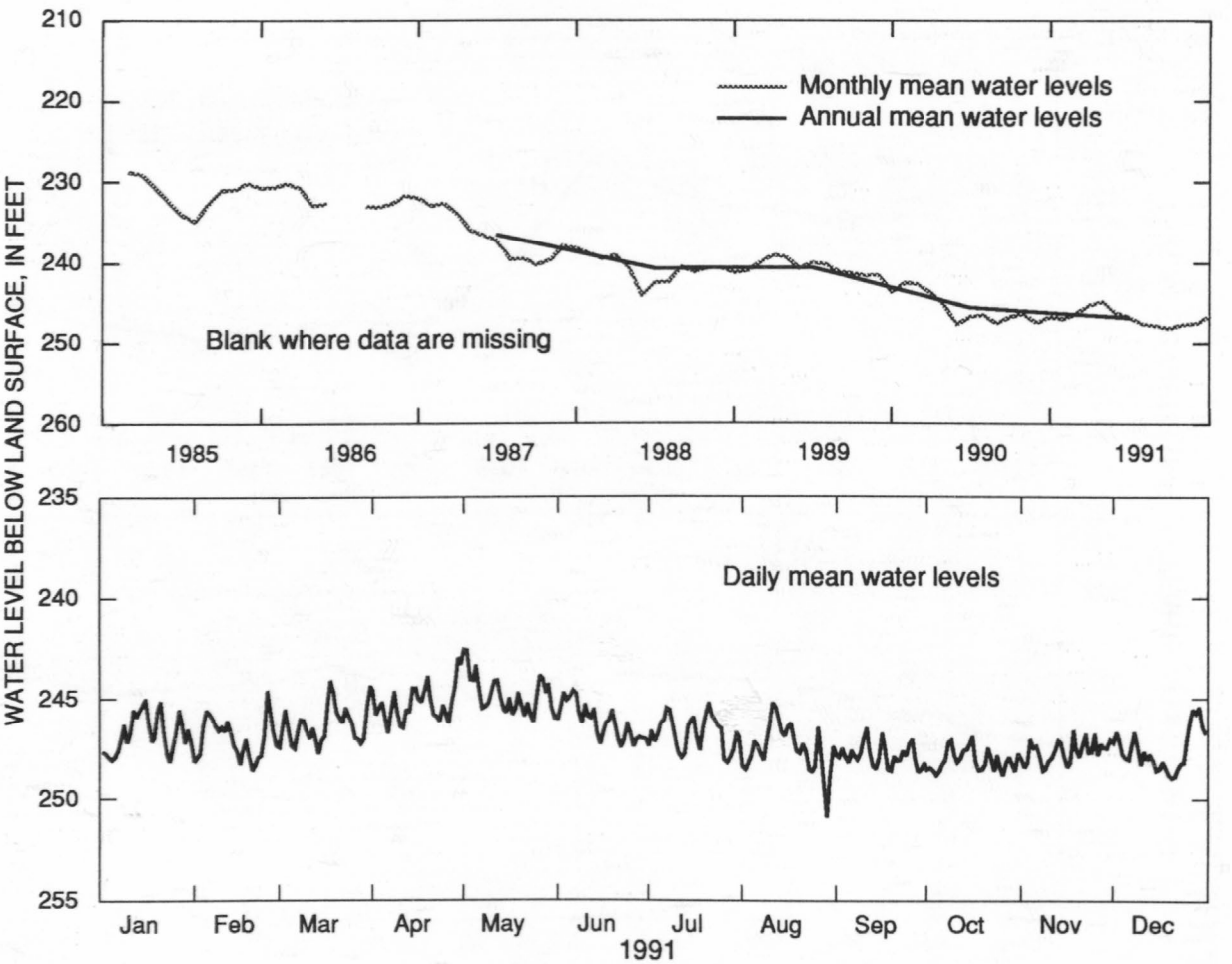


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	127.56	127.03	126.45	126.14	126.04	126.36	126.36	125.86	126.02	126.24	126.26	126.09
LOW	127.73	127.30	126.76	126.35	126.17	126.48	126.58	126.04	126.21	126.35	126.38	126.26
HIGH	127.20	126.89	126.18	126.00	125.96	126.18	126.07	125.73	125.81	126.16	126.09	125.97

CAL YR	1991		MEAN	126.36		HIGH	125.73		LOW	127.73		

Figure 86.--Water level in observation well 30AA04, Richmond County.

325848082480901 Local number, 23X027.
LOCATION.--Lat 32°58'48", long 82°48'08", Hydrologic Unit 03070102.
Owner: City of Sandersville, well 8.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Dublin-Midville aquifer system.
WELL CHARACTERISTICS.--Drilled unused municipal well, diameter 8 in., depth 750 ft, cased to 480 ft, screened intervals, 480-485 ft, 605-610 ft, 650-655 ft, 695-700 ft, and 740-745 ft.
DATUM.--Altitude of land-surface datum is 450 ft.
REMARKS.--Borehole geophysical survey conducted March 14, 1985. Well sounded to 672 ft on March 14, 1985. Lower screens probably caved.
PERIOD OF RECORD.--March 1985 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 227.68 ft below land-surface datum, April 9, 1985; lowest, 250.91ft below land-surface datum, August 29, 1991.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	246.75	246.99	246.31	245.24	244.81	246.17	246.75	247.56	247.85	248.10	247.64	247.53
LOW	248.15	248.60	247.74	246.74	246.16	247.43	248.22	250.91	248.69	248.85	248.61	248.95
HIGH	245.00	244.58	244.10	242.95	242.59	244.57	245.22	245.24	246.47	246.92	246.57	245.38

CAL YR	1991		MEAN	246.80		HIGH	242.55		LOW	250.91		

Figure 87.--Water level in observation well 23X027, Washington County.

Paleozoic Rock Aquifers

The water level in an unconfined Paleozoic limestone aquifer in Walker County is monitored in well 03PP01 (figs. 88 and 89). In this area, water levels in wells tapping the Paleozoic rock aquifers are affected mainly by precipitation and local pumping. The effect of precipitation on water levels in areas where thin regolith overlies aquifers having secondary openings (fractures or solution openings) is indicated in the hydrograph of daily mean water levels for well 03PP01 (fig. 89). The annual mean water level in this well was about the same in 1991 as in 1990.

