

GROUND-WATER CONDITIONS IN GEORGIA, 1989

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

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CITY OF VALDOSTA

Doraville, Georgia

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CONTENTS

Abstract	1
Introduction	1
Purpose and scope	2
Well-numbering system	2
Ground-water resources	2
Precipitation	5
Ground-water levels	7
Surficial aquifers	21
North Georgia area	21
Southwest area	21
Coastal area	
Upper Brunswick aquifer	30
Floridan aquifer system	30
Upper Floridan aquifer	30
Southwest area	37
South-central area	37
East-central area	51
Coastal area	51
Savannah area	51
Jesup-Riceboro area	61
Kings Bay-Okefenokee Swamp area	61
Brunswick area	61
Lower Floridan aquifer	72
Brunswick area	72
Claiborne aquifer	72
Clayton aquifer	72
Cretaceous aquifer system	97
Providence aquifer	97
Dublin, Midville, and Dublin-Midville aquifer systems	97
Paleozoic rock aquifers	109
Crystalline rock aquifers	109
Chloride concentrations in the Floridan aquifer system	117
Savannah area	117
Brunswick area	117
Selected references	124

ILLUSTRATIONS

- Figure 1. Map showing areas of utilization of major aquifers and block diagram showing major aquifers and physiographic provinces of Georgia 3
2. Map showing locations of precipitation-monitoring stations and average annual precipitation in Georgia, 1941-70 6
- Figures 3.-12. Graphs showing precipitation departure from normal for National Weather Service station:
3. Columbus Weather Service Office, Airport, Muscogee County 8
4. Rome, Floyd County 9
5. Savannah Weather Service Office, Airport, Chatham County 10
6. Cleveland, White County 11
7. Athens Weather Service Office, Airport, Clarke County 12
8. Albany 3 Southeast, Dougherty County 13
9. Clayton 1 South-southwest, Rabun County 14
10. Augusta Weather Service Office, Airport, Richmond County 15
11. Atlanta Weather Service Office, Airport, Fulton County 16
12. Macon Weather Service Office, Airport, Bibb County 17
- Figure 13. Map showing locations of observation wells for which hydrographs are included in this report 18
14. Map showing locations of observation wells completed in the surficial aquifers 22
- Figures 15.-22. Hydrographs showing the water level in observation well:
15. 11AA01, Spalding County 23
16. 13M007, Worth County 24
17. 07H003, Miller County 25
18. 35P094, Chatham County 26
19. 37P116, Chatham County 27
20. 32R003, Bulloch County 28
21. 34H438, Glynn County 29
22. 32L017, Wayne County 31
- Figure 23. Map showing locations of observation wells completed in the upper Brunswick aquifer 32
- Figures 24.-26. Hydrographs showing the water level in observation well:
24. 31U009, Bulloch County 33
25. 32L016, Wayne County 34
26. 34H437, Glynn County 35
- Figure 27. Map showing subareas and locations of observation wells completed in the Upper Floridan aquifer 36
28. Map showing water levels and locations of observation wells completed in the Upper Floridan aquifer in the Albany area, November 1989 38
- Figures 29.-43. Hydrographs showing the water level in observation well:
29. 09F520, Decatur County 39
30. 08G001, Miller County 40
31. 06F001, Seminole County 41
32. 13L012, Dougherty County 42
33. 10G313, Mitchell County 43
34. 13L003, Dougherty County 44
35. 13J004, Mitchell County 45
36. 15L020, Worth County 46
37. 18K049, Tift County 47
38. 18H016, Cook County 48
39. 19E009, Lowndes County 49
40. 19F039, Lowndes County 50
41. 21T001, Laurens County 52
42. 25Q001, Montgomery County 53
43. 26R001, Toombs County 54

ILLUSTRATIONS--Continued

- Figure 44. Map showing locations of observation wells completed in the Upper Floridan aquifer in the coastal area 55
- Figures 45.-59. Hydrographs showing the water level in observation well:
- 45. 36Q008, Chatham County 56
 - 46. 36Q020, Chatham County 57
 - 47. 38Q002, Chatham County 58
 - 48. 39Q003, Chatham County 59
 - 49. 32R002, Bulloch County 60
 - 50. 30L003, Wayne County 62
 - 51. 32L015, Wayne County 63
 - 52. 33M004, Long County 64
 - 53. 34M054, Liberty County 65
 - 54. 34N089, Liberty County 66
 - 55. 35M013, McIntosh County 67
 - 56. 33E027, Camden County 68
 - 57. 27E004, Charlton County 69
 - 58. 33H127, Glynn County 70
 - 59. 33H133, Glynn County 71
- Figure 60. Map showing locations of observation wells completed in the Lower Floridan aquifer 73
- Figures 61.-62. Hydrographs showing the water level in observation well:
- 61. 34H391, Glynn County 74
 - 62. 33J044, Glynn County 75
- Figure 63. Map showing water levels and locations of observation wells completed in the Claiborne aquifer, November 1989 76
- Figures 64.-74. Hydrographs showing the water level in observation well:
- 64. 11L001, Dougherty County 77
 - 65. 12L019, Dougherty County 78
 - 66. 06K010, Early County 79
 - 67. 09G001, Decatur County 80
 - 68. 09M009, Randolph County 81
 - 69. 14P015, Crisp County 82
 - 70. 15R007, Dooly County 83
 - 71. 13L011, Dougherty County 84
 - 72. 11K002, Dougherty County 85
 - 73. 11P015, Lee County 86
 - 74. 13M005, Worth County 87
- Figure 75. Map showing water levels and locations of observation wells completed in the Clayton aquifer, November 1989 88
- Figures 76.-83. Hydrographs showing the water level in observation well:
- 76. 14P014, Crisp County 89
 - 77. 07N001, Randolph County 90
 - 78. 09M007, Randolph County 91
 - 79. 09N001, Terrell County 92
 - 80. 11L002, Dougherty County 93
 - 81. 13L002, Dougherty County 94
 - 82. 06K009, Early County 95
 - 83. 11K005, Dougherty County 96
- Figure 84. Map showing locations of observation wells completed in the Cretaceous aquifer system 98

ILLUSTRATIONS--Continued

- Figures 85.-91. Hydrographs showing the water level in observation well:
- 85. 06S001, Chattahoochee County 99
 - 86. 12L021, Dougherty County 100
 - 87. 18U001, Twiggs County 101
 - 88. 18T001, Pulaski County 102
 - 89. 21U004, Laurens County 103
 - 90. 24V001, Johnson County 104
 - 91. 28X001, Burke County 105
- Figure 92. Map showing water levels and locations of observation wells completed in the Dublin-Midville aquifer system, November 1989 106
- Figures 93.-94. Hydrographs showing the water level in observation well:
- 93. 30AA04, Richmond County 107
 - 94. 23X027, Washington County 108
- Figure 95. Map showing location of observation well completed in the Paleozoic rock aquifers 110
- 96. Hydrographs showing the water level in observation well 03PP01, Walker County 111
 - 97. Map showing locations of observation wells completed in the crystalline rock aquifers 112
- Figures 98.-101. Hydrographs showing the water level in observation well:
- 98. 10DD02, Fulton County 113
 - 99. 11FF04, DeKalb County 114
 - 100. 19HH12, Madison County 115
 - 101. 21BB04, Greene County 116
- Figure 102. Map showing locations of chloride-monitoring wells completed in the Floridan aquifer system in the Savannah area 118
- 103. Graphs showing chloride concentrations in the Upper and Lower Floridan aquifers in the Savannah area 119
 - 104. Map showing chloride concentrations and locations of chloride-monitoring wells in the upper water-bearing zone of the Upper Floridan aquifer in the Brunswick area, October 1989 120
 - 105. Graphs showing chloride concentrations in the Floridan aquifer system in the Bay Street area of Brunswick 121
 - 106. Graphs showing chloride concentrations in the in the Floridan aquifer system in the north Brunswick area 122

TABLES

- Table 1. Aquifer and well characteristics in Georgia 4
2. Observation wells for which water-level hydrographs are included in this report 19

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

<u>Multiply inch-pound units</u>	<u>by</u>	<u>to obtain metric units</u>
	<u>Length</u>	
inches	2.540	centimeters (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	<u>Volumetric rate</u>	
gallon per minute (gal/min)	0.06308	liter per second (L/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m ³ /s)
million gallons per day (Mgal/d)	43.81	liter per second (L/s)
	<u>Concentration</u>	
parts per million (ppm)	1	milligram per liter (mg/L)

Sea level.--In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD 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.

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ABSTRACT

Ground-water conditions in Georgia during 1989, and the 10-year period, 1980-89, were evaluated using data from ground-water-level and ground-water-quality monitoring networks. These data include continuous water-level records from 76 wells, periodic water-level measurements from an additional 589 wells, precipitation records from 10 National Weather Service stations, and chloride analyses from 104 wells during 1989.

Annual mean ground-water levels in Georgia in 1989 ranged from 4.1 feet lower to 10.8 feet higher than those for 1988. With the exception of the coastal area, precipitation was above normal during 1989. Of the 76 continuous-record wells included in this report, 39 had mean water levels that were higher in 1989 than in 1988. Thirty-seven wells had mean water levels that were lower in 1989 than in 1988, 21 of which were in the coastal area. Record low water levels were measured in nine wells tapping the upper Brunswick aquifer, Floridan aquifer system, the Clayton aquifer, and the Cretaceous aquifer system. These record lows were from 0.1 foot to 1.1 feet lower than the previous record lows. The overall water-level trend during 1980-89 was downward in 50 of the 76 wells due to below-normal precipitation and increased pumping.

Periodic water sampling and analysis in the coastal area indicates that chloride concentrations in the Upper Floridan aquifer generally have decreased or remained stable during 1980-89. However, chloride concentrations have increased 40 to 200 milligrams per liter in the northern part of Brunswick over the same period. Chloride concentrations in the Lower Floridan aquifer during 1980-89 remained about the same in the Savannah area, but increased 200 to 925 milligrams per liter in the Bay Street area of Brunswick.

INTRODUCTION

Monitoring ground-water levels and quality is essential to water-resources management. Ground-water levels and quality have been monitored in Georgia for about 100 years. In the early years, water-level data were used in areal reconnaissance studies to show water-level trends. These data had limited value for resource-management purposes because of the large amount of time between collection and publication of the data.

As part of the cooperative ground-water investigations undertaken by the U.S. Geological Survey and the State of Georgia, a statewide water-level-measurement program was begun in 1938. Initially, this program consisted of an observation-well network in the coastal area of Georgia that provided data concerning changes in ground-water storage and quality. Additional wells were added in areas where changes in water levels and water quality could forewarn potential water-resources problems. About 1,200 water-level measurements were made in Georgia during 1989. Water-level measurements were made in 589 wells, and levels were continuously monitored in an additional 128 network wells (76 of which are included in this report), and 13 project wells. During 1989, water samples were collected from 104 wells and analyzed to monitor chloride concentrations in the Savannah and Brunswick areas.

Purpose and Scope

This report continues a series of annual publications that present both ground-water-level and ground-water-quality data for Georgia. Formerly titled "Ground-water Data for Georgia", the series is herein renamed "Ground-water Conditions in Georgia" to more accurately reflect its content.

Hydrographs for 76 wells, precipitation graphs for 10 National Weather Service stations, and water-level maps of the Upper Floridan, Claiborne, and Clayton aquifers, and the Dublin-Midville aquifer system have been selected to illustrate the effects that changes in recharge and discharge have had on the various aquifers in the State. Graphs of chloride concentrations for 13 wells in the coastal area and a chloride concentration map for the Upper Floridan aquifer in the Brunswick area have been included to show the distribution and changes in chloride concentration during 1980-89.

Well Numbering System

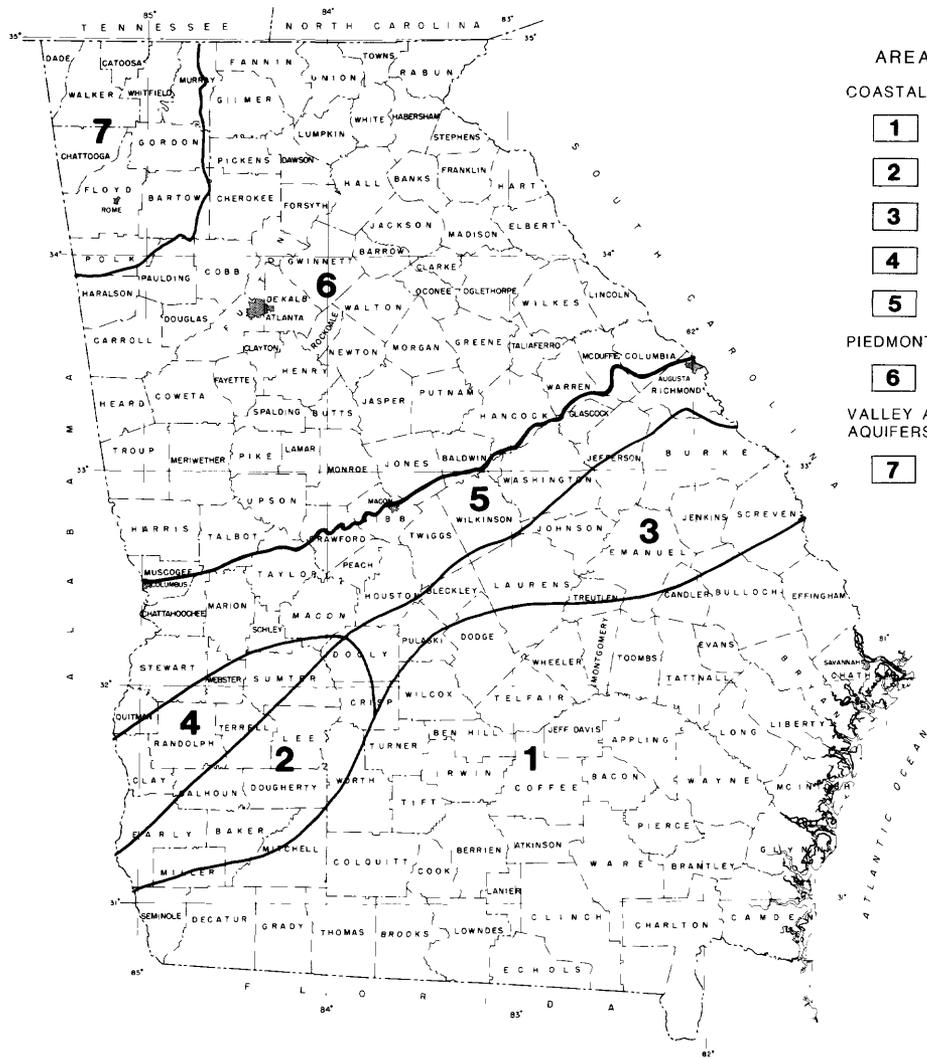
Wells in this report are numbered according to a system based on the U.S. Geological Survey index to topographic maps of Georgia. Each 7 1/2-minute topographic quadrangle in the State has been given a six-digit number and letter designation beginning at the southwestern corner of the State. Numbers increase sequentially eastward and letters advance alphabetically northward. Quadrangles in the northern part of the State are designated by double letters, with AA following 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.

Ground-Water Resources

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

Surficial aquifers are present in each of the different physiographic provinces. These aquifers are usually unconfined, and are used for domestic and stock supplies in most areas of Georgia. In the Piedmont, Blue Ridge, and Valley and Ridge provinces, 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. In the coastal area, the surficial aquifers locally may be under semi-confined conditions.

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 crop out or are near land surface. The aquifers of the Coastal Plain include, in descending order, the upper Brunswick aquifer, the lower Brunswick aquifer, the Floridan aquifer system, the Claiborne aquifer, the Clayton aquifer, and the Cretaceous aquifer system (fig. 1, table 1).



EXPLANATION

AREA IN WHICH AQUIFER IS UTILIZED

COASTAL PLAIN AQUIFERS

- 1** Floridan aquifer system
- 2** Floridan aquifer system, Claiborne aquifer, Clayton aquifer, Cretaceous aquifer system
- 3** Floridan aquifer system, Cretaceous aquifer system
- 4** Claiborne aquifer, Clayton aquifer, Cretaceous aquifer system
- 5** Cretaceous aquifer system

PIEDMONT AND BLUE RIDGE AQUIFERS

- 6** Crystalline rock aquifers

VALLEY AND RIDGE AND APPALACHIAN PLATEAU AQUIFERS

- 7** Paleozoic rock aquifers

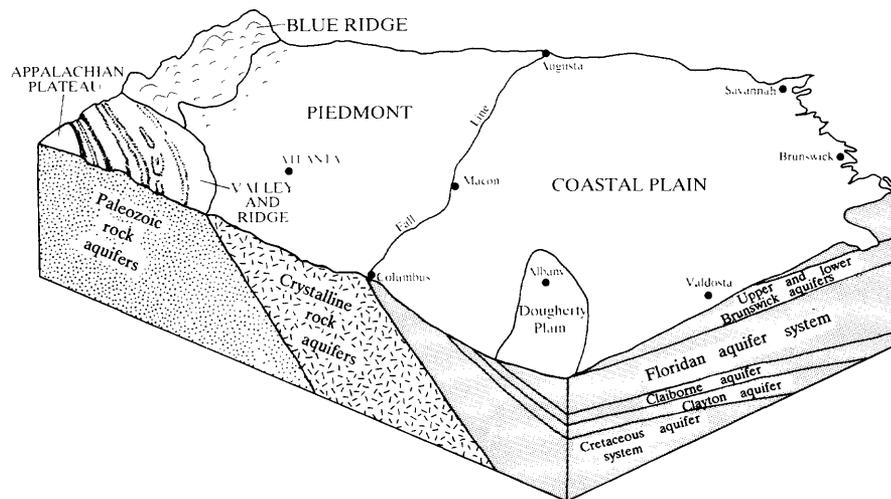


Figure 1.--Areas of utilization of major aquifers and block diagram showing major aquifers and physiographic provinces of Georgia.

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			Remarks
	Depth (ft)	Yield (gal/min)		
	Common range	Common range	May exceed	
<u>Upper Brunswick aquifer:</u> Phosphatic and dolomitic quartz sand. Generally confined.	85-200	10-15	30	Not a major source of water in coastal Georgia, but considered a supplemental water supply to the Upper Floridan aquifer. Most wells are multiaquifer tapping both the Upper and Lower Brunswick aquifers and the Upper Floridan aquifer.
<u>Lower Brunswick aquifer</u> Phosphatic and dolomitic quartz sand. Generally confined.	190-390	15-30	180	
<u>Floridan aquifer system:</u> Limestone, dolostone, 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 water-bearing zone and the lower water- bearing zone. The lower Floridan aquifer is not considered a major aquifer because of high chloride concentrations. In the Brunswick area, the Lower Floridan aquifer consists of the brackish- water zone, the deep freshwater zone, and the Fernandina permeable zone.
<u>Claiborne aquifer:</u> Sand and sandy limestone. Generally confined.	20-450	150-600	1,500	Major source of water in southwestern Georgia. Supplies industrial and municipal users at Dougherty, Crisp and Dooly Counties and provides irrigation water north of Dougherty Plain. In east- central Georgia, the Claiborne aquifer is part of the Gordon aquifer system.
<u>Clayton aquifer:</u> Limestone and sand. Generally confined.	40-800	250-600	2,150	Major source of water in southwestern Georgia. Supplies industrial and municipal users at Albany and provides irrigation water northwest of Albany. Water-level declines exceed 100 ft at Albany.

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			Remarks
	Depth (ft)	Yield (gal/min)		
	Common range	Common range	May exceed	
<u><i>Cretaceous aquifer system:</i></u> 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 Providence aquifer in southwestern Georgia and the Dublin and Midville aquifer systems in east-central Georgia. Water-level declines greater than 50 ft at kaolin mining centers and 100 ft near Albany.
<u><i>Paleozoic rock aquifers:</i></u> Sandstone, limestone, and dolostone; storage is in regolith and fractures and solution openings in rock. Generally unconfined.	15-2,100	1-50	3,500	Not laterally extensive. Limestone and dolostone aquifers most productive. Springs in limestone and dolostome aquifers discharge at rates of as much as 5,000 gal/min. Sinkholes can form in areas of intensive pumping.
<u><i>Crystalline rock aquifers:</i></u> Granite, gneiss, schist, and quartzite; storage is in fractures in rock and in regolith. Generally unconfined.	40-600	1-25	500	Not laterally extensive.

PRECIPITATION

Recharge to the ground-water system in Georgia is derived almost entirely from precipitation. Based on records for 1941-70, annual precipitation averaged 50 in. (inches) statewide, and ranged from 44 in. in the east-central part to about 76 in. in the northeastern corner (fig. 2) (Carter and Stiles, 1983). 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).

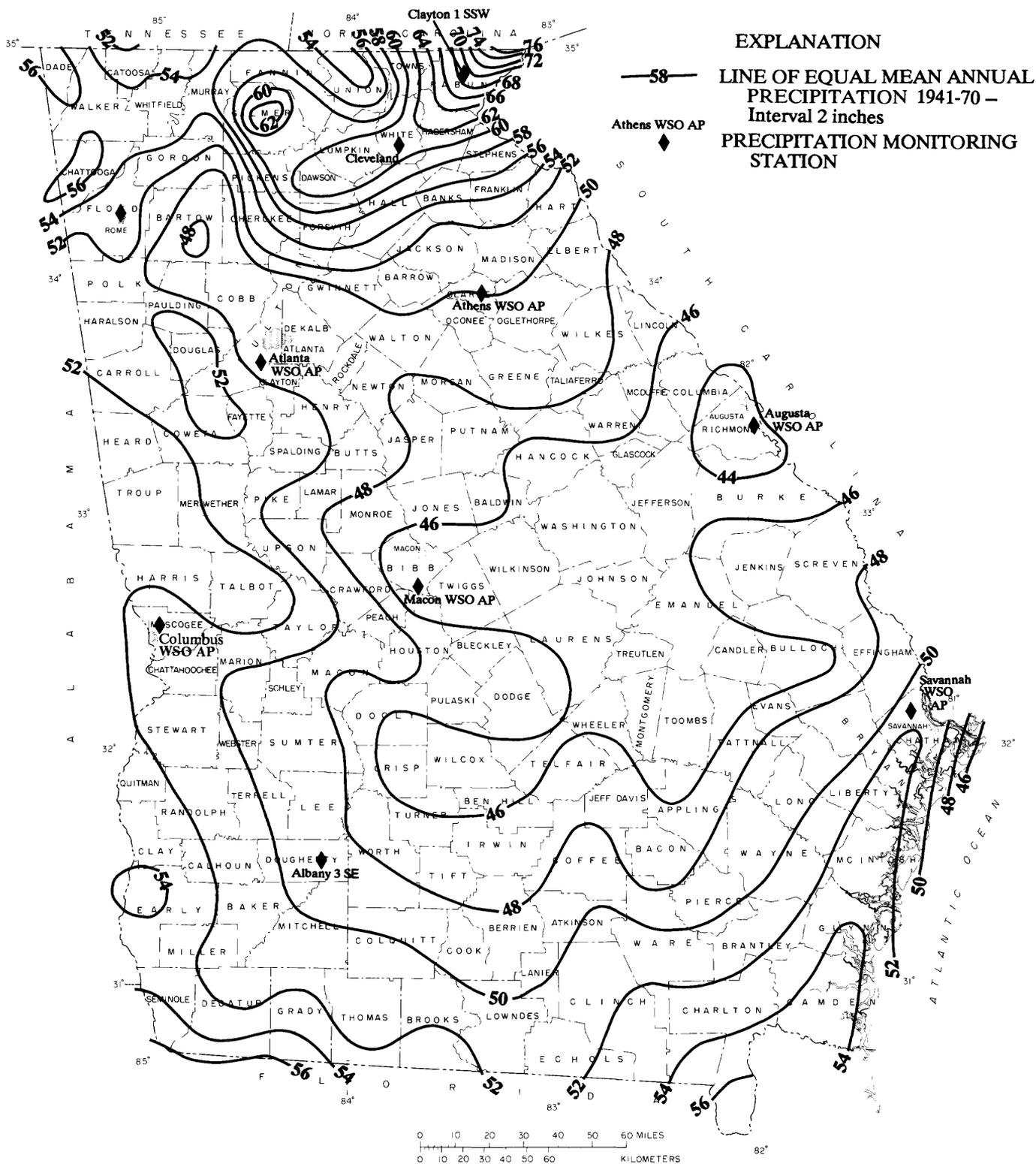


Figure 2.-- Locations of precipitation-monitoring stations and average annual precipitation in Georgia, 1941-70. Modified from Carter and Stiles (1983).

Cumulative departure is a term used to describe the long-term surplus or deficit of precipitation over a designated period of time. It is derived by adding successive monthly values of precipitation departures from normal. For example, if precipitation in January was 2 in. above normal and in February was 1 in. below normal, the cumulative departure would be $(+2)+(-1) = +1$ in. Thus, the annual cumulative departure through December would represent the sum of all deficits or surpluses during the year. Similarly, the 10-yr cumulative departure at the end of December would represent the sum of all deficits or surpluses for the previous 120 months.

Monthly mean precipitation data furnished by the National Weather Service are shown graphically for 10 precipitation stations (figs. 3-12). For each station, monthly precipitation was compared to the 30-yr (1951-80) average (normal) for the station. The lower graph shows the cumulative departure from normal precipitation for the period 1980-89; the upper graph shows the monthly departure and cumulative departure for 1989.

Precipitation over most of Georgia was above normal during 1989. The cumulative departure of precipitation for 1989 at nine of the ten National Weather Service Stations ranged from 5.8 in. above normal at Columbus (fig. 3) to 21.4 in. above normal at Rome (fig. 4). At the Savannah station (fig. 5), precipitation was 2.8 in. below normal for the year. At the Columbus, Cleveland, Athens, Albany, Clayton, and Augusta stations (figs. 3, 6, 7, 8, 9, and 10), precipitation was substantially below normal from January through May, but generally was above normal from June through December. Precipitation at the Atlanta and Macon stations (figs. 11 and 12) generally was below normal from January through March, but was above normal for most of April through December. At the Savannah station (fig. 5), precipitation generally was below normal from January through August, and above normal from September through December. At the Rome station (fig. 4), precipitation generally was above normal for the entire year.

For the 10-yr period 1980-89, the cumulative departure of precipitation was below normal at seven of the 10 stations, and ranged from 10.6 in. below normal at the Macon station (fig. 12) to 77.2 in. below normal at the Clayton station (fig. 9). The 10-yr cumulative departure was above normal for 1980-89 at the Albany (+19.7 in.), Augusta (+4.5 in.), and Atlanta (+11.6 in.) stations (figs. 8, 10, and 11).

GROUND-WATER LEVELS

Fluctuations and long-term trends in water levels occur as a result of changes in recharge to and discharge from the aquifer. Recharge varies in response to precipitation, evapotranspiration, 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 in a network of 128 wells completed in the surficial and upper Brunswick aquifers, the Floridan aquifer system, the Claiborne and Clayton aquifers, the Cretaceous aquifer system, the Paleozoic rock aquifers, and the crystalline rock aquifers. Of the 128 network wells that were monitored continuously during 1989, daily mean water levels are shown in hydrographs for 76 of the wells (fig. 13, table 2). Water-level fluctuations and trends in these 76 wells were considered to represent ground-water conditions throughout much of the State. For each well, daily-mean water levels are shown in hydrographs for 1989, and monthly-mean water levels are shown for the 10-yr period, 1980-89. A summary of monthly and annual water-level statistics is included with each hydrograph. In this report, a record water level refers to the lowest or highest daily-mean water level for the period of record in a particular well. Thus, any individual water-level measurement on a given day may be lower or higher than the record mentioned in the text, the minimum or maximum value in the statistics, or the daily-mean measurement shown on the hydrograph.

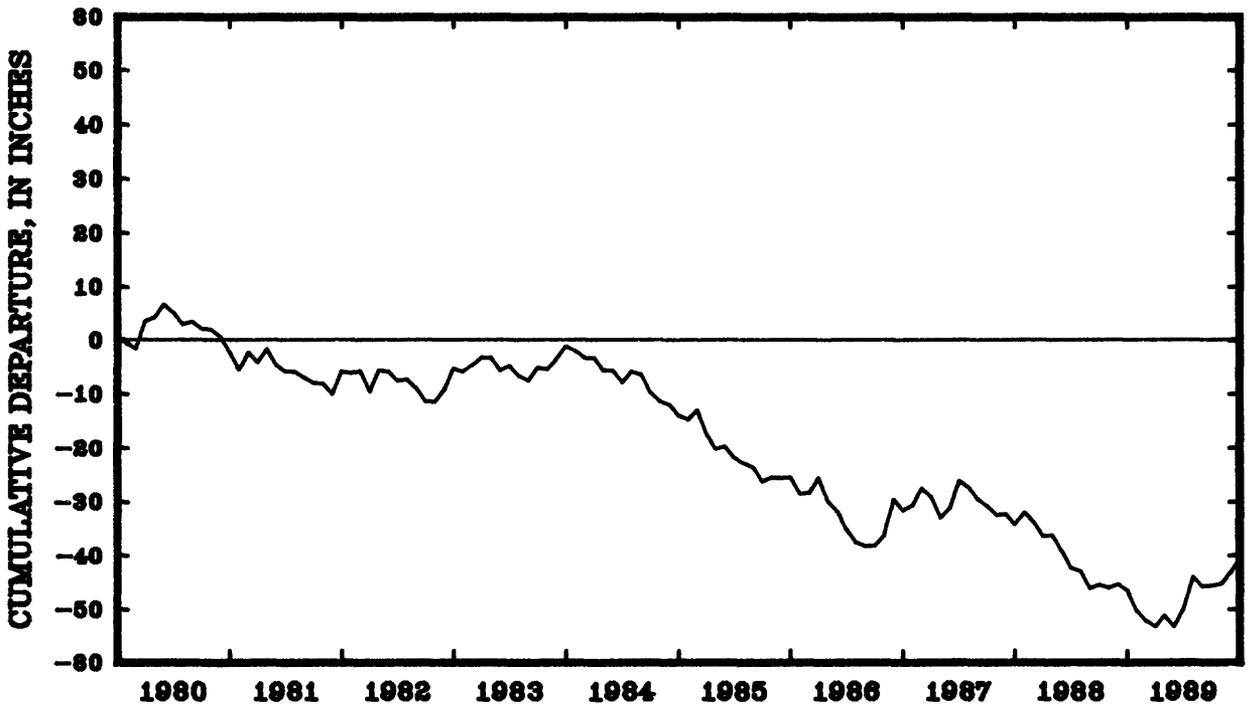
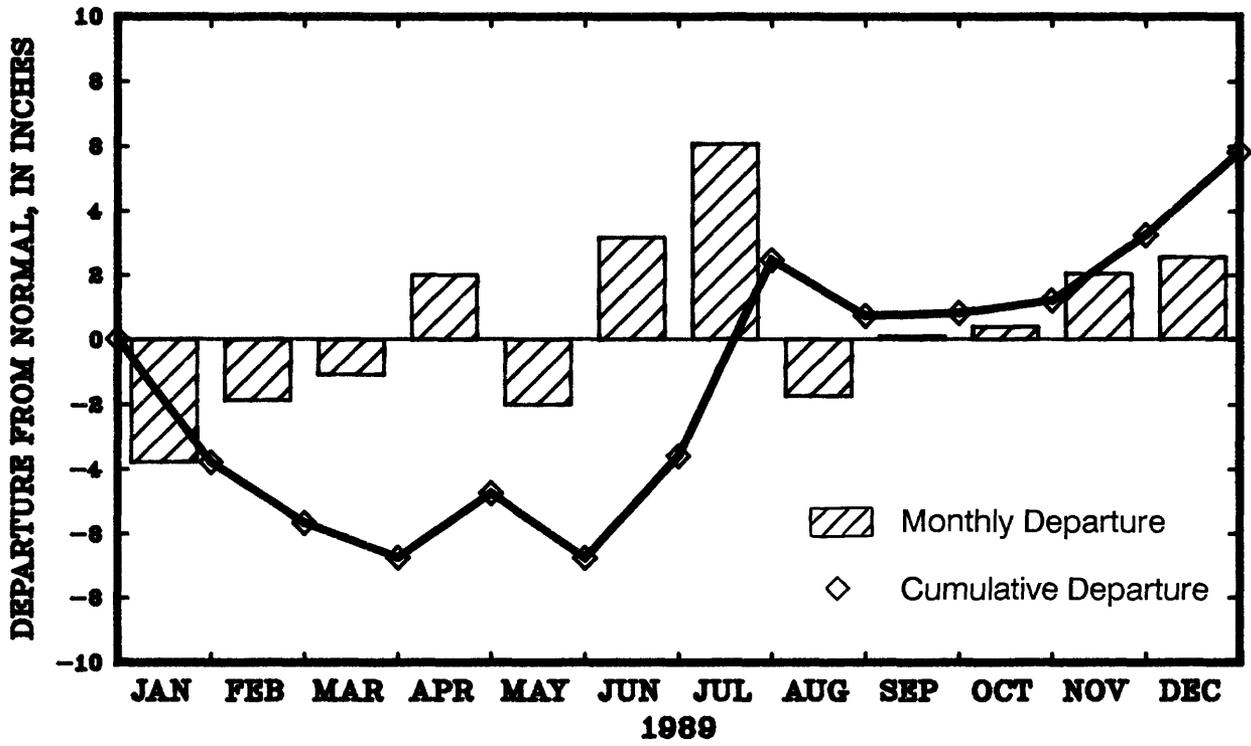


Figure 3.--Precipitation departure from normal for National Weather Service station at Columbus Weather Service Office, Airport, Muscogee County.