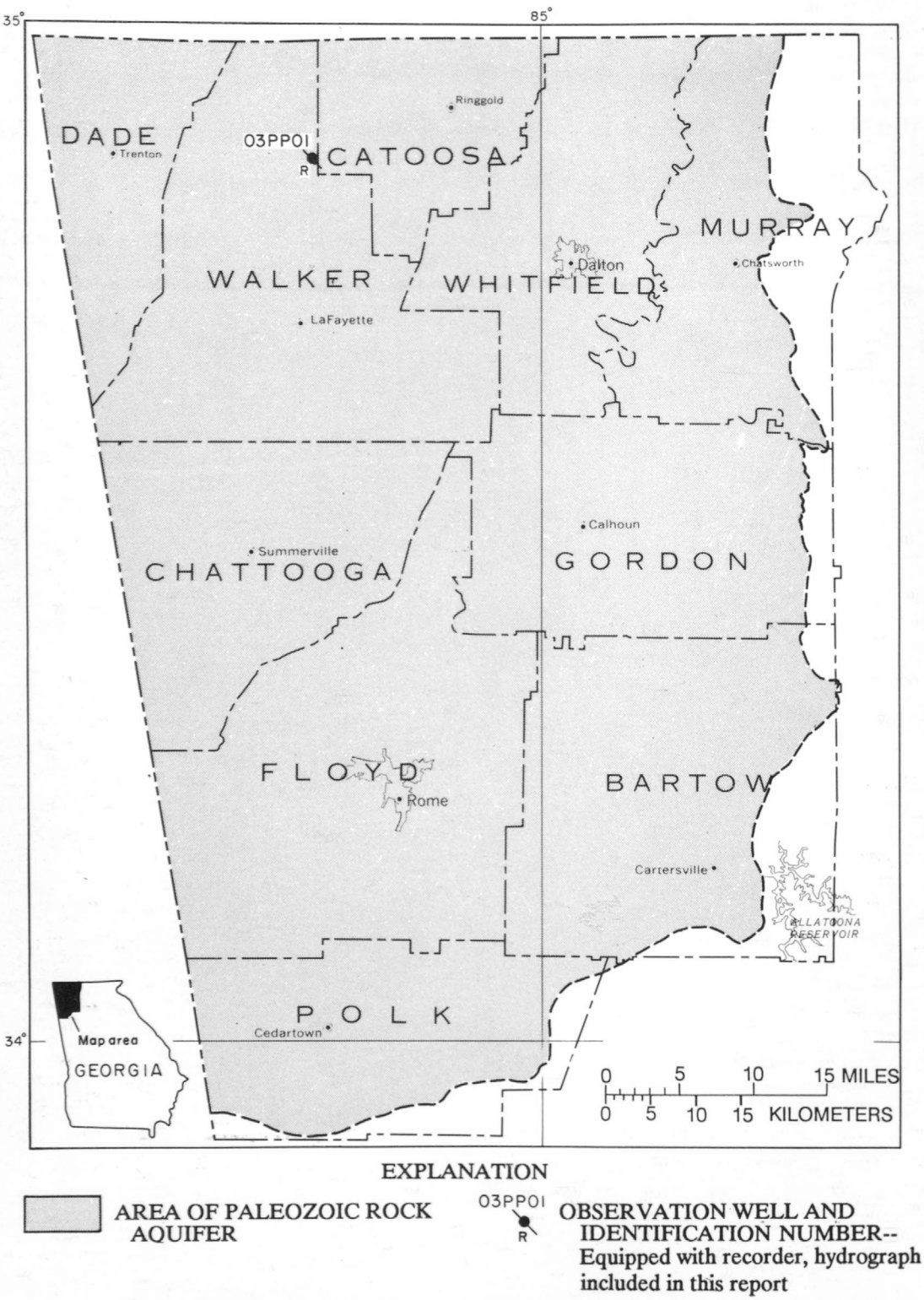
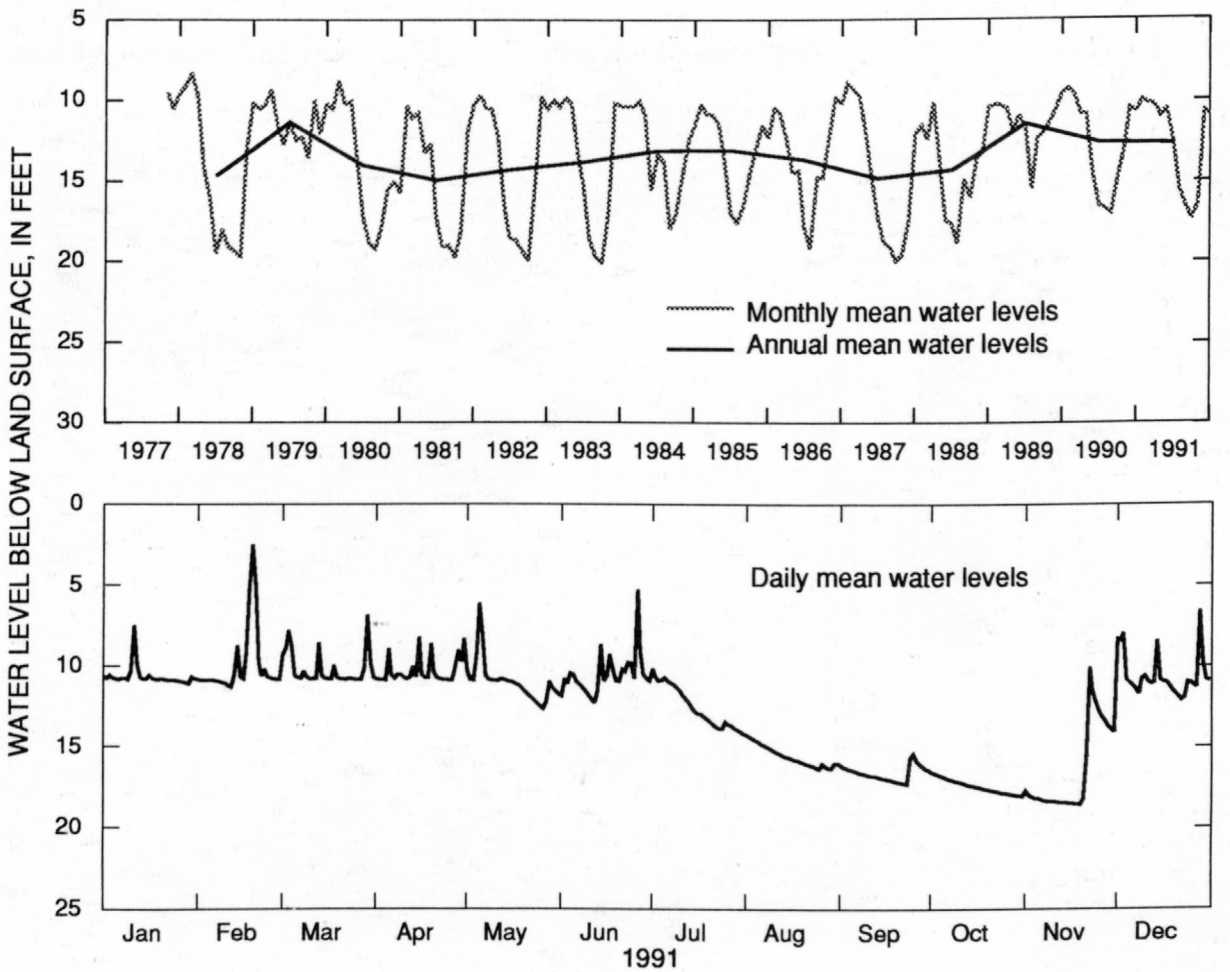


Figure 88.--Location of an observation well in a Paleozoic rock aquifer.

345403085160001 Local number, 03PP01.
LOCATION.--Lat 34°54'08", long 85°16'00", Hydrologic Unit 06020001.
Owner: National Park Service, Chickamauga Battlefield Park.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Paleozoic Rock (Chickamauga Limestone).
WELL CHARACTERISTICS.--Cable-tooled, observation well, diameter 8 in., depth 72 ft, cased to 11 ft, open hole.
DATUM.--Altitude of land-surface datum is 730 ft.
REMARKS.--Well sounded October 18, 1977.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.97 ft below land-surface datum, March 9, 1978; lowest, 21.70 ft below land-surface datum, August 5, 1978.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.65	9.95	10.20	10.28	10.96	10.53	12.51	15.55	16.59	17.42	16.54	10.61
LOW	11.09	11.30	10.84	10.87	12.61	12.28	14.15	16.34	17.29	18.04	18.56	12.06
HIGH	7.47	2.49	6.87	8.22	6.12	5.28	10.63	14.38	15.41	16.62	10.03	6.58

CAL YR 1991 MEAN 12.66 HIGH 2.49 LOW 18.56

Figure 89.--Water level in observation well 03PP01, Walker County.

Crystalline-Rock Aquifers

Water levels in the crystalline-rock aquifers are monitored in nine wells, five of which are summarized in this report (figs. 90 - 95). Water levels in wells tapping the crystalline-rock aquifers are affected mainly by precipitation and evapotranspiration, and locally by pumping (J.S. Clarke, U.S. Geological Survey, oral commun., 1992). As in the Paleozoic rock aquifers, precipitation can cause rapid rises in water levels in areas where thin regolith overlies aquifers having secondary openings, and the effect is illustrated in the hydrograph for well 11FF04 (fig. 93). The annual mean water levels in these wells ranged from 1.0 ft lower to 0.5 ft higher in 1991 than in 1990.