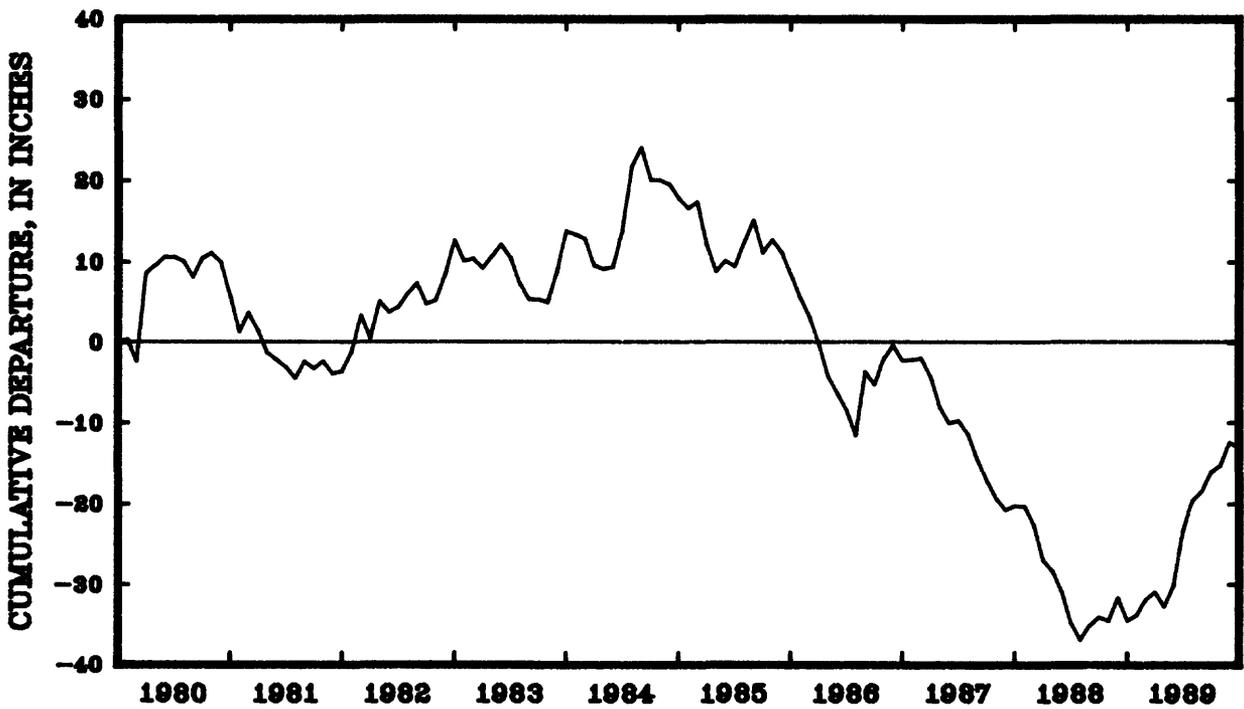
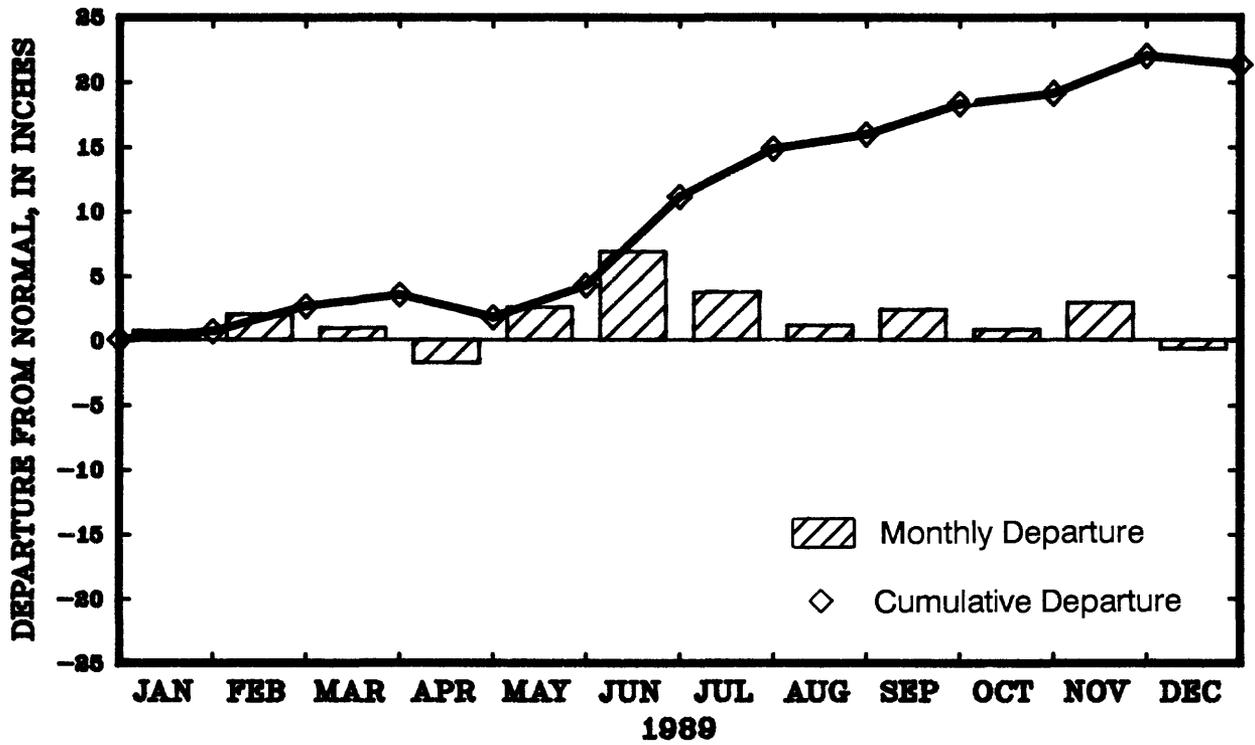


Figure 4.--Precipitation departure from normal for National Weather Service station at Rome, Floyd County.

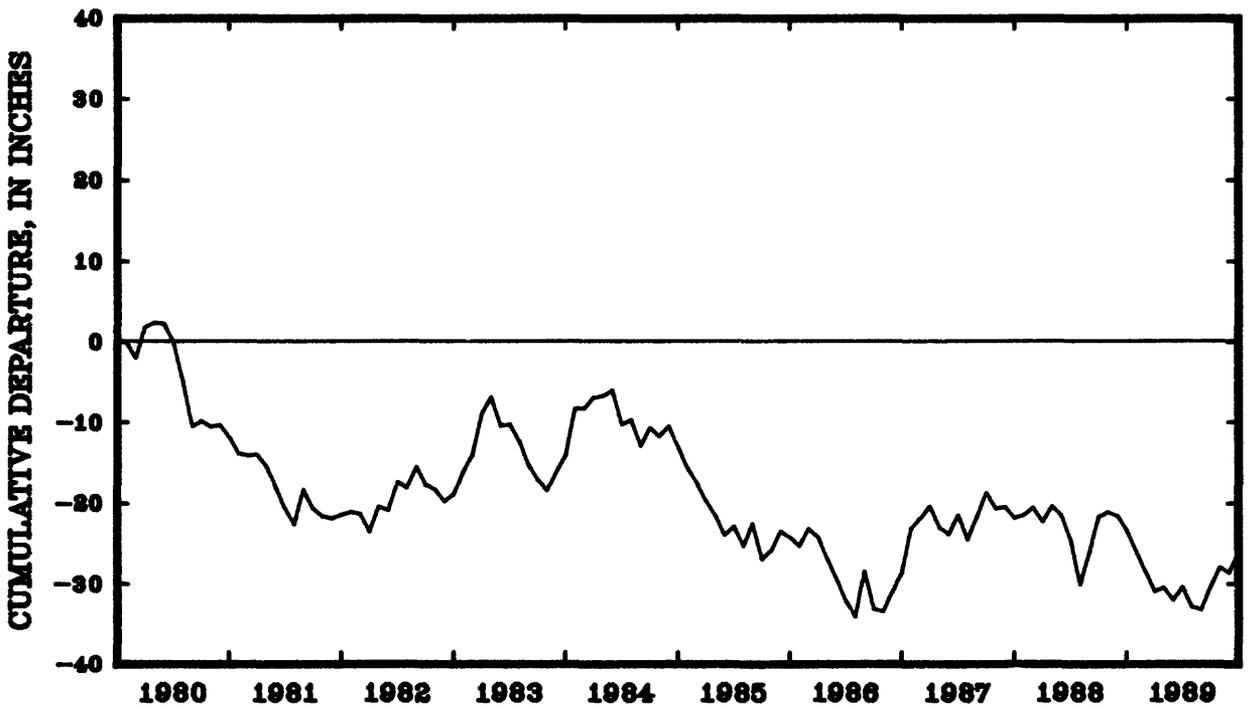
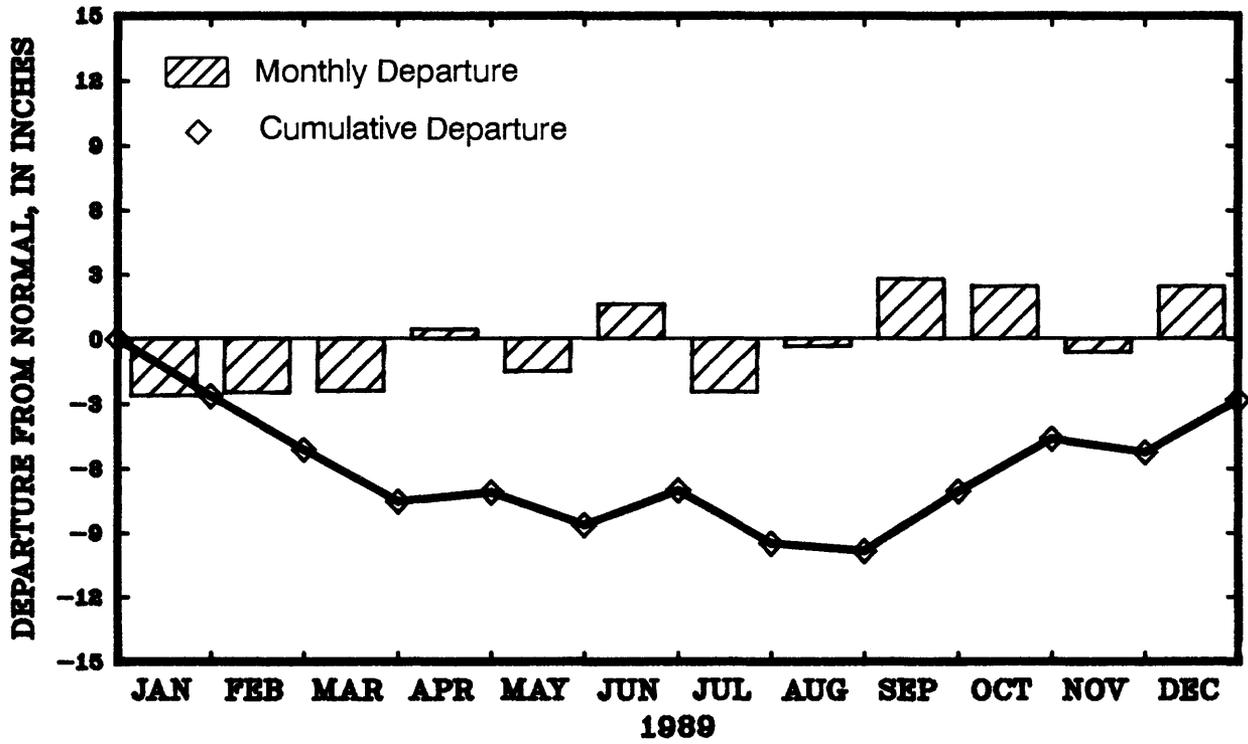


Figure 5.--Precipitation departure from normal for National Weather Service station at Savannah Weather Service Office, Airport, Chatham County.

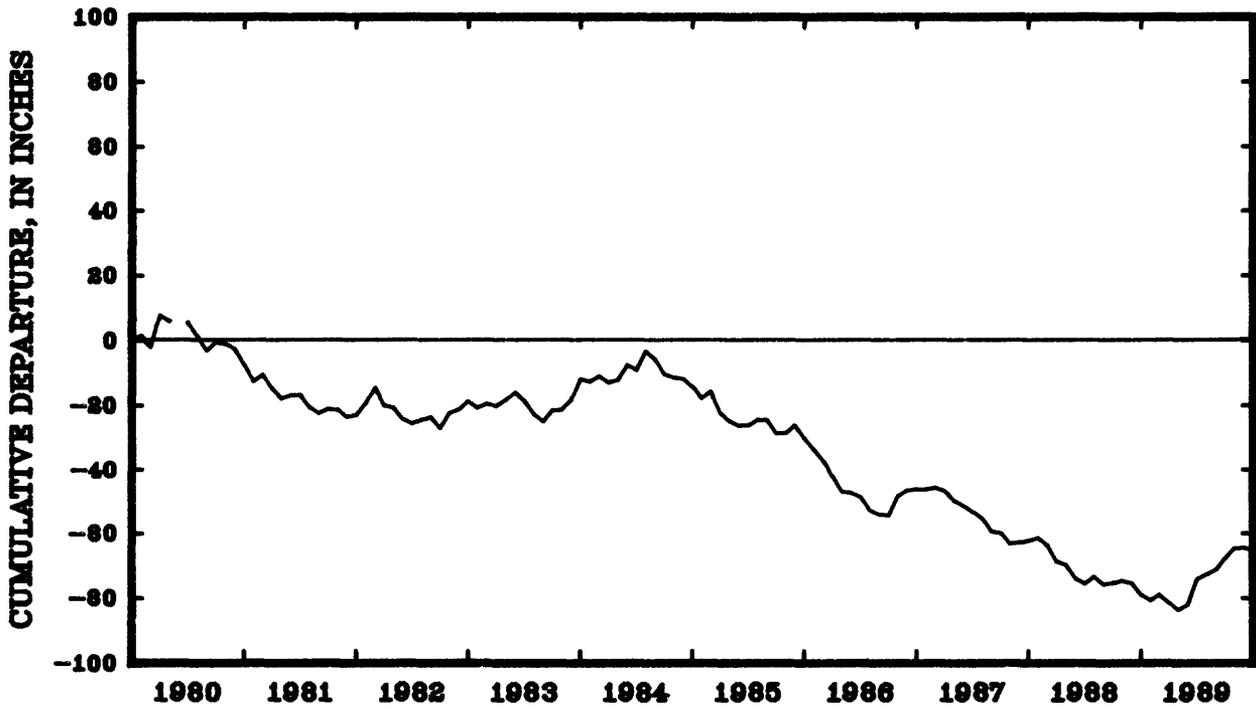
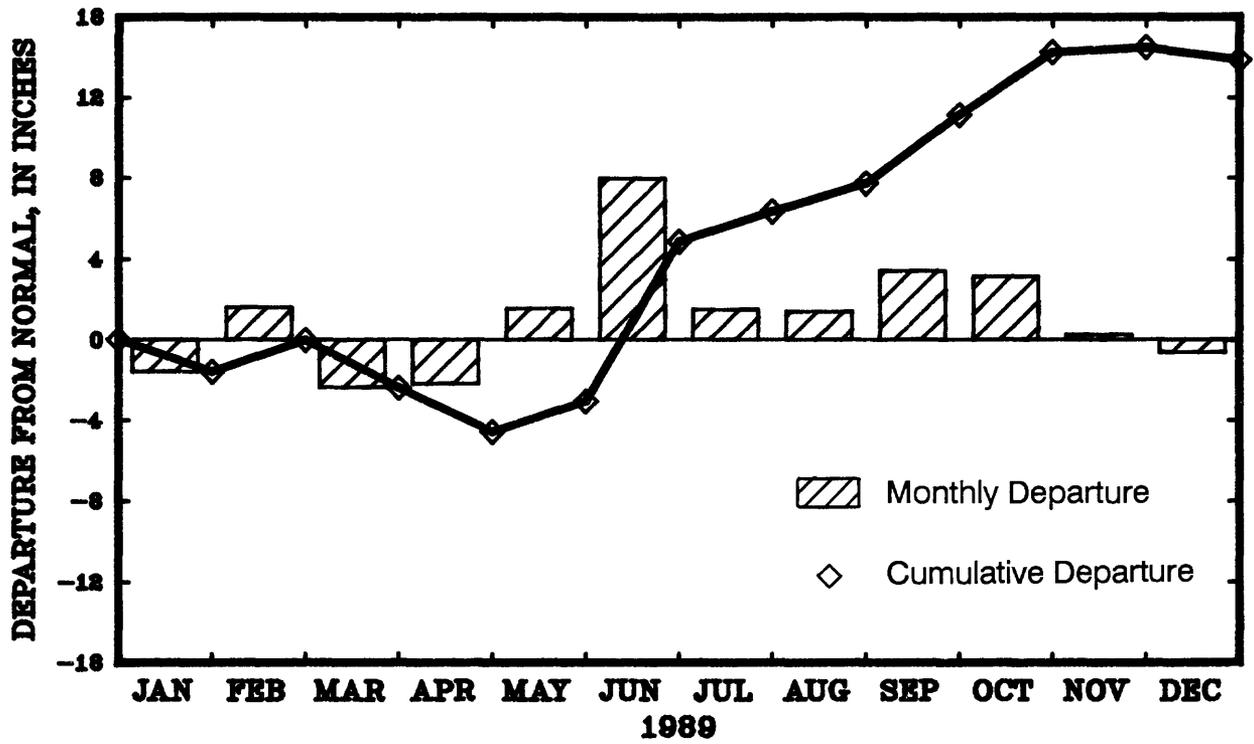


Figure 6.--Precipitation departure from normal for National Weather Service station at Cleveland, White County.

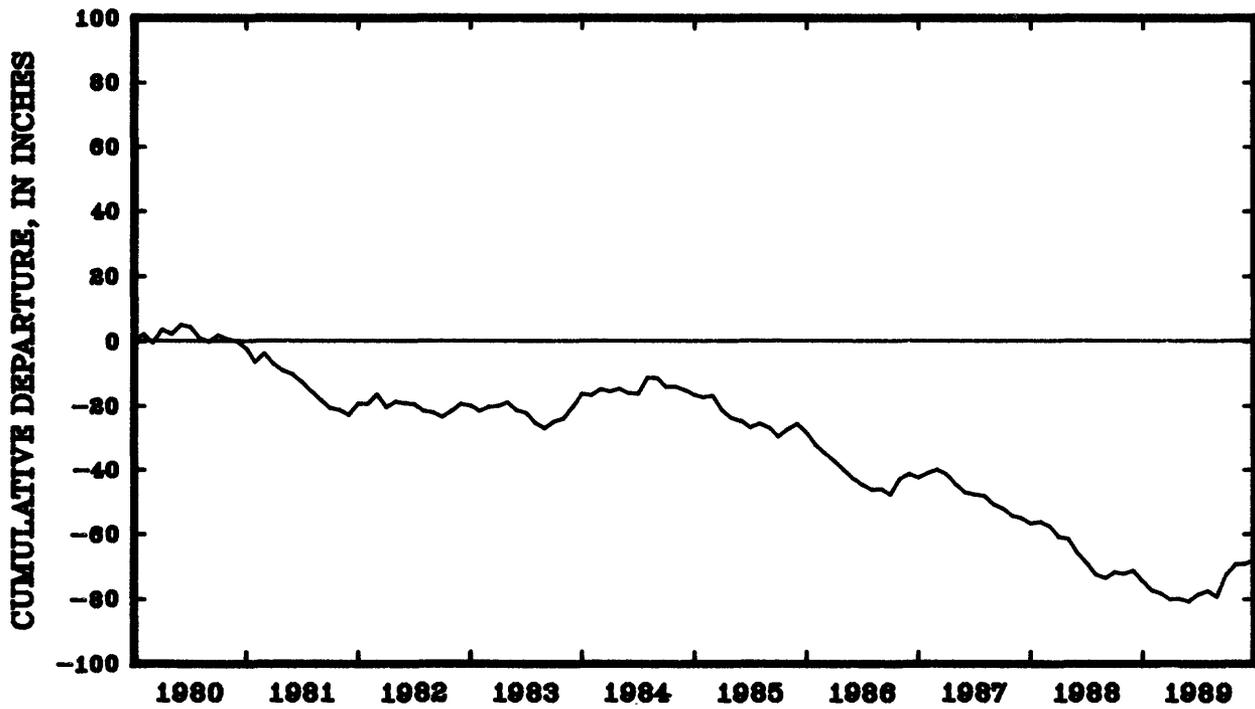
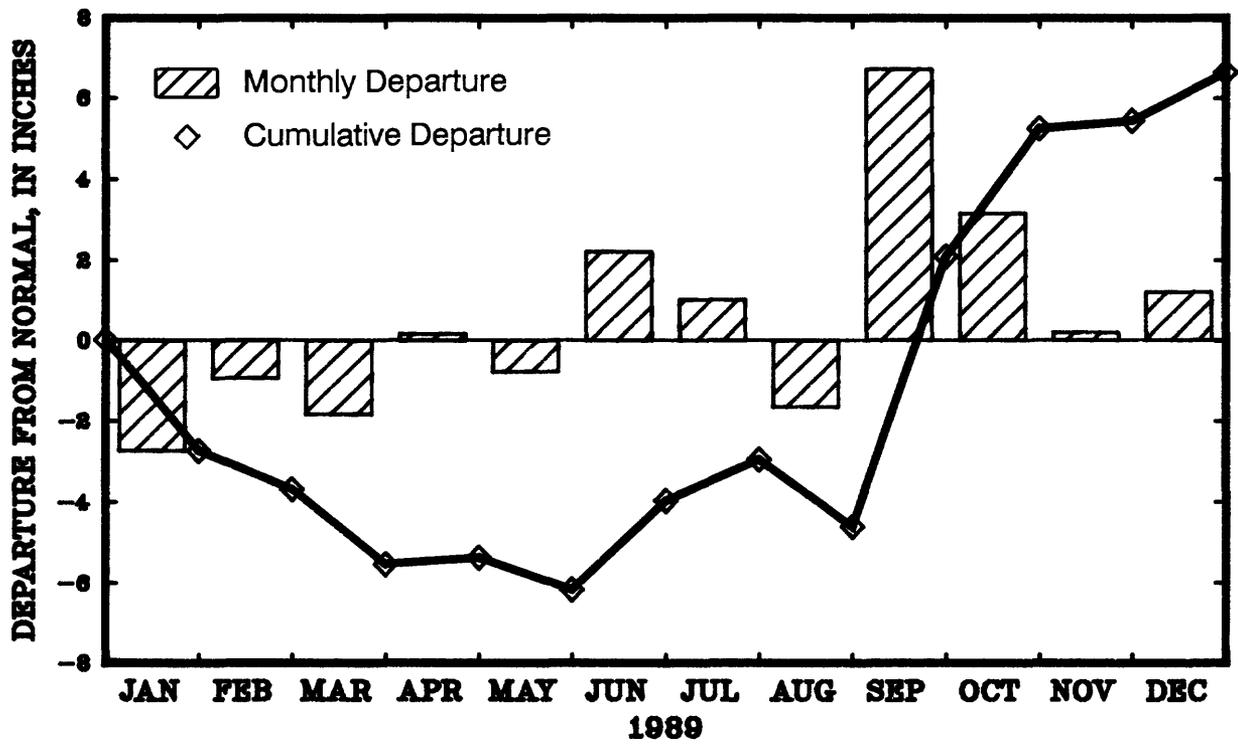


Figure 7.--Precipitation departure from normal for National Weather Service station at Athens Weather Service Office, Airport, Clarke County.

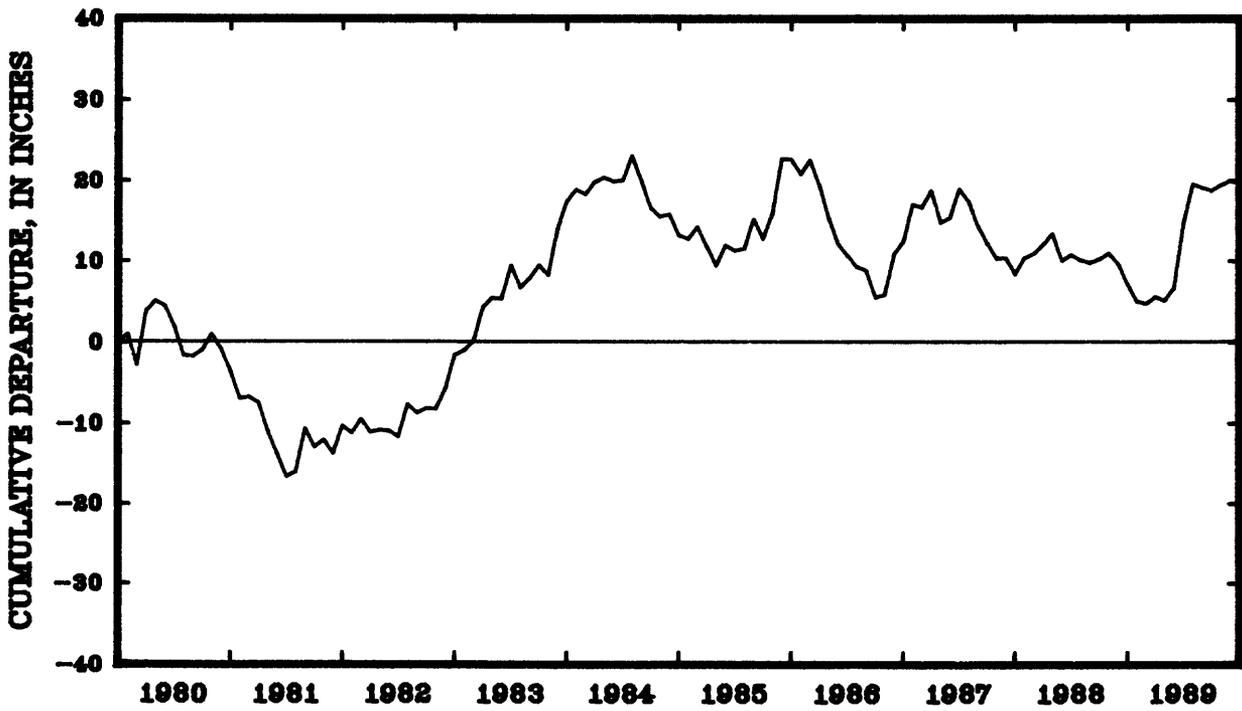
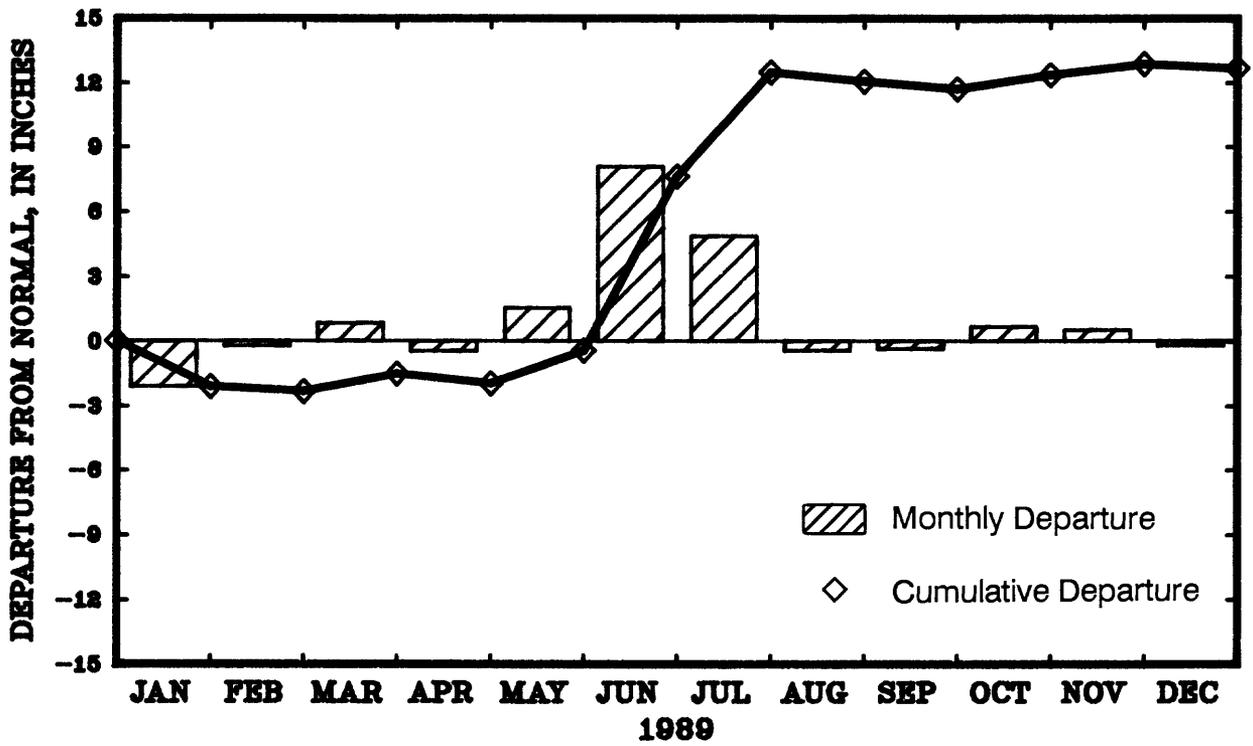


Figure 8.--Precipitation departure from normal for National Weather Service station at Albany 3 Southeast, Dougherty County.

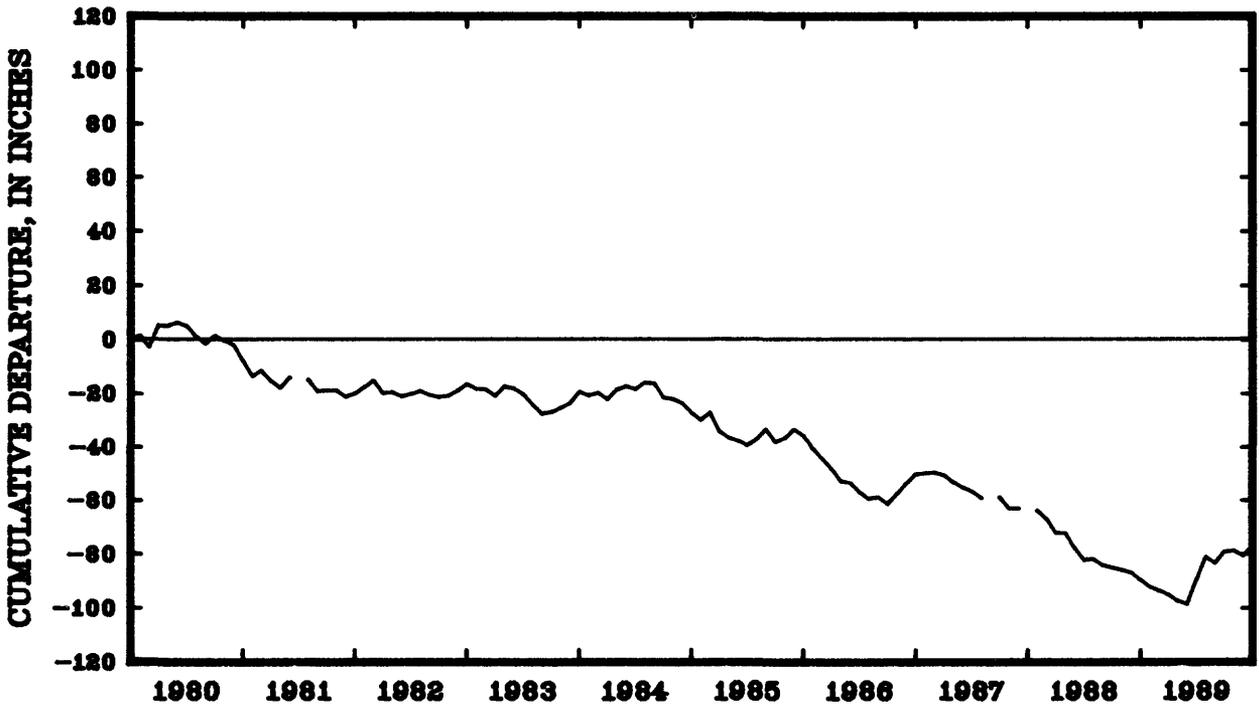
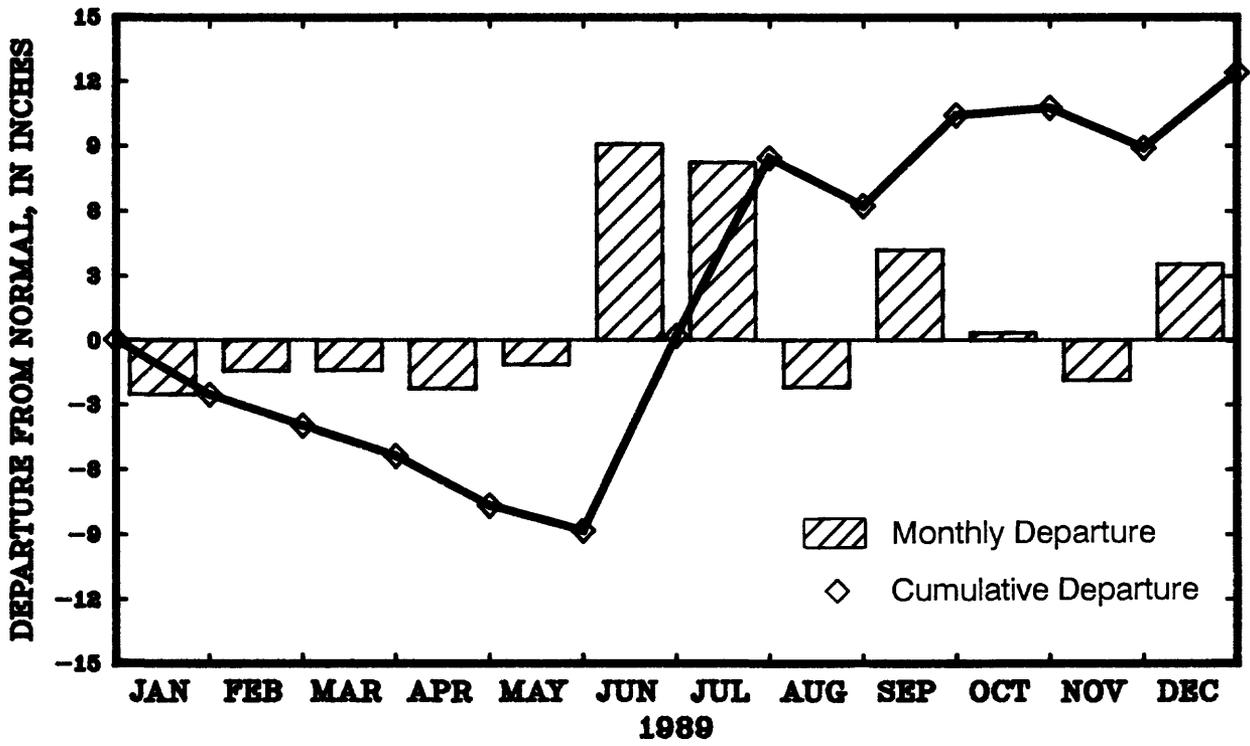


Figure 9.--Precipitation departure from normal for National Weather Service station at Clayton 1 South southwest, Rabun County.