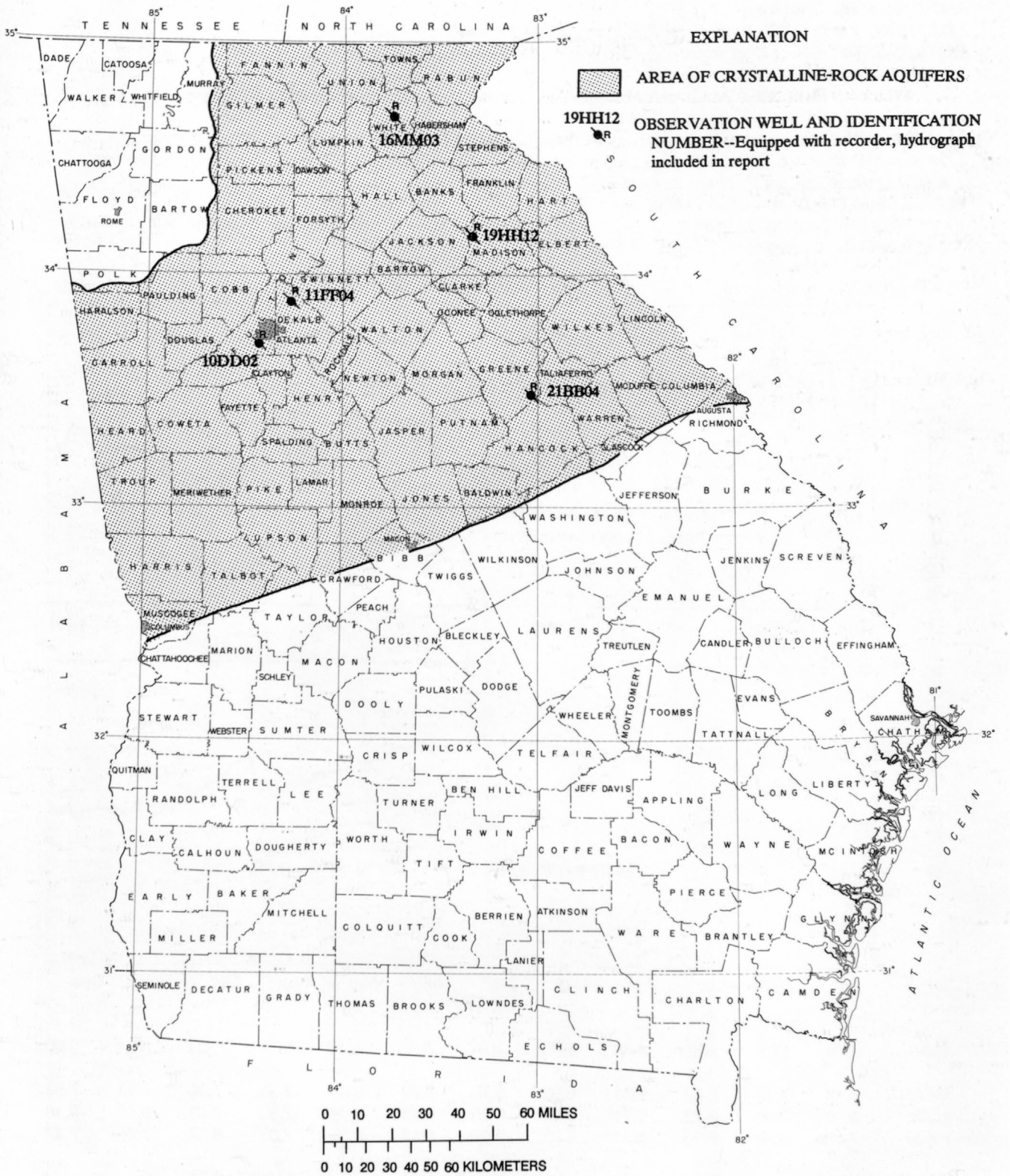
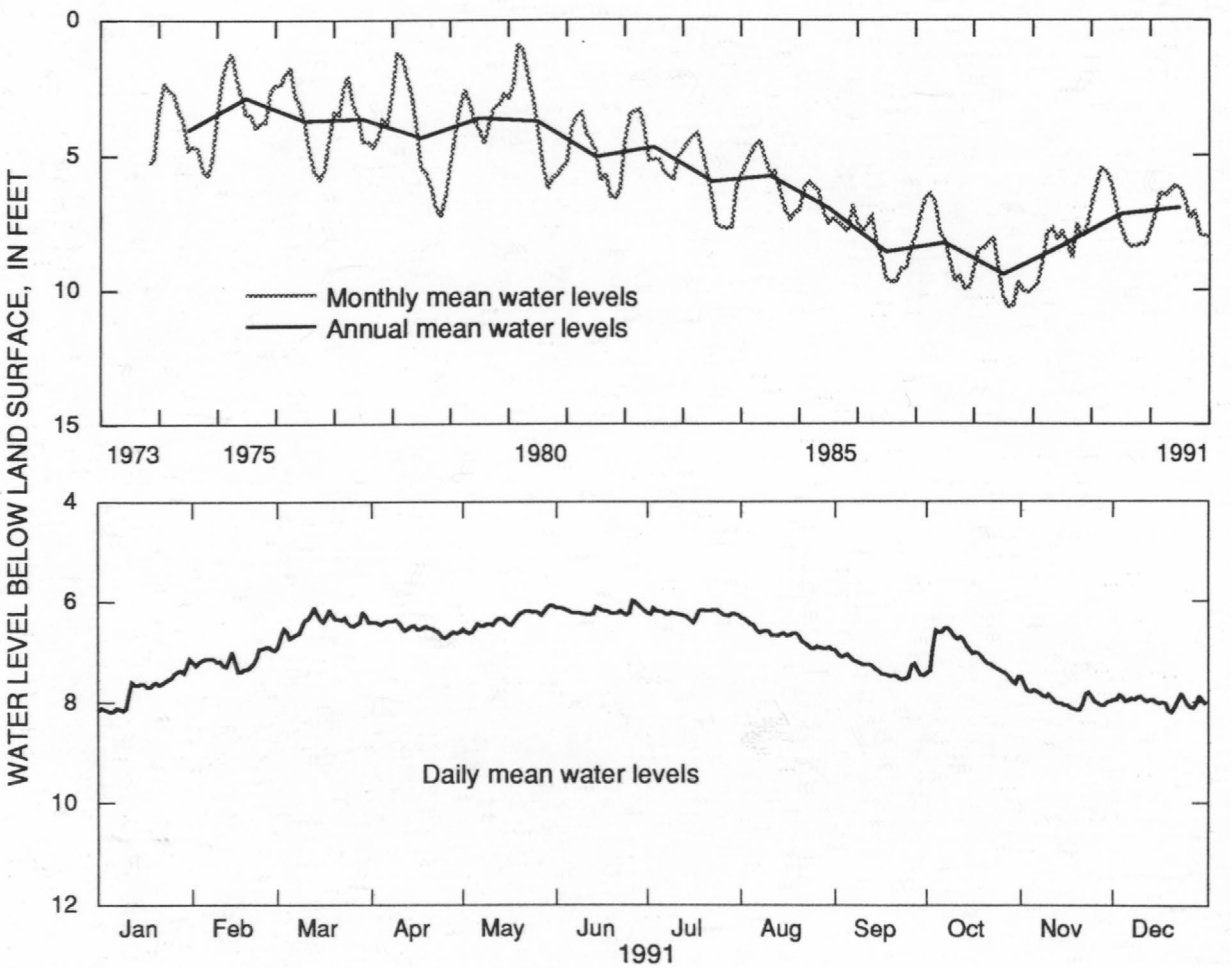


Figure 90.--Locations of observation wells completed in crystalline-rock aquifers.

334207084254801 Local number, 10DD02.
LOCATION.--Lat 33°42'07", long 84°25'48", Hydrologic Unit 03130002.
INSTRUMENTATION.--Analog recorder.
AQUIFER.--Crystalline rock (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.
REMARKS.--Well pumped and sounded February 14, 1976, to a depth of 338 ft. Well pumped and sampled by Georgia Geologic Survey, March 7, 1991. Borehole geophysical survey conducted November 19, 1974. Water levels for periods of missing record, January 14-27 and June 6 to July 2, were estimated.
PERIOD OF RECORD.--November 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.10 ft below land-surface datum, March 30, 1980; lowest, 10.95 ft below land-surface datum, September 2, 1988.

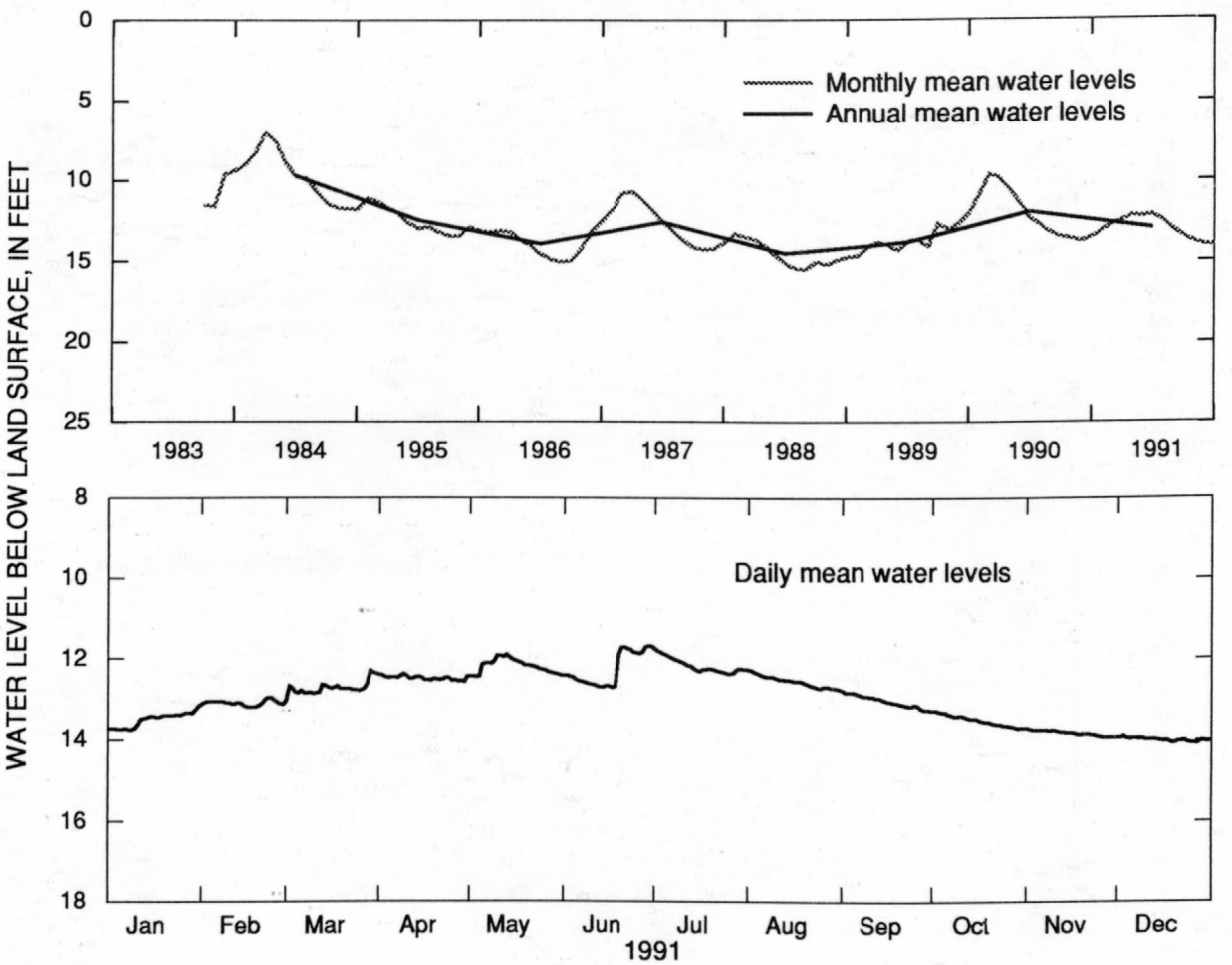


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	7.74	7.15	6.42	6.51	6.33	6.16	6.23	6.68	7.31	7.06	7.93	7.98
LOW	8.18	7.38	6.72	6.71	6.61	6.25	6.42	6.95	7.55	7.63	8.15	8.19
HIGH	7.12	6.89	6.10	6.35	6.05	5.97	6.12	6.34	7.05	6.53	7.65	7.82

CAL YR	1991		MEAN	6.96		HIGH	5.97		LOW	8.19		

Figure 91.--Water level in observation well 10DD02, Fulton County.