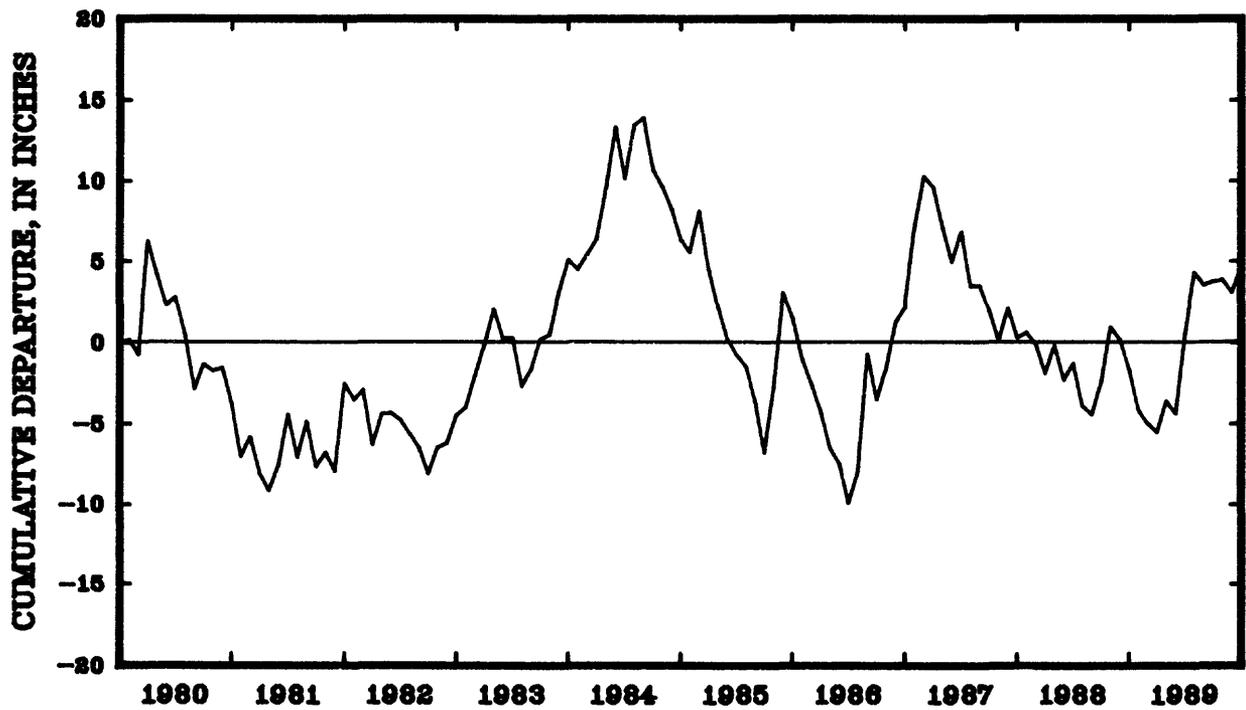
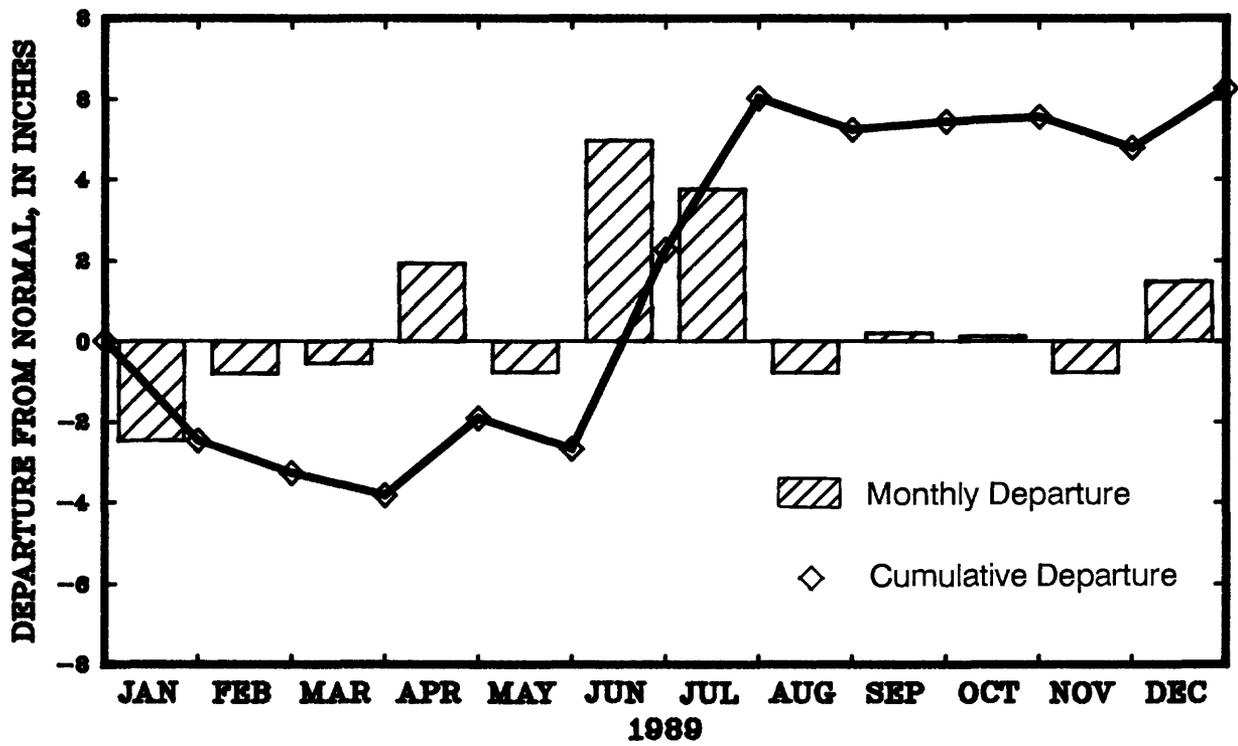


Figure 10.--Precipitation departure from normal for National Weather Service station at Augusta Weather Service Office, Airport, Richmond County.

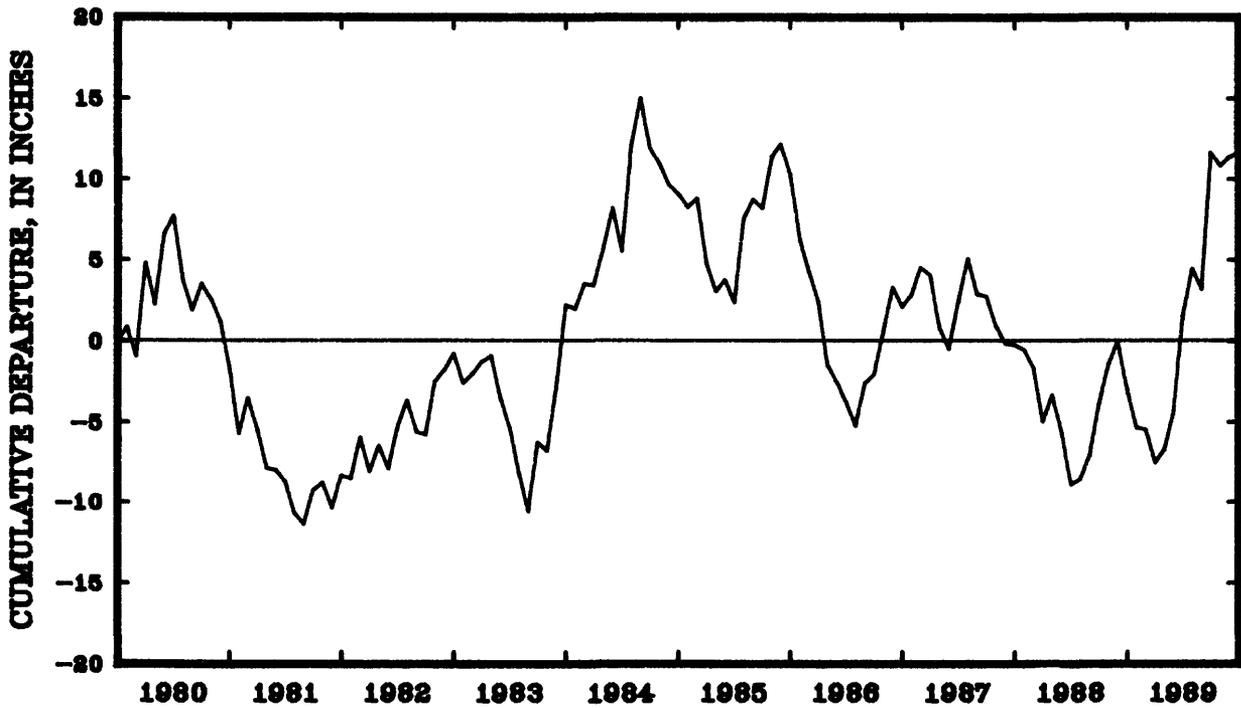
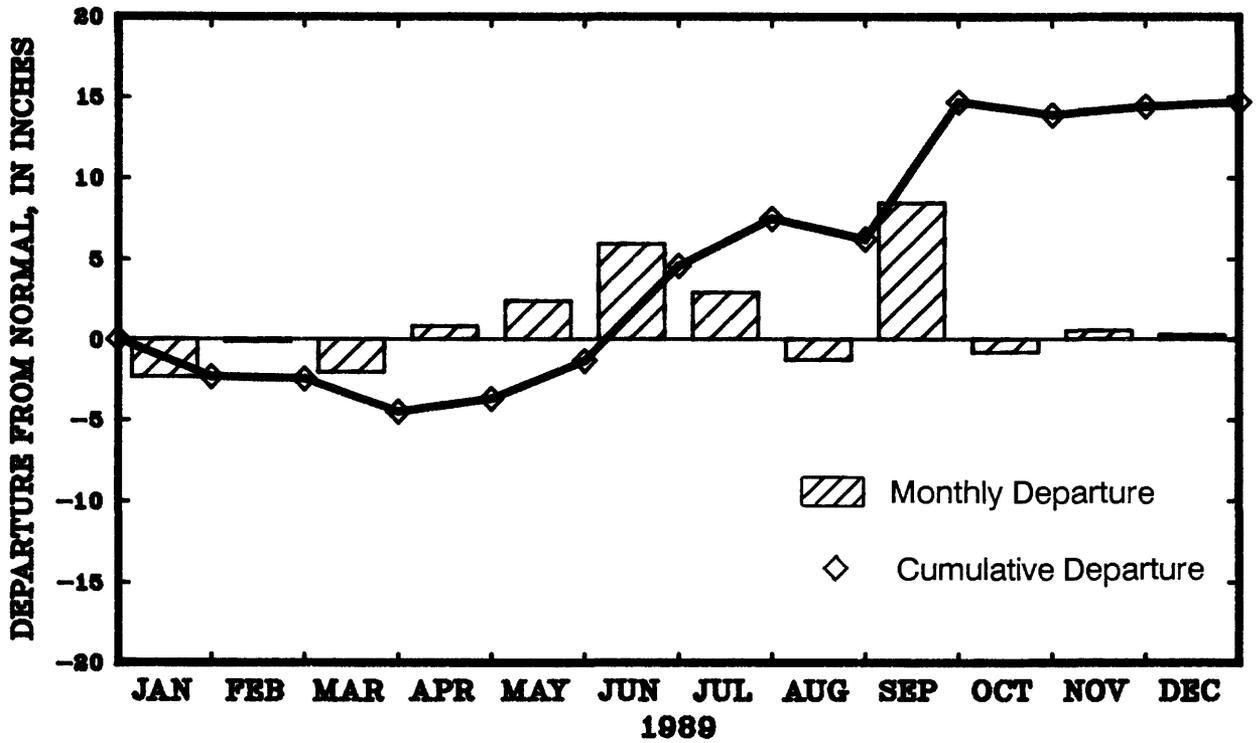


Figure 11.--Precipitation departure from normal for National Weather Service station at Atlanta Weather Service Office, Airport, Fulton County.

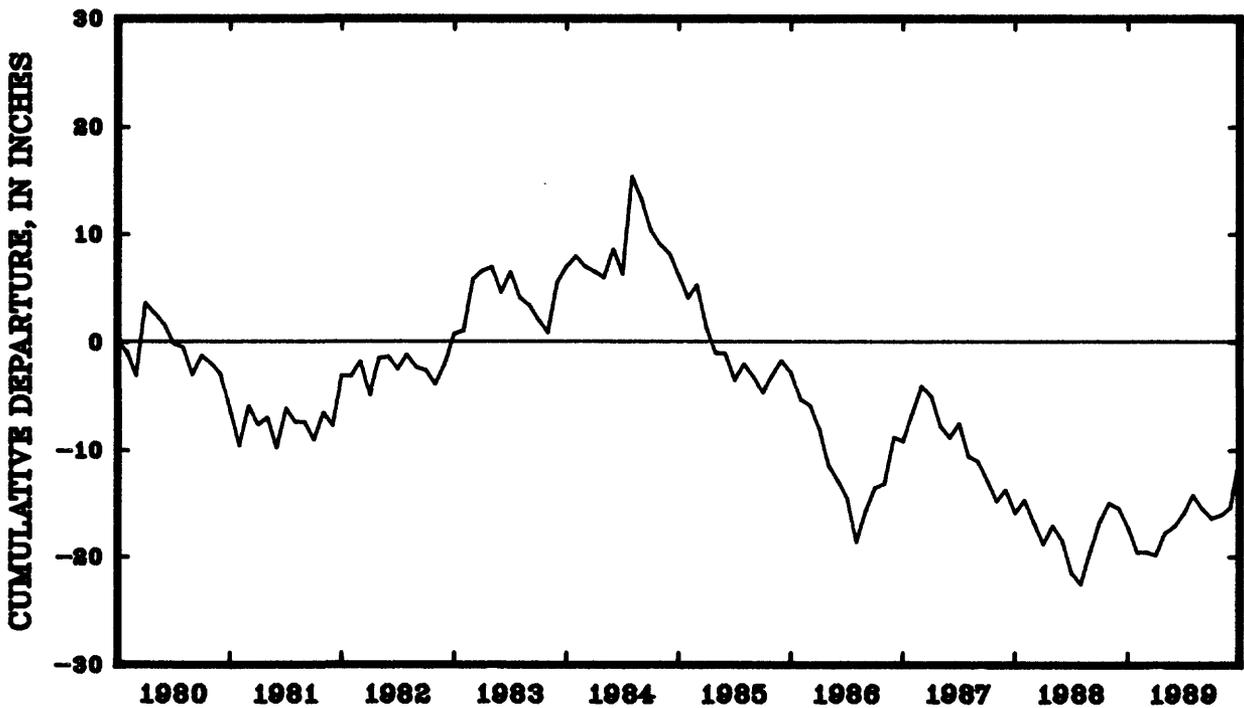
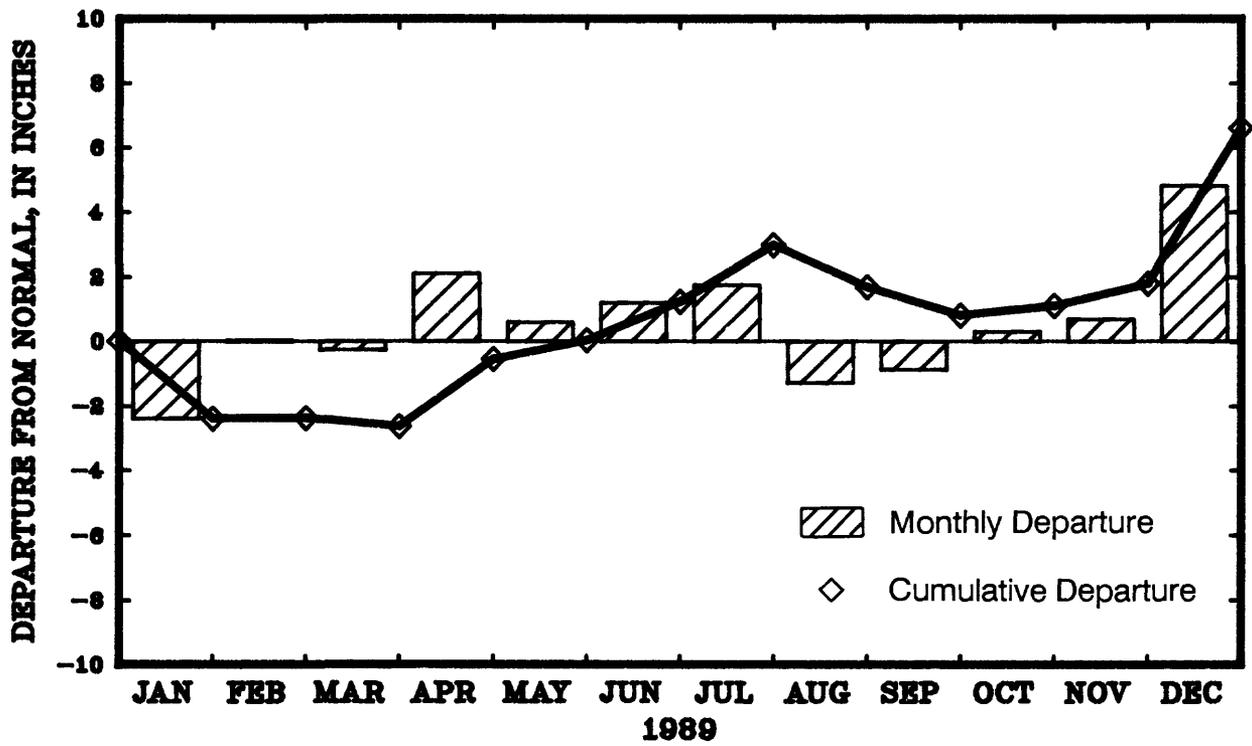


Figure 12.--Precipitation departure from normal for National Weather Service station at Macon Weather Service Office, Airport, Bibb County.

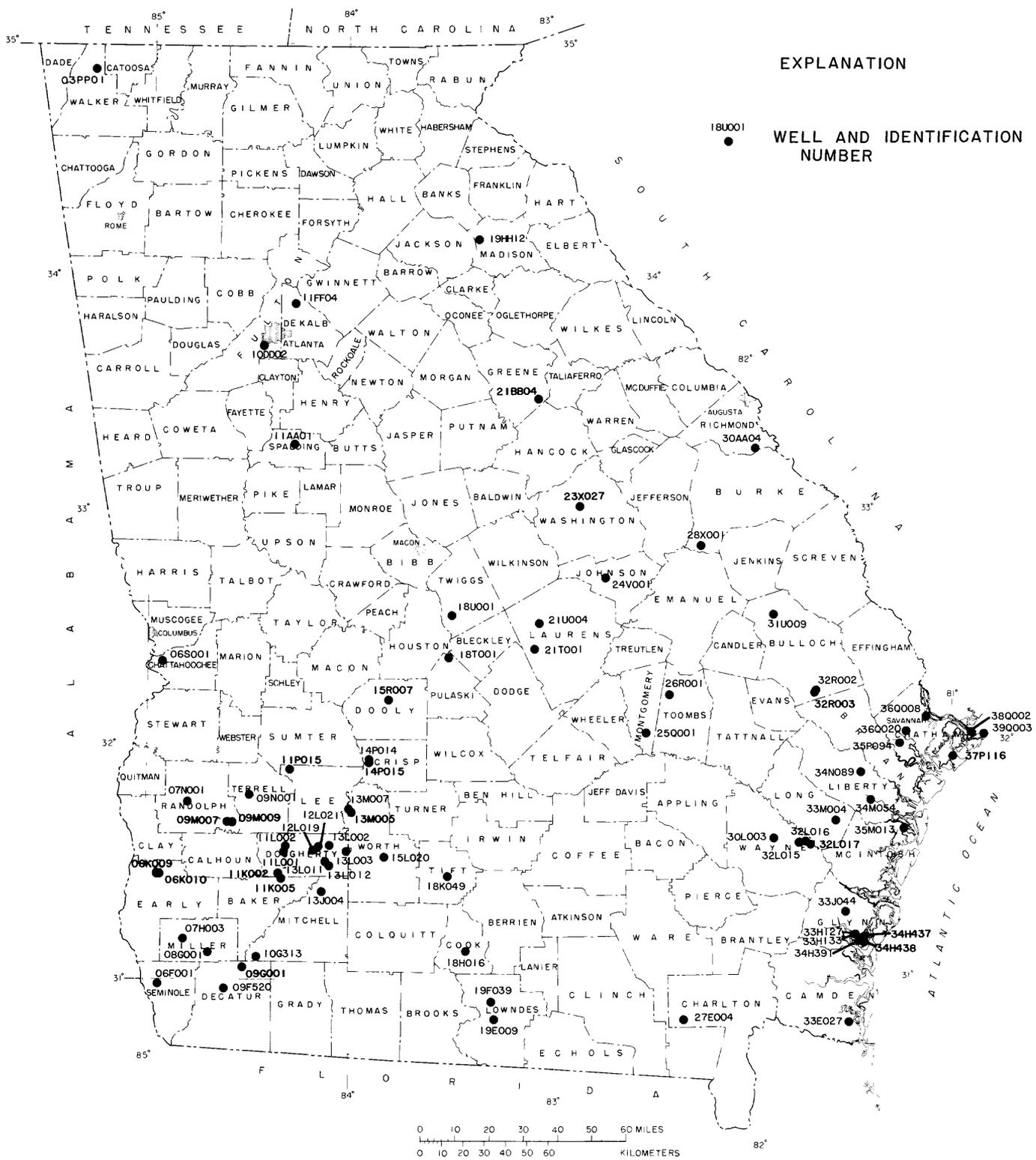


Figure 13.--Locations of observation wells for which hydrographs are included in this report.

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

County	Aquifer	Well number	Well name
Bulloch	Upper Floridan	32R002	Bulloch South test well 1
Bulloch	Surficial	32R003	Bulloch South test well 2
Bulloch	Upper Brunswick	31U009	Hopeulikit test well 2
Burke	Midville aquifer system	28X001	Midville Experiment Station
Camden	Upper Floridan	33E027	Kings Bay
Charlton	Upper Floridan	27E004	Test well OK9
Chatham	Surficial	35P094	UGA
Chatham	Upper Floridan	36Q008	Layne-Atlantic
Chatham	Upper Floridan	36Q020	Morrison
Chatham	Surficial	37P116	Skidaway Institute test well 4
Chatham	Upper Floridan	38Q002	Pilot House
Chatham	Upper Floridan	39Q003	Test well 7, point 3
Chattahoochee	Cretaceous aquifer system	06S001	Fort Benning
Cook	Upper Floridan	18H016	Adel
Crisp	Clayton	14P014	Georgia Veterans Memorial State Park test well 1
Crisp	Claiborne	14P015	Georgia Veterans Memorial State Park test well 2
Decatur	Upper Floridan	09F520	Bolton
Decatur	Claiborne	09G001	DP-4
DeKalb	Crystalline rock	11FF04	GAR, test well 5
Dooly	Claiborne	15R007	Pinehurst-Horne
Dougherty	Providence	12L021	Test well 10
Dougherty	Claiborne	11K002	Test well 11
Dougherty	Clayton	11K005	Test well 12
Dougherty	Clayton	11L002	Albany Nursery
Dougherty	Clayton	13L002	Turner City
Dougherty	Claiborne	11L001	Test well 4
Dougherty	Claiborne	12L019	Test well 5
Dougherty	Claiborne	13L011	Test well 2
Dougherty	Upper Floridan	13L003	Albany-Dougherty County
Dougherty	Upper Floridan	13L012	Test well 3
Early	Clayton	06K009	Kolomoki State Park test well 1
Early	Claiborne	06K010	Kolomoki State Park test well 2
Fulton	Crystalline rock	10DD02	Fort McPherson
Glynn	Upper Floridan	33H127	Test well 3
Glynn	Upper Floridan	33H133	Test well 6
Glynn	Lower Floridan	33J044	Test well 27
Glynn	Lower Floridan	34H391	Test well 16
Glynn	Upper Brunswick	34H437	Coffin Park test well 2
Glynn	Surficial	34H438	Coffin Park test well 3
Greene	Crystalline rock	21BB04	Veasey
Johnson	Midville aquifer system	24V001	Test well 1
Laurens	Upper Floridan	21T001	Hogan
Laurens	Midville aquifer system	21U004	Test well 3
Lee	Claiborne	11P015	Pete Long 2

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

County	Aquifer	Well number	Well name
Liberty	Upper Floridan	34M054	Test well 2
Liberty	Upper Floridan	34N089	Test well 1
Long	Upper Floridan	33M004	Test well 3
Lowndes	Upper Floridan	19E009	Valdosta
Lowndes	Upper Floridan	19F039	Valdosta 8
Madison	Crystalline rock	19HH12	Meadowlake Estates
McIntosh	Upper Floridan	35M013	Harris Neck
Miller	Surficial	07H003	DP-3
Miller	Upper Floridan	08G001	Fleet
Mitchell	Upper Floridan	10G313	Meinders
Mitchell	Upper Floridan	13J004	Wright
Montgomery	Upper Floridan	25Q001	Uvalda School
Pulaski	Midville aquifer system	18T001	Arrowhead test well 1
Randolph	Clayton	07N001	Cuthbert
Randolph	Clayton	09M007	Martin test well 2
Randolph	Claiborne	09M009	Martin test well 1
Richmond	Dublin-Midville aquifer system	30AA04	McBean 2
Seminole	Upper Floridan	06F001	Roddenberry Farms test well 1
Spalding	Surficial	11AA01	Experiment Station
Terrell	Clayton	09N001	Graves School
Tift	Upper Floridan	18K049	Test well 1
Toombs	Upper Floridan	26R001	Vidalia 2
Twiggs	Dublin aquifer system	18U001	Test well 3
Walker	Paleozoic rock	03PP01	Fort Oglethorpe
Washington	Dublin-Midville aquifer system	23X027	Sandersville Ga 8
Wayne	Upper Floridan	30L003	Johnson
Wayne	Upper Floridan	32L015	Gardi test well 1
Wayne	Upper Brunswick	32LO16	Gardi test well 2
Wayne	Surficial	32L017	Gardi test well 3
Worth	Claiborne	13M005	DP-7
Worth	Surficial	13M007	DP-9
Worth	Upper Floridan	15L020	Sylvester

Continuous records from 76 wells indicate that annual mean ground-water levels during 1989 were from 4.1 ft lower to 10.8 ft higher than annual means during 1988. When compared to 1988 records, the annual mean water level during 1989 was higher in 39 wells and lower in 37 wells. During the period 1980-89, the overall water-level trend was downward in 50 of the 76 wells included in this report. In the Coastal Plain, record-low water levels were measured during 1989 in nine wells, and were from 0.1 to 1.1 ft lower than the previous record lows. The record lows were measured during December in the Cretaceous aquifer system near Columbus; during February in the Clayton aquifer in southwestern Dougherty County; and during June to September and during December in the Upper Floridan, Lower Floridan, and upper Brunswick aquifers in the Coastal area.

Surficial Aquifers

Water-level fluctuations and trends in the surficial aquifers are monitored in 13 wells statewide, records from eight are included in this report (figs. 14-22). Water-level fluctuations in the surficial aquifers are caused mainly by changes in precipitation, evapotranspiration, and natural drainage. Generally, water levels 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 hill tops and steep slopes, resulting in temporary well failures. Generally, well yields are restored with the return of precipitation. In some areas, the surficial aquifer is semi-confined and water levels are influenced locally by nearby pumping.

North Georgia area

Water-level fluctuations and trends in the surficial aquifer in the northern part of Georgia are monitored locally in two wells, records from one are included in this report. In this area, water levels in the surficial aquifer are affected by variations in precipitation, as illustrated by the hydrograph for well 11AA01 (fig. 15) at Griffin, Spalding County. The 10-yr hydrograph indicates that water levels in the well were affected by severe droughts in 1981, 1986, and 1988. (see precipitation graph for Atlanta, fig. 11.) The general trend in the water level was slightly downward during 1983-88, but above normal precipitation during 1984, 1987, and 1989 resulted in increased recharge to the aquifer and higher water levels. The mean water level in well 11AA01 was 0.9 ft higher in 1989 than in 1988.

Southwest area

In the southwest area, five wells are monitored to detect water-level fluctuations and trends in the surficial aquifer, records from two are included in this report (figs. 16, 17). Water-level fluctuations in these two wells are directly related to localized precipitation events. The mean water level in well 13M007 (fig. 16) in Worth County was 0.8 ft lower and the mean water level in well 07H003 (fig. 17) in Miller County was 2.1 ft higher in 1989 than in 1988. The 10-yr hydrographs indicate that water levels in both wells were affected by a severe drought in 1981. A slight downward trend during 1983-89 is evident in well 13M007, but no trend is apparent in the hydrograph for well 07H003. The difference in water-level response at the two wells results from areal variations in precipitation.

Coastal area

Water levels in the surficial aquifer in the coastal area are monitored in six wells, records from five are included in this report (figs. 18-22). Throughout the coastal area, the surficial aquifer is recharged by precipitation, as illustrated by the hydrographs for wells 35P094 and 37P116 in Chatham County (figs. 18, 19), and well 32R003 in Bulloch County (fig. 20). At well 35P094, recharge by precipitation is reflected by a sharp rise in the water level followed by a gradual decline that represents evapotranspiration and natural drainage (Clarke and others, 1990, p. 22). The water-level response at wells 32R003 and 37P116 is less pronounced because the wells tap deeper parts of the surficial aquifer where semi-confined conditions occur as a result of a clay semi-confining unit. The annual mean water level in well 37P116 in Chatham County was about the same in 1989 as in 1988; in well 32R003 in Bulloch County the annual mean water level was about 0.7 ft higher and in well 35P094 it was about 0.3 ft lower in 1989 than in 1988. There is no apparent long-term trend indicated on the 10-yr graphs for these wells.

Water-level fluctuations in the surficial aquifer in the Brunswick area are influenced by nearby pumping from the surficial aquifer, by precipitation, and by tidal fluctuations (Clarke and others, 1990, p. 24). The mean water level in well 34H438 (fig. 21) in Glynn County was 0.3 ft higher in 1989 than in 1988, reversing a slight downward trend since at least 1984 (when monitoring began). The water-level rise during 1988-89 may be a result of increased precipitation and decreased pumping.