341020083201701 Local number, 19HH12.
LOCATION.--Lat 34°10'20", long 83°20'17", Hydrologic Unit 03060104.
Owner: Meadowlake Estates.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Crystalline rock.
WELL CHARACTERISTICS.--Drilled, unused supply well, diameter 6 in., depth 185 ft, cased to 50 ft, open hole.
DATUM.--Altitude of land-surface datum is 800 ft.
REMARKS.--Pump test conducted April 4-5, 1984. Borehole geophysical survey conducted October 31, 1983, and November 16, 1983. Water levels for period of missing record, February 23 to April 23, were estimated.
PERIOD OF RECORD.--October 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.69 ft below land-surface datum, April 14, 1984; lowest, 15.56 ft below land-surface datum, September 2-3, 1988.

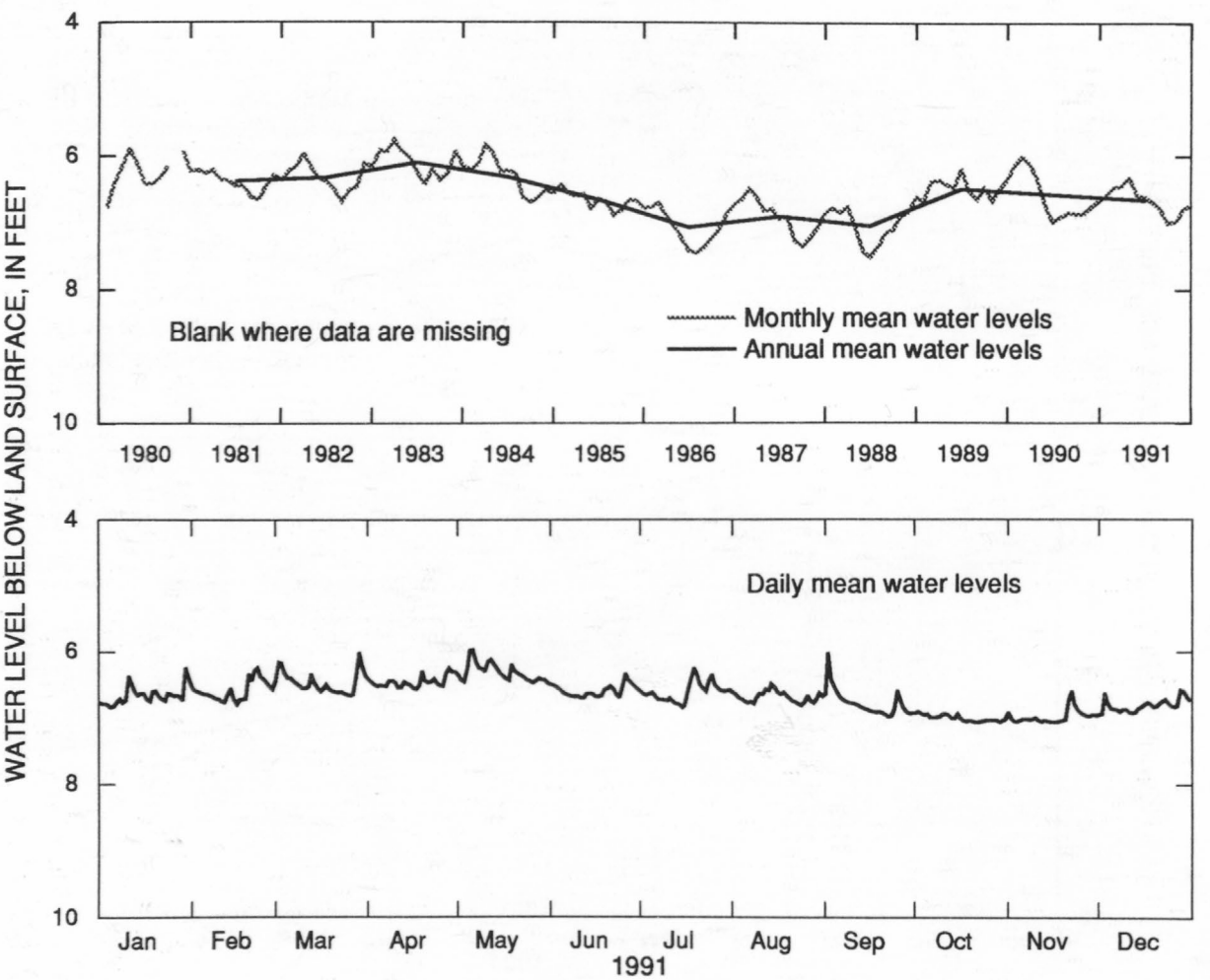


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	13.51	13.09	12.73	12.49	12.18	12.26	12.15	12.54	13.03	13.51	13.82	14.00
LOW	13.76	13.20	12.87	12.58	12.45	12.70	12.36	12.75	13.27	13.73	13.92	14.08
HIGH	13.18	12.96	12.31	12.39	11.91	11.67	11.79	12.28	12.82	13.27	13.74	13.90

CAL YR	1991		MEAN	12.94		HIGH	11.67		LOW	14.08		

Figure 92.--Water level in observation well 19HH12, Madison County.

335517084164001 Local number, 11FF04.
LOCATION.--Lat 33°55'17", long 84°16'40", Hydrologic Unit 03130001.
Owner: U.S. Geological Survey.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Crystalline rock.
WELL CHARACTERISTICS.--Drilled, observation well, diameter 6 in., depth 620 ft, cased to 36 ft, open hole.
DATUM.--Altitude of land-surface datum is 950 ft.
REMARKS.--Borehole geophysical survey conducted April 18, 1980.
PERIOD OF RECORD.--February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.98 ft below land-surface datum, March 17, 1990; lowest, 7.66 ft below land-surface datum, July 20, 1988.

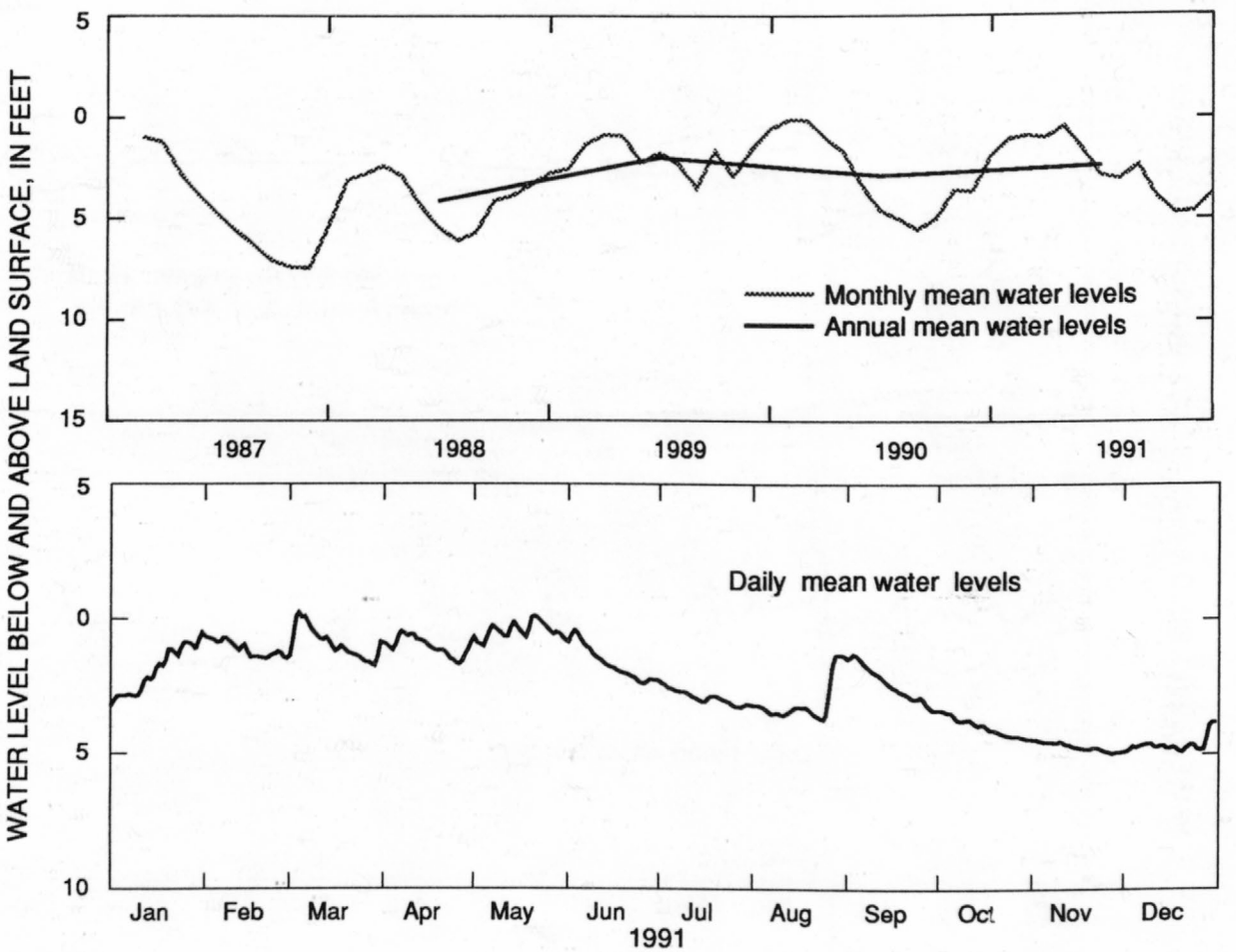


1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	6.66	6.58	6.46	6.45	6.31	6.60	6.62	6.70	6.79	7.01	6.98	6.80
LOW	6.84	6.79	6.66	6.56	6.48	6.70	6.85	6.83	6.99	7.07	7.06	6.93
HIGH	6.23	6.24	6.00	6.25	5.97	6.34	6.26	6.50	6.02	6.92	6.59	6.57

CAL YR	1991		MEAN	6.66		HIGH	5.97		LOW	7.07		

Figure 93.--Water level in observation well 11FF04, DeKalb County.

332808083010201 Local number, 21BB04.
LOCATION.--Lat 33°28'08", long 83°01'02", Hydrologic Unit 03070101.
Owner: Charles Veazey.
INSTRUMENTATION.--Analog recorder.
AQUIFER.--Crystalline rock.
WELL CHARACTERISTICS.--Drilled, unused supply well, diameter 6 in., depth 497 ft, cased to 15 ft, open hole.
DATUM.--Altitude of land-surface datum is 675 ft.
REMARKS.--Borehole geophysical survey conducted March 13, 1987. Water levels for period of missing record, March 27-30, were estimated.
PERIOD OF RECORD.--March 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.55 ft above land-surface datum, February 20, 1990; lowest, 7.58 ft below land-surface datum, December 7, 1987.



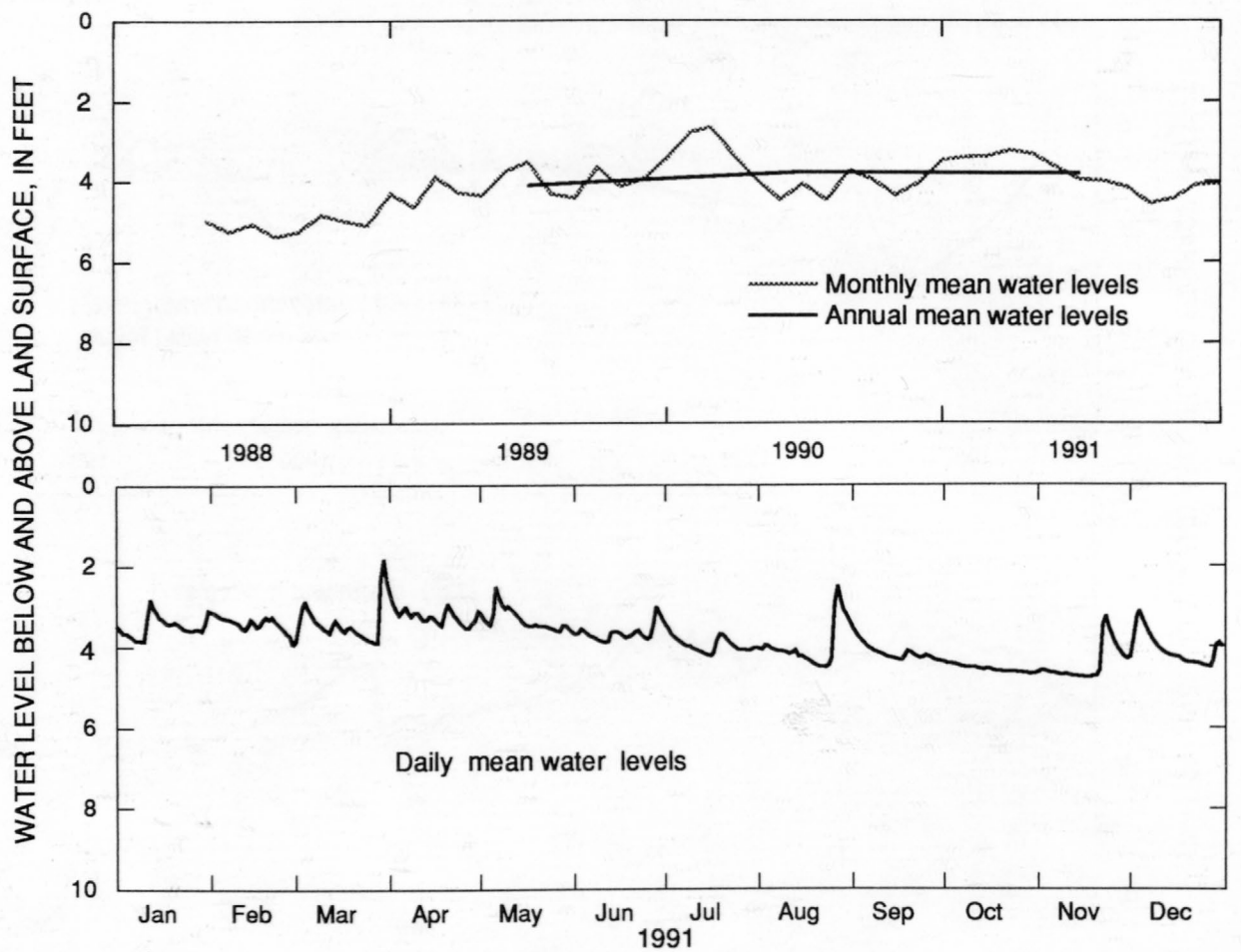
1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	1.90	1.08	0.90	1.01	0.45	1.61	2.87	3.07	2.37	3.98	4.73	4.65
LOW	3.03	1.45	1.73	1.67	1.00	2.37	3.26	3.73	3.38	4.46	4.98	4.91
HIGH	0.48	0.68	-0.23	0.47	-0.09	0.42	2.37	1.29	1.28	3.38	4.47	3.81

CAL YR	1991	MEAN	2.40	HIGH	-0.23	LOW	4.98

[Negative values indicate level above land surface]

Figure 94.--Water level in observation well 21BB04, Greene County.

344314083433201 Local number, 16MM03.
LOCATION.--Lat 34°43'14", long 83°43'32", Hydrologic Unit 03130001.
Owner: Unicoi State Park.
INSTRUMENTATION.--Digital recorder.
AQUIFER.--Crystalline rock.
WELL CHARACTERISTICS.--Drilled, unused supply well, diameter 6.25 in., depth 400 ft, cased to 72 ft, open hole.
DATUM.--Altitude of land-surface datum is 1550 ft.
REMARKS.--Borehole geophysical survey conducted December 7, 1987. Water levels for periods of missing record, January 15 to February 19, February 28, and August 14-24, were estimated.
PERIOD OF RECORD.--May 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.74 ft above land-surface datum, March 17, 1989; lowest, 5.59 ft below land-surface datum, September 2, 1988.



1991	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	3.48	3.40	3.40	3.24	3.33	3.65	3.96	3.99	4.15	4.55	4.42	4.07
LOW	3.84	3.95	3.90	3.55	3.63	3.89	4.23	4.51	4.36	4.66	4.75	4.49
HIGH	2.82	3.16	1.83	2.93	2.50	3.01	3.57	2.49	3.67	4.40	3.24	3.11

CAL YR	1991		MEAN	3.81		HIGH	1.83		LOW	4.75		

Figure 95.--Water level in observation well 16MM03, White County.

CHLORIDE CONCENTRATIONS IN WATER FROM THE FLORIDAN AQUIFER SYSTEM

Chloride concentration in water from the Floridan aquifer system has been monitored periodically in coastal Georgia since the 1950's. During October 1991, water samples were collected from 84 wells that tap the Floridan aquifer system in the Savannah and Brunswick areas and were analyzed for chloride concentration. Of the 84 wells sampled in October 1991, a chloride-concentration map and graph for 13 of these wells are shown (table 3, figs. 97 - 100). Chloride concentration in water from the Upper Floridan aquifer in most of the coastal Georgia area is less than 40 milligrams per liter (mg/L) (Clarke and others, 1990, p. 48), which is lower than the 250 mg/L drinking-water standards established by the Georgia Department of Natural Resources (1977) and the U.S. Environmental Protection Agency (1990). Chloride concentration in water from the Upper Floridan aquifer that exceeds drinking-water standards has been detected only in the Brunswick area (fig. 98). Water in the Lower Floridan aquifer generally has high chloride concentration throughout the coastal area, and therefore, generally is unsuitable for human consumption (Clarke and others, 1990, p. 48). Chloride concentration in water from the Fernandina permeable zone at the base of the Lower Floridan aquifer has been measured as high as 30,000 mg/L (Krause and Randolph, 1989, p. D51).