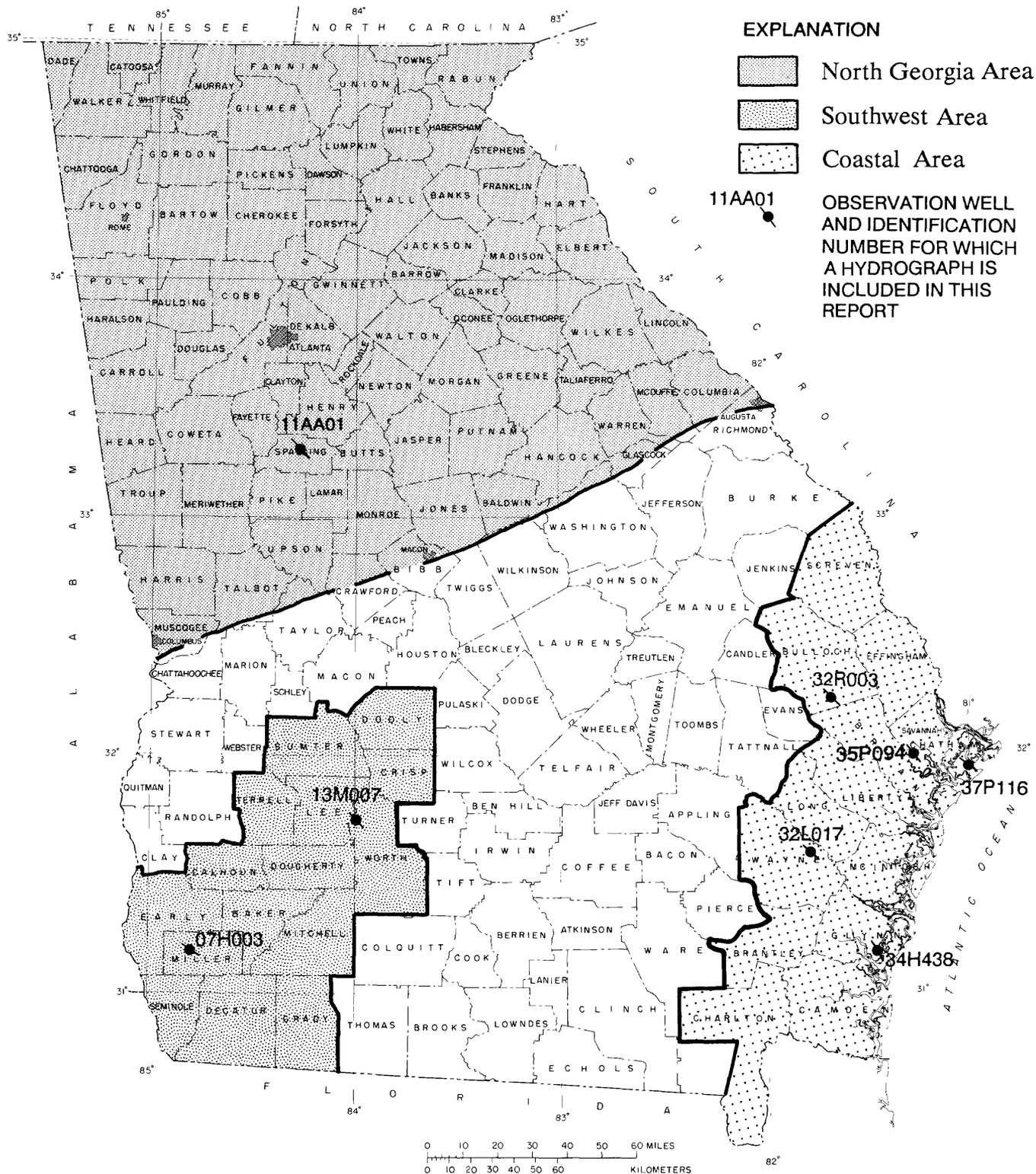


Figure 14.--Locations of observation wells completed in surficial aquifers.

331507084171801 Local number, 11AA01.

LOCATION.--Lat 33°15'54", long 84°16'56", Hydrologic Unit 03070103, University of Georgia Experiment Station, Experiment, Ga.

Owner: University of Georgia.

AQUIFER.--Surficial (residuum).

WELL CHARACTERISTICS.--Dug unused supply well, size 4 x 4 ft, depth 30 ft, cased to 30 ft, open end.

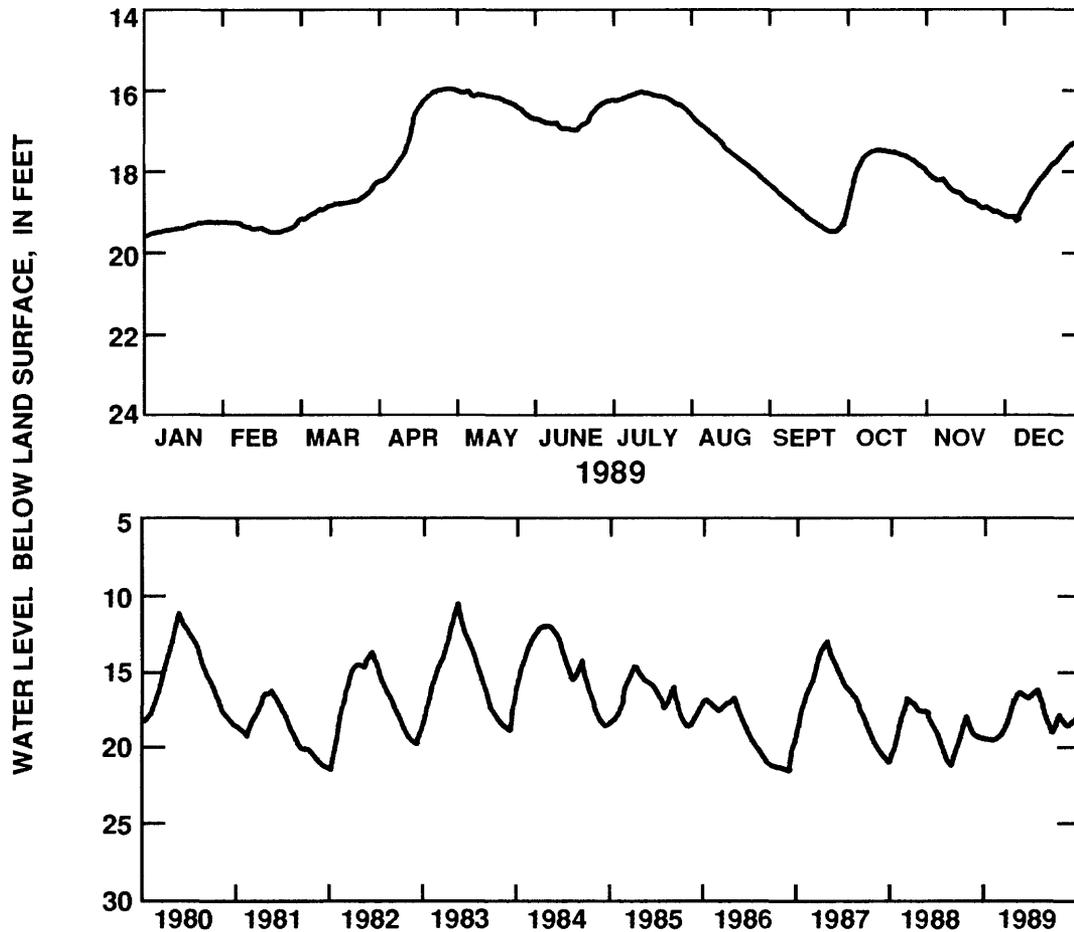
DATUM.--Altitude of land-surface datum is 950 ft.

Measuring point: Top of recorder shelf, 3.1 ft above land-surface datum.

REMARKS.--None.

PERIOD OF RECORD.--October 1943 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.26 ft below land-surface datum, March 19, 1948; lowest, 21.82 ft below land-surface datum, November 18-19, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	19.40	19.43	18.79	16.82	16.27	16.73	16.21	17.46	19.01	17.76	18.54	18.27
MAX	19.57	19.58	19.24	18.26	16.66	17.05	16.58	18.30	19.48	19.02	19.01	19.18
MIN	19.28	19.21	18.23	15.97	16.01	16.25	16.01	16.64	18.35	17.47	18.00	17.24
CAL YR 1989			MEAN	17.88		HIGH	15.97		LOW	19.58		

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, westernmost of three observation wells, 50 ft north of Ga. Highway 32, 1,400 ft east of the Flint River, 1.7 mi east of the intersection of Ga. Highway 32 and Ga. Highway 91.

Owner: U.S. Geological Survey test well DP-9.

AQUIFER.--Surficial (residuum).

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 25 ft, cased to 10 ft, open hole.

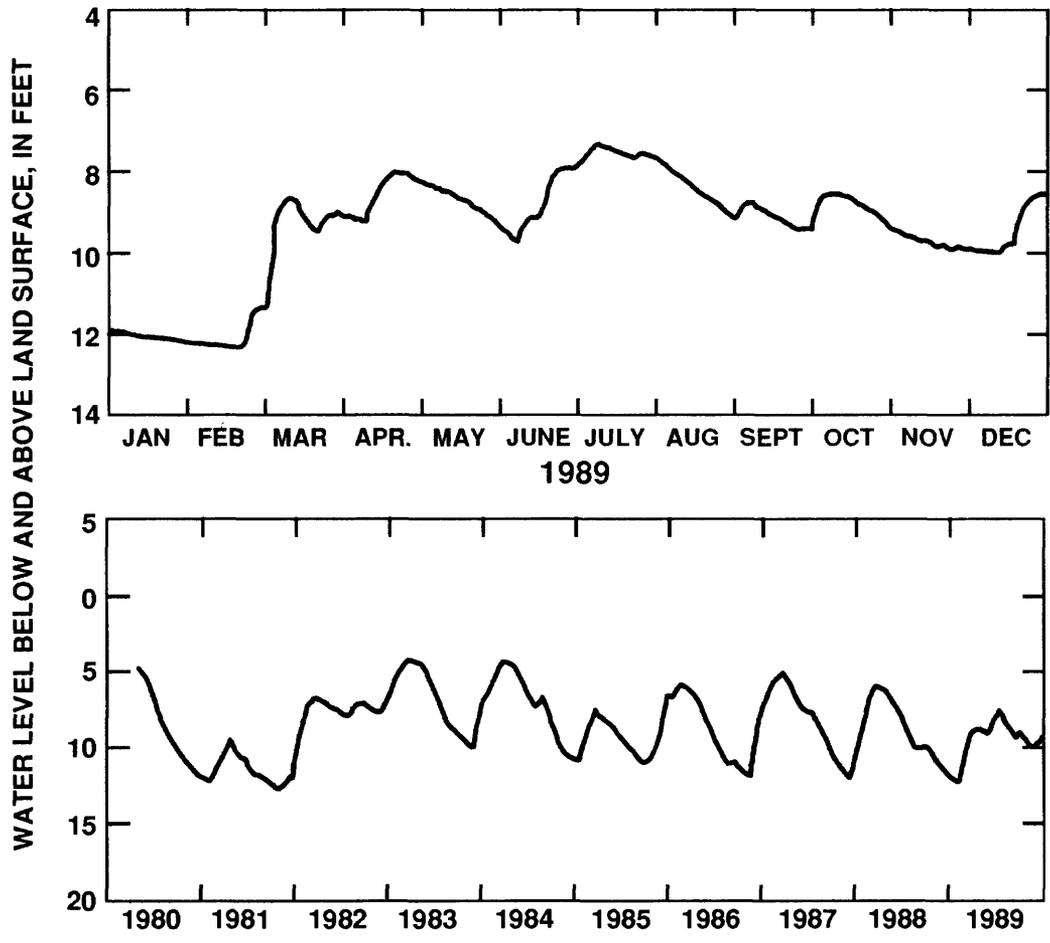
DATUM.--Altitude of land-surface datum is 230 ft.

Measuring point: Top of 4 in. casing, 1 ft above land-surface datum.

REMARKS.--Water levels for period of missing record, February 28 to March 28, were estimated.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	12.04	12.08	9.25	8.47	8.65	8.82	7.52	8.42	9.15	8.90	9.75	9.49
MAX	12.22	12.30	11.34	9.18	9.30	9.69	7.88	9.12	9.50	9.39	9.97	10.03
MIN	11.86	11.30	8.62	7.92	8.17	7.86	7.29	7.68	8.75	8.54	9.45	8.50
CAL YR 1989			MEAN	9.36		HIGH	7.29		LOW	12.30		

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, 0.2 mi north on dirt road off Ga. Highway 273, 2.75 mi west of intersection of Ga. Highways 273 and 91.

Owner: U.S. Geological Survey test well DP-3.

AQUIFER.--Surficial (residuum).

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 40 ft, perforated casing 30 to 40 ft.

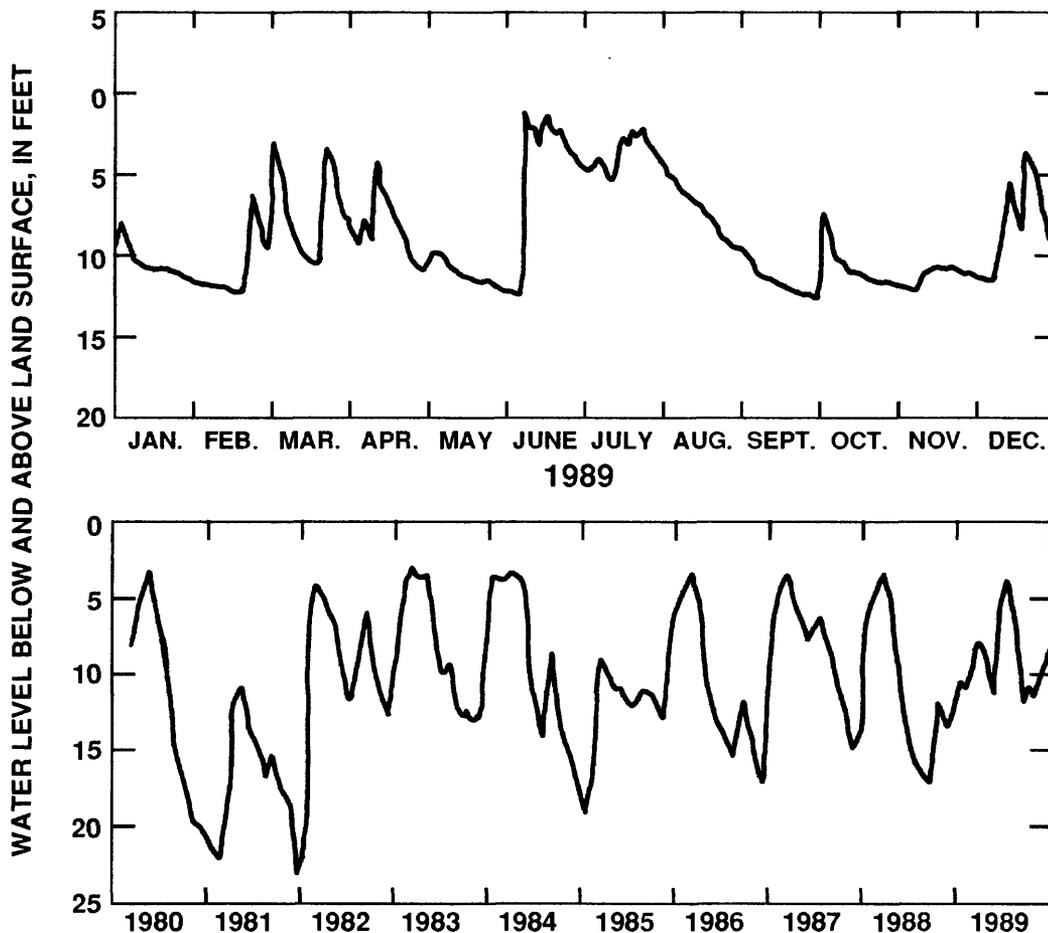
DATUM.--Altitude of land-surface datum is 180 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 11, 1989. Water levels for period of missing record, August 11-12, were estimated.

PERIOD OF RECORD.--February 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.52 ft below land-surface datum, March 6, 1984; lowest, 24.19 ft below land-surface datum, November 10, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.43	10.93	7.59	8.18	11.16	5.28	3.87	7.17	11.67	10.77	11.29	8.23
MAX	11.55	12.24	10.39	10.89	12.16	12.45	5.50	9.54	12.65	11.86	12.22	11.53
MIN	7.85	6.30	3.18	4.28	9.87	1.32	2.09	4.39	9.64	7.55	10.72	3.70
CAL YR 1989			MEAN	8.86		HIGH	1.32		LOW	12.65		

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

315950081161201 Local number, 35P094.

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

Owner: University of Georgia, formerly U.S. Department of Agriculture.

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.