Table 3.--*Observation wells for which chloride concentration graphs are included in this report*

County	Aquifer	Well number	Well name
Chatham	Lower Floridan	38Q196	Test well 1 point 2
Do.	do.	39Q017	Test well 7 point 1
Do.	do.	39Q018	Test well 7 point 2
Do.	do.	38Q004	Test well 4
Do.	Upper Floridan	37Q185	Hutchinson Island test well 1
Glynn	Upper Floridan, upper water-bearing zone	34H393	Test well 17
Do.	Upper Floridan, lower water-bearing zone	34H403	Test well 24
Do.	Lower Floridan, brackish-water zone	34H399	Test well 19
Do.	do.	34H391	Test well 16
Do.	Upper Floridan, upper water-bearing zone	34H132	Test well 2
Do.	do.	34H427	E.M. Champion well 2
Do.	do.	33H133	Test well 6
Do.	Upper Floridan, lower water-bearing zone	33H127	Test well 3

Savannah Area

Twelve wells are sampled semi-annually in Chatham County, five of which are summarized in this report (figs. 96 and 97). Data from these wells indicate that chloride concentration generally increases with depth below land surface in the Savannah area (fig. 97).

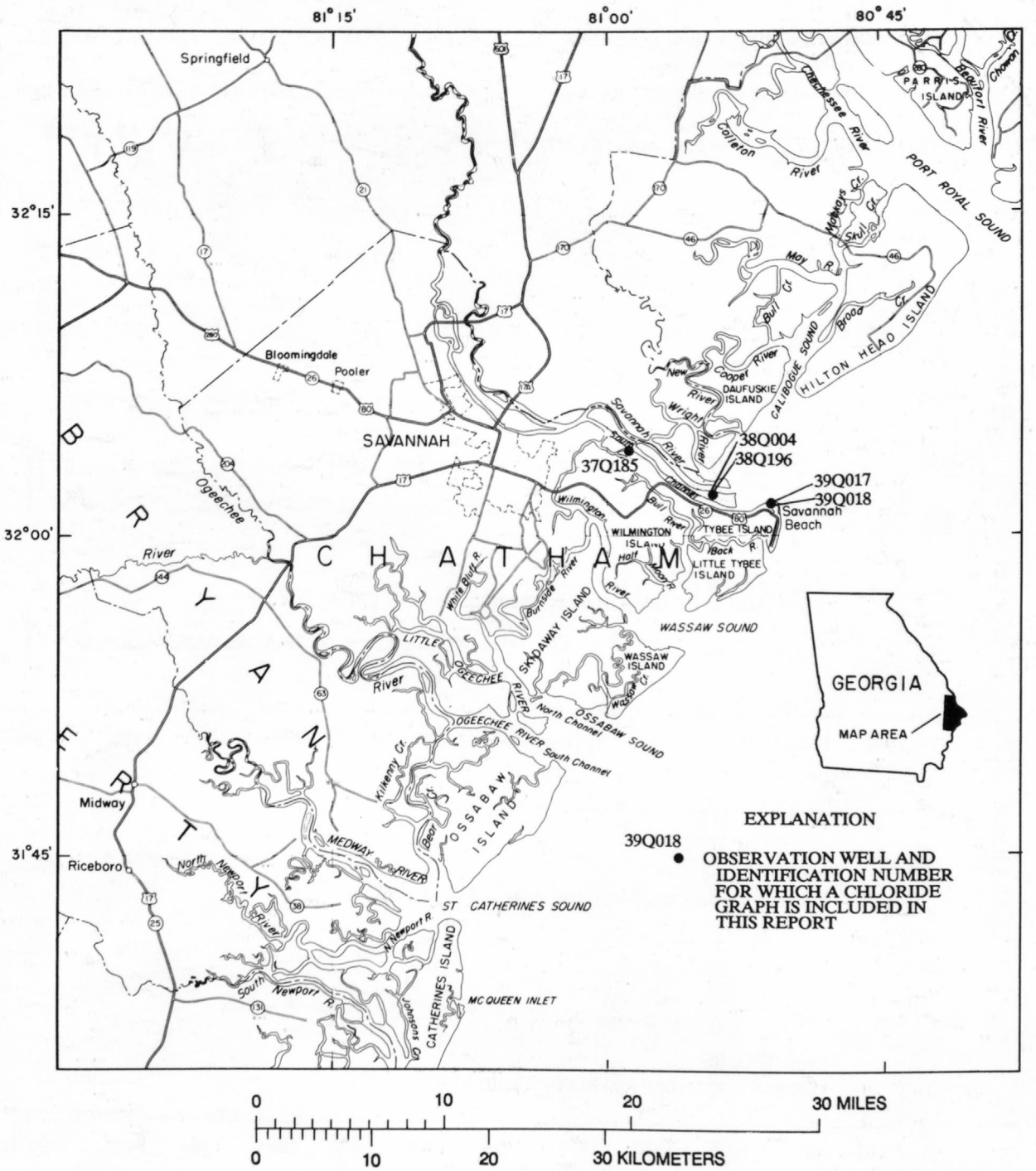


Figure 96.--Locations of chloride-monitoring wells completed in the Floridan aquifer system in the Savannah area.

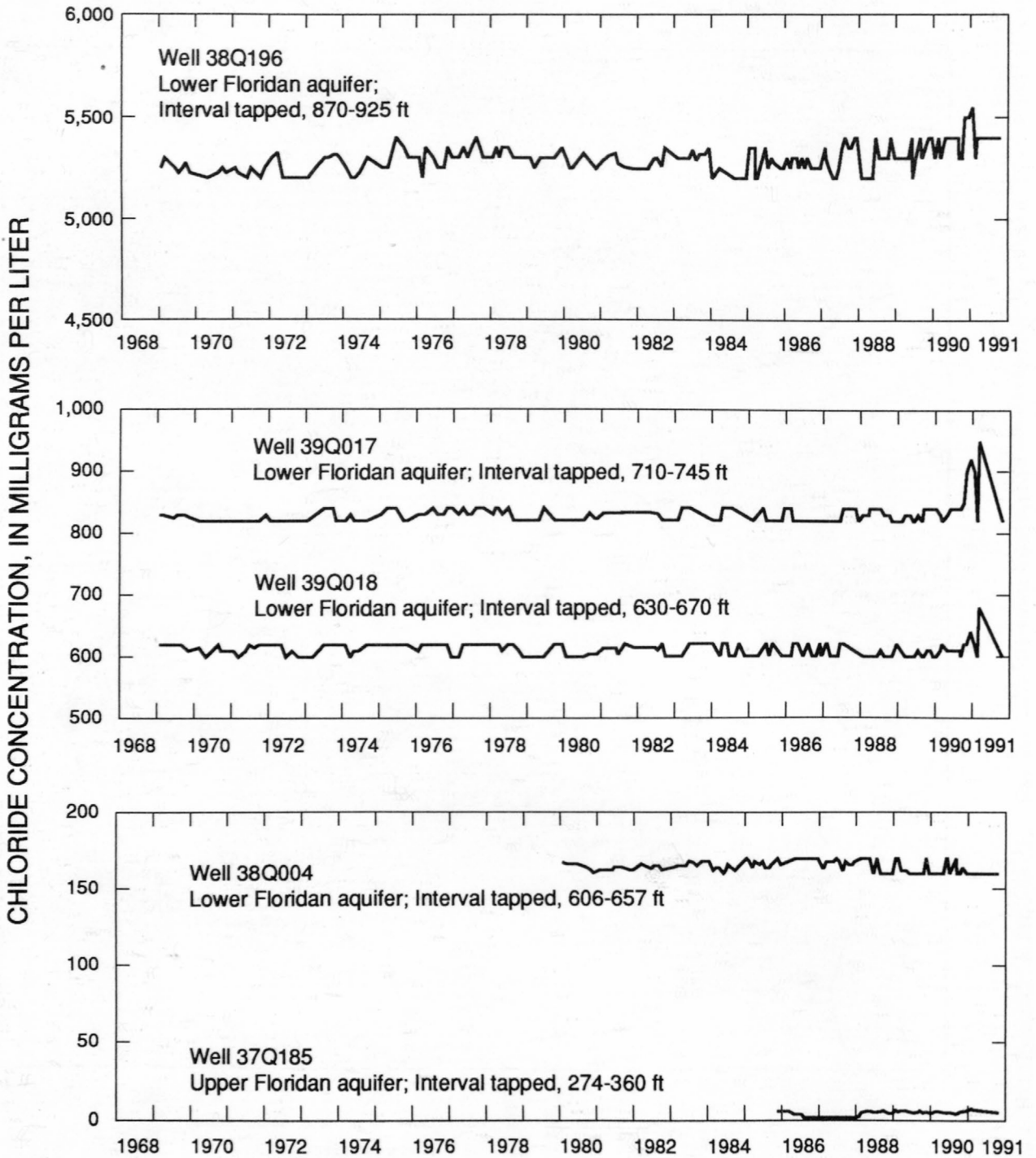


Figure 97.--Chloride concentration in the Upper and Lower Floridan aquifers in the Savannah area.

Brunswick Area

Since pumping began in the Brunswick area in the late 1800's, ground-water withdrawal has lowered the water level in the Upper Floridan aquifer (Krause and Randolph, 1989). This water-level decline has allowed saltwater to migrate upward into the Upper Floridan aquifer in Brunswick from the Fernandina permeable zone, which is at the base of the Lower Floridan aquifer (Krause and Randolph, 1989, p. D51). Chloride concentration in water from the upper water-bearing zone of the Upper Floridan aquifer is greater than 2,000 mg/L in parts of Brunswick (fig. 98).

About 80 wells in Glynn County, mostly in the Brunswick area, are pumped and sampled semi-annually for chloride analysis. Results of analysis of water sampled from 41 wells tapping the upper water-bearing zone of the Upper Floridan aquifer during October-November 1991, were used to construct a chloride-concentration map for the Brunswick area (fig. 98). The configuration of the map has changed little since October 1990 (Milby and others, 1991). Graphs of chloride concentration in water from eight wells tapping various zones of the Floridan aquifer system are included in this report (figs. 99 and 100).

Chloride concentration in water from wells 34H393 and 34H403 (fig. 99), which tap the upper and lower water-bearing zones, respectively, of the Upper Floridan aquifer in the southern Brunswick area, does not show long-term trends in chloride concentration since sampling began in 1968. The chloride concentration in water from well 34H391 (fig. 99) tapping the brackish-water zone of the Lower Floridan aquifer, also do not show a long-term trend since sampling began in 1968. However, the chloride concentration in water from well 34H399 (fig. 99) tapping the brackish-water zone of the Lower Floridan aquifer shows a general increasing trend since sampling began in 1970.

Chloride concentrations in water from wells 34H132 and 34H427 (fig. 100), which tap the upper water-bearing zone of the Upper Floridan aquifer in the northern Brunswick area, show a slight upward trend that began in 1988. Prior to this upward trend, the chloride concentration from the two wells showed a downward trend that began in 1980 in well 34H427, and in 1984 in well 34H132 (fig. 100). The chloride concentrations in water from wells 33H133 and 33H127, which tap the upper and lower water-bearing zones of the Upper Floridan aquifer, respectively, show an upward trend since sampling began in 1966 (fig. 100).

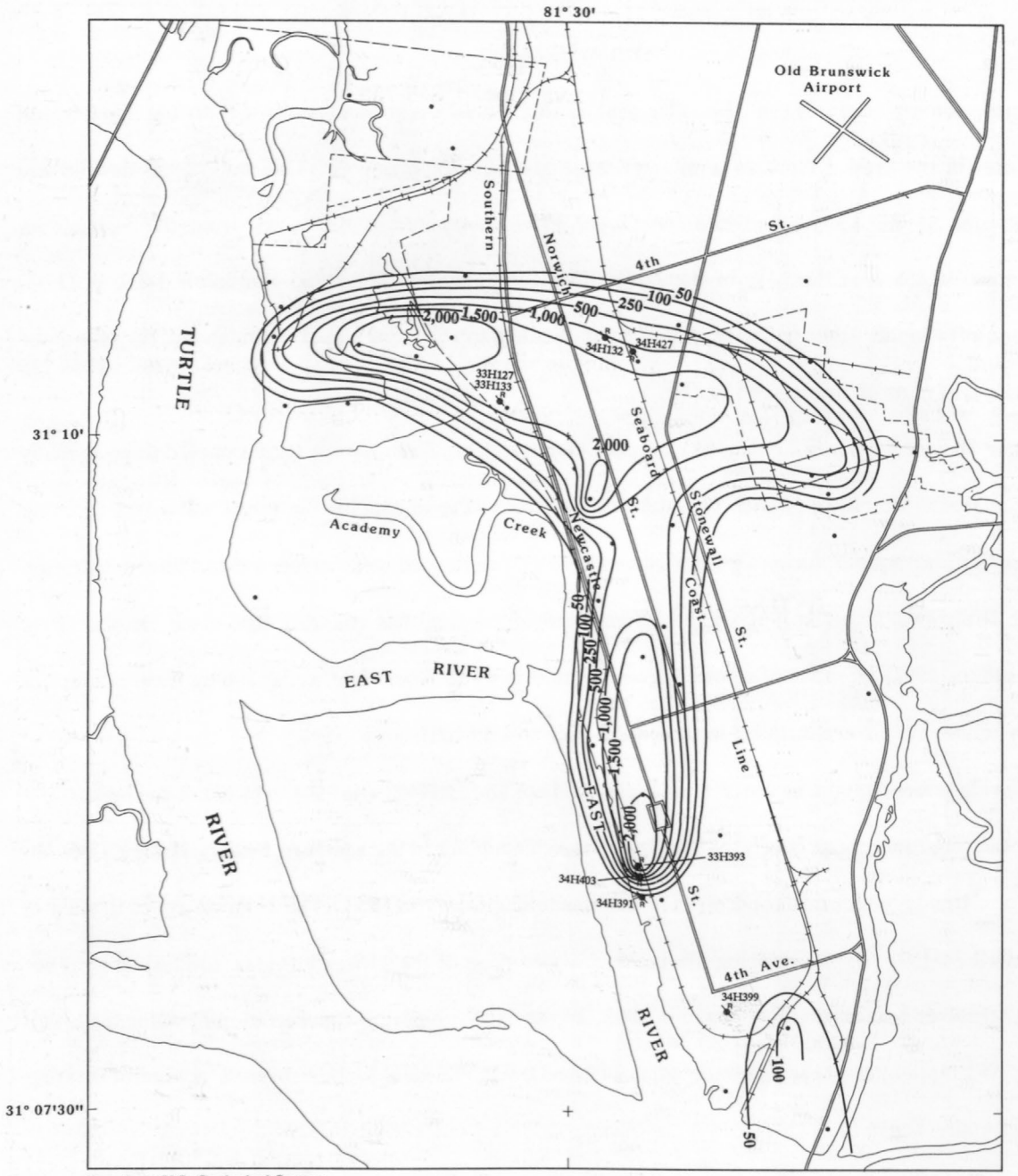


Figure 98.--Chloride concentration in the upper water-bearing zone of the Upper Floridan aquifer and locations of chloride-monitoring wells completed in the Floridan aquifer system in the Brunswick area, October, 1991.

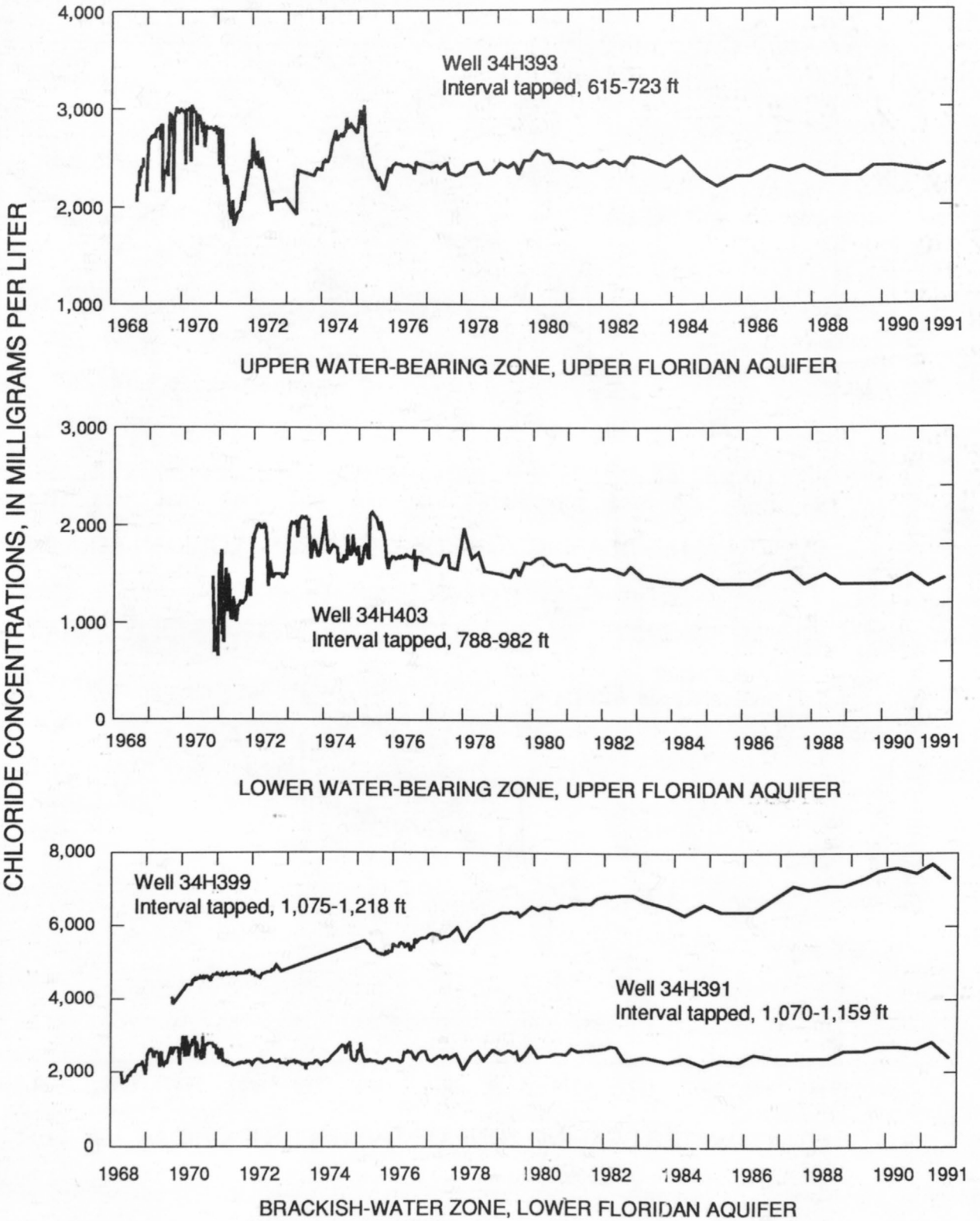


Figure 99--Chloride concentration in the Floridan aquifer system in the southern Brunswick area.