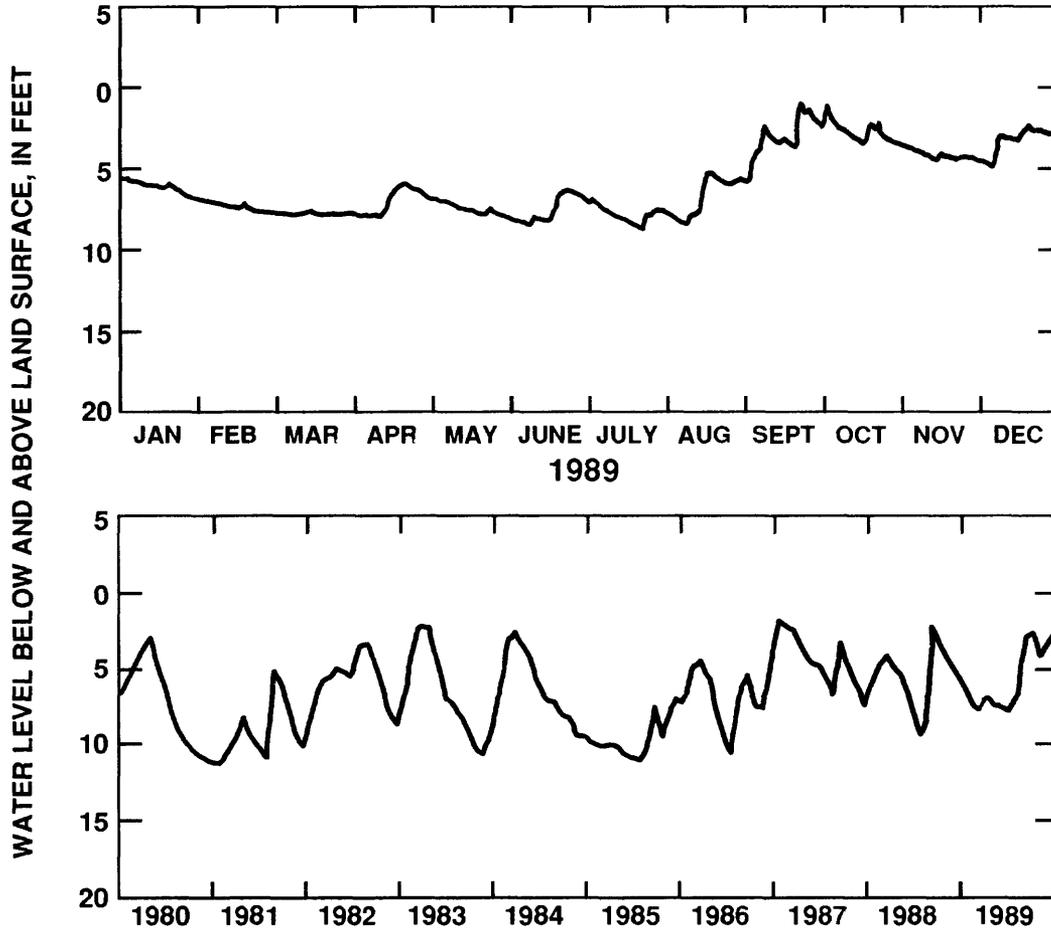
DATUM.--Altitude of land-surface datum is 18.67 ft.

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

REMARKS.--Responds quickly to precipitation.

PERIOD OF RECORD.--August 1942 to current year.

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



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	6.17	-7.32	7.66	6.83	7.40	7.38	7.75	6.66	2.93	2.68	4.08	3.22
MAX	6.90	7.64	7.78	7.81	7.93	8.32	8.58	8.34	5.67	3.46	4.36	4.70
MIN	5.58	6.93	7.50	5.82	6.81	6.24	6.86	5.13	.84	1.03	3.53	2.23
CAL YR 1989			MEAN	5.83		HIGH	.84		LOW	8.58		

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, 1300 ft southeast of University of Georgia Skidaway Institute.

Owner: Georgia Geologic Survey, Skidaway Institute test well 4.

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.

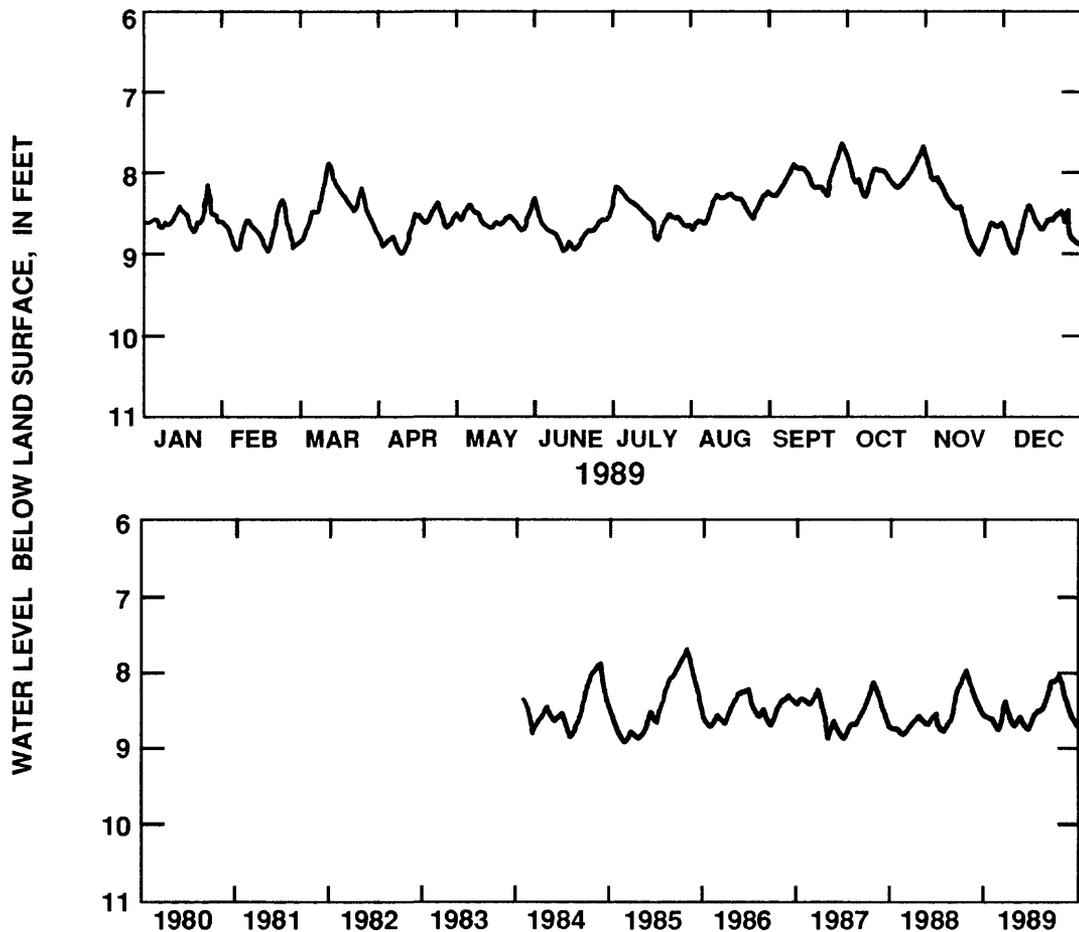
DATUM.--Altitude of land-surface datum is 10 ft.

Measuring point: Top of recorder shelf, 3.8 ft above land-surface datum.

REMARKS.--Water levels for periods of missing record, January 18-25, February 27 to March 1, and July 6-16, were estimated.

PERIOD OF RECORD.--January 11, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.19 ft below land-surface datum, October 31, 1985; lowest, 9.03 ft below land-surface datum, December 6, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	8.57	8.74	8.39	8.68	8.59	8.74	8.50	8.44	8.07	8.05	8.50	8.67
MAX	8.75	8.98	8.84	9.00	8.76	8.96	8.83	8.74	8.31	8.30	9.02	9.03
MIN	8.14	8.33	7.92	8.37	8.36	8.42	8.17	8.26	7.66	7.70	7.83	8.41
CAL YR 1989			MEAN	8.49		HIGH	7.66		LOW	9.03		

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, 2.6 mi north along State Road 67 from the Bulloch-Bryan County line, approximately 100 ft east of center line of road.

Owner: Georgia Geologic Survey, Bulloch South test well 2.

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.

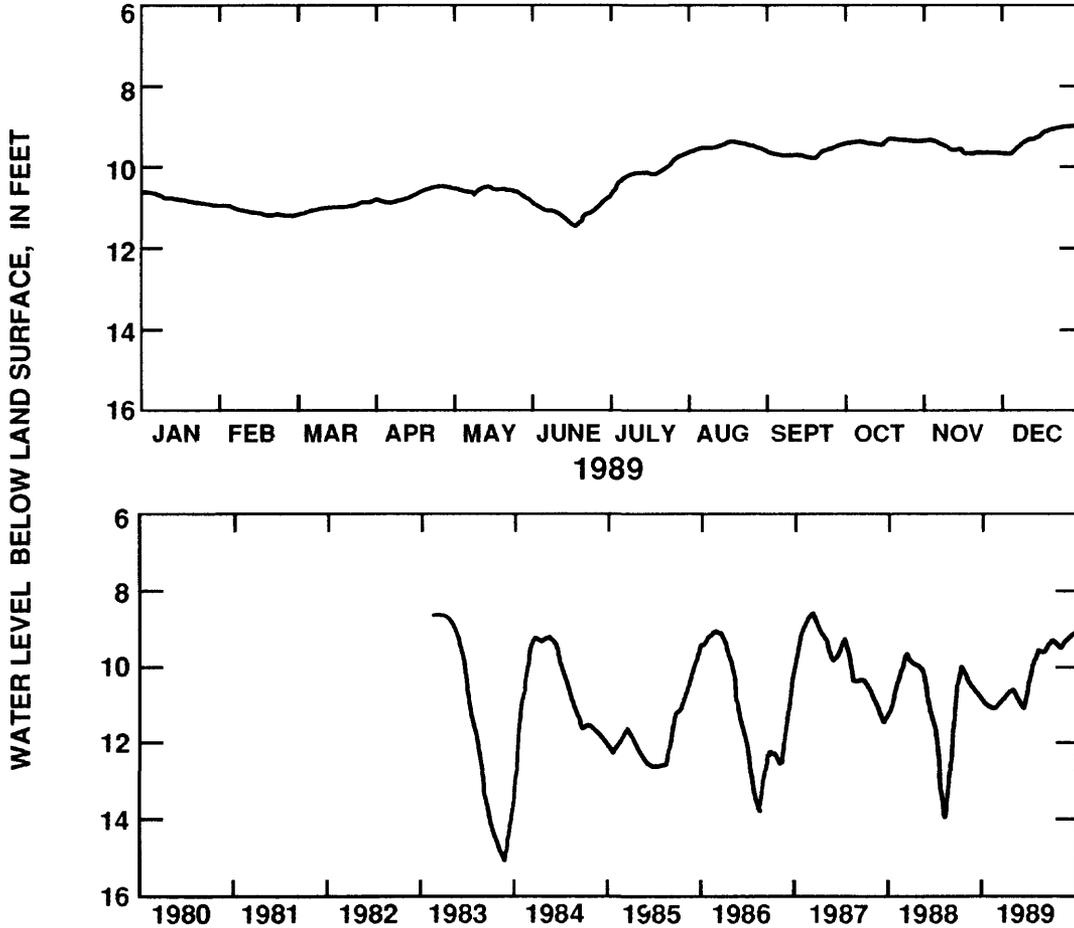
DATUM.--Altitude of land-surface datum is 120 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Well sounded August 1982.

PERIOD OF RECORD.--February 24, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.83	11.13	10.97	10.67	10.56	11.08	10.10	9.46	9.62	9.32	9.50	9.24
MAX	11.00	11.22	11.20	10.87	10.82	11.44	10.64	9.65	9.78	9.42	9.61	9.62
MIN	10.65	10.99	10.80	10.49	10.45	10.73	9.67	9.34	9.40	9.24	9.29	8.94
CAL YR 1989			MEAN	10.20		HIGH	8.94		LOW	11.44		

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, easternmost of three observation wells at the north end of Coffin Park, near the intersection of U.S. Highway 17 and U.S. Highway 25, in Brunswick.

Owner: Georgia Geologic Survey, Coffin Park test well 3.

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.

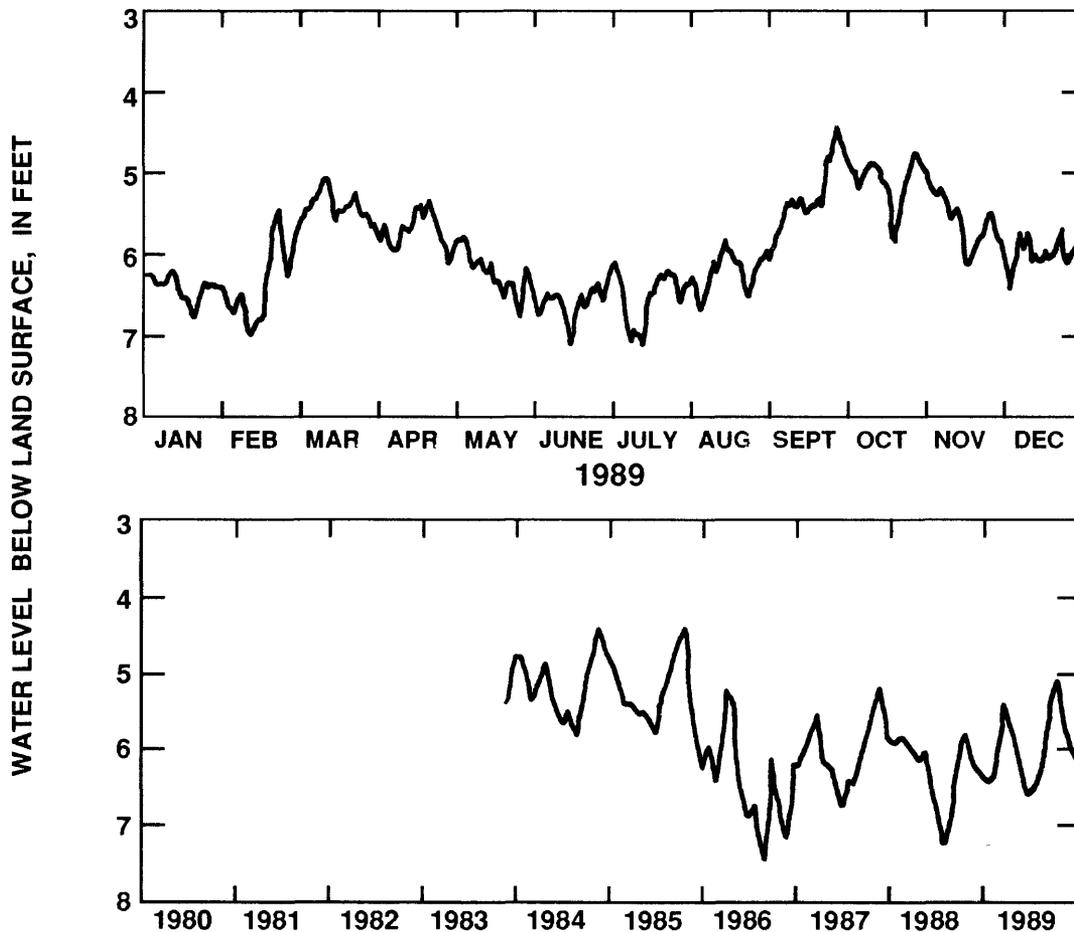
DATUM.--Altitude of land-surface datum is 7 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--None.

PERIOD OF RECORD.--November 30, 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.79 ft below land-surface datum, January 4, 1985; lowest, 7.93 ft below land-surface datum, August 4, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	6.43	6.38	5.41	5.71	6.21	6.60	6.52	6.24	5.34	5.09	5.55	6.02
MAX	6.79	6.99	5.66	6.12	6.78	7.11	7.10	6.70	6.08	5.85	6.13	6.44
MIN	6.21	5.46	5.08	5.35	5.79	6.36	6.12	5.85	4.47	4.73	4.97	5.73
CAL YR 1989			MEAN	5.96		HIGH	4.47		LOW	7.11		

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

In the Jesup, Wayne County area, water-level fluctuations in the surficial aquifer reflect changes in precipitation and nearby pumping (Clarke and others, 1990, p. 26). The mean water level in well 32L017 (fig. 22) was about the same in 1989 as in 1988, leveling-off the general downward trend since monitoring began in 1984.

Upper Brunswick Aquifer

Water levels in the upper Brunswick aquifer are monitored in three wells, all of which are included 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 due to hydraulic connection between the aquifers (Clarke and others, 1990, p. 28). Near outcrop areas, the water level primarily responds to seasonal climatic changes, although the water level also is affected by regional pumping from the Floridan aquifer system.

The upper Brunswick aquifer crops out in Bulloch County and the water level in the aquifer in this area is influenced by both changes in recharge rate and by pumping from the Upper Floridan aquifer. These fluctuations are illustrated by the hydrograph for well 31U009 (fig. 24). The annual-mean water level in well 31U009 was 0.2 ft higher in 1989 than in 1988, leveling-off a general downward trend since monitoring began in 1983.

In the Wayne and Glynn County areas, the water level in the upper Brunswick aquifer is affected by nearby pumping. During 1988-89, the water level in well 32L016 near Jesup (fig. 25) and well 34H437 near Brunswick (fig. 26) continued a downward trend similar to that in the underlying Upper Floridan aquifer. The mean water levels in the two wells were 0.7 ft lower in 1989 than in 1988, and a record low was measured in well 32L016 in December. This decline corresponded to a downward trend in the Upper Floridan aquifer. Although water levels were lower in 1989 than in 1988, the rate of decline has diminished.

Floridan Aquifer System

Water levels in the Floridan aquifer system are monitored in 59 wells, records from 32 are included in this report (fig. 27). In most of the area, the Floridan aquifer is comprised of the upper Floridan aquifer and the lower Floridan aquifer. In and near outcrop areas, water levels in wells