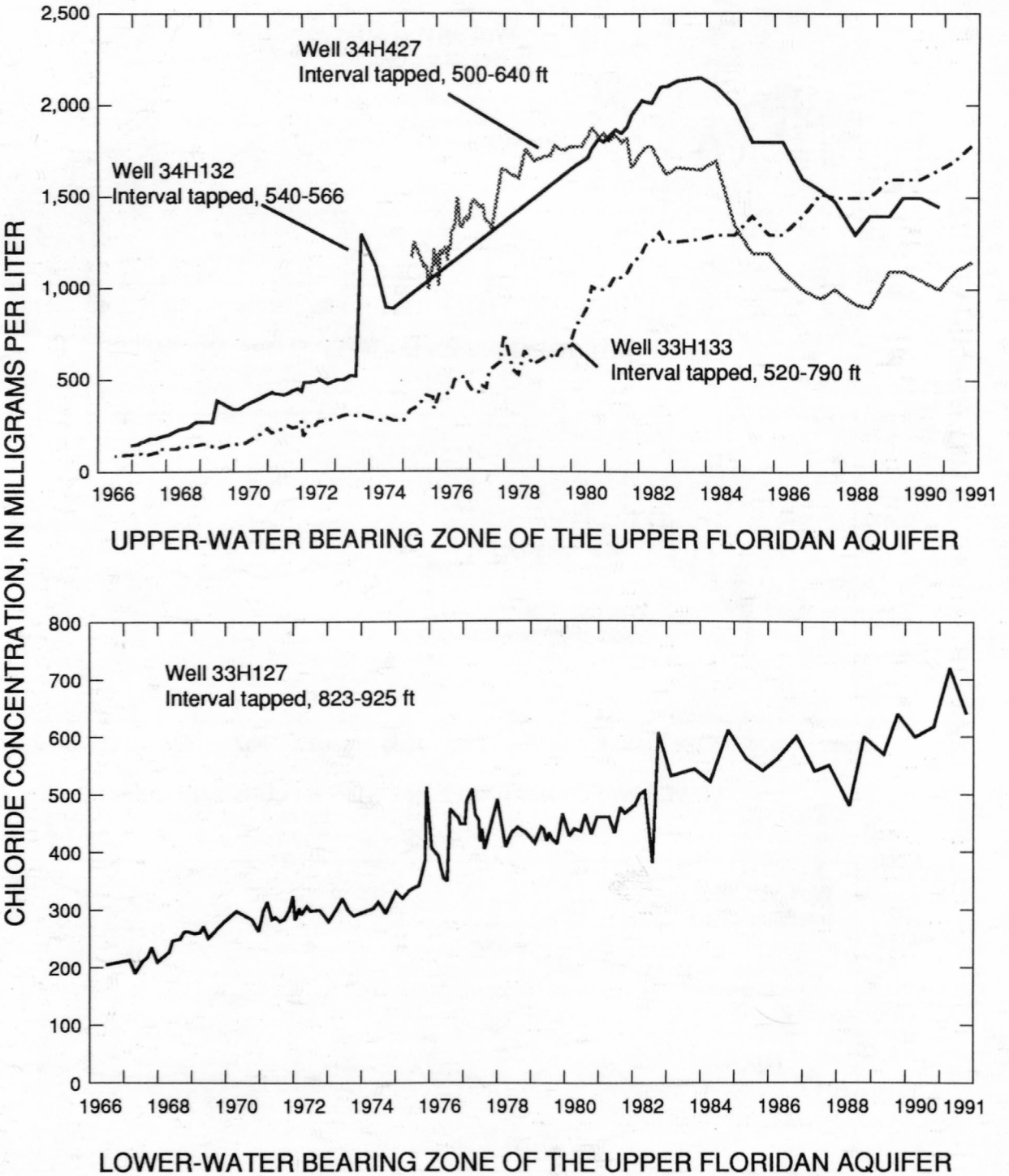


Figure 100.-- Chloride concentration in the Floridan aquifer system in the northern Brunswick area.

REFERENCES CITED

Carter, R.F., and Stiles, H.R., 1983, Average annual rainfall and runoff in Georgia, 1941-70: Georgia Geologic Survey Hydrologic Atlas 9, 1 sheet.

Clarke, J.S., Brooks, Rebekah, and Faye, R.E., 1985, Hydrogeology of the Dublin and Midville aquifer system of east-central Georgia: Georgia Geologic Survey Information Circular 74, 62 p.

Clarke, J.S., Longsworth, S.L., McFadden, K.W., and Peck, M.F., 1985, Ground-water data for Georgia, 1984: U.S. Geological Survey Open-File Report 85-331, 150 p.

Clarke, J.S., Faye, R.E., and Brooks, Rebekah, 1983, Hydrogeology of the Providence aquifer of southwest Georgia: Georgia Geologic Survey Hydrologic Atlas 11, 5 sheets.

Clarke, J.S., Hacke, C.M., and Peck, M.F., 1990, Geology and ground-water resources of the coastal area of Georgia: Georgia Geologic Survey Bulletin 113, 106 p.

Fanning, J.L., Doonan, G.A., and Montgomery, L.T., 1992, Water use in Georgia by county for 1990: Georgia Geologic Survey Information Circular 90, 116 p.

Georgia Department of Natural Resources, 1977, Rules for safe drinking water: Atlanta, Georgia Department of Natural Resources, Environmental Protection Division, Chapter 391-3-5, p. 601-657.

Gorday, L.L., 1985, The hydrogeology of the Coastal Plain strata of Richmond and northern Burke Counties, Georgia: Georgia Geologic Survey Information Circular 61, 43 p.

Gregg, D.O., and Zimmerman, E.A., 1974, Geologic and hydrologic control of chloride contamination in aquifers at Brunswick, Glynn County, Georgia: U.S. Geological Survey Water-Supply Paper 2029-D, 44 p.

Hayes, R.H., Maslia, M.L., and Meeks, W.C., 1983, Hydrology and model evaluation of the principal artesian aquifer, Dougherty Plain, southwest Georgia: Georgia Geologic Survey Bulletin 97, 93 p.

Hicks, D.W., Krause, R.E., and Clarke, J.S., 1981, Geohydrology of the Albany area Georgia: Georgia Geologic Survey Information Circular 57, 31 p.

Joiner, C.N., Peck, M.F., Reynolds, M.S., and Stayton, W.L., 1989, Ground-water data for Georgia, 1988: U.S. Geological Survey Open-File Report 89-408, 176 p.

Krause, R.E., 1979, Geohydrology of Brooks, Lowndes, and western Echols Counties, Georgia: U.S. Geological Survey Water-Resources Investigations Report 78-117, 48 p.

Krause, R.E., and Randolph, R.B., 1989, Hydrogeology of the Floridan aquifer system in southeast Georgia and adjacent parts of Florida and South Carolina: U.S. Geological Survey Professional Paper 1403-D, 65 p.

Marella, R., 1986, Annual water use survey: 1985: St. Johns River Water Management District, Technical Publication SJ 86-5, August 1986, 117 p.

Milby, B.J., Joiner, C.N., Cressler, A.M., and West, C.T., 1991, Ground-water conditions in Georgia, 1990: U.S. Geological Survey Open-File Report 91-486, 147 p.

Pierce, R.R., and Kundell, J.E, 1990, Georgia water supply and use *in* Carr, J.E., Chase, E.B., Paulson, R.W., and Moody, D.W., *ed.*; National Water Summary 1987-Hydrologic events and water supply and use: U.S. Geological Survey Water-Supply Paper 2350, p. 215-222.

Torak, L.J., Davis, G.S., Strain, G.A., and Herndon, J.G., 1991, Geohydrology and evaluation of water-resource potential of the Upper Floridan aquifer in the Albany area, southwestern Georgia: U.S. Geological Survey Open-File Report 91-52, 86 p.

U.S. Environmental Protection Agency, 1990, Drinking water regulations under the safe Drinking Water Act: Washington, D.C., U.S. Environmental Protection Agency, Criteria and Standards Division, Office of Drinking Water, SDWA Fact Sheet, 45 p.

U.S. Geological Survey, 1978, Ground-water levels and quality data for Georgia, 1977: U.S. Geological Survey Open-File Report 79-213, 88 p.

U.S. National Oceanic and Atmospheric Administration, 1991, Climatological data, Georgia, January-December 1991, v. 95, no. 1-12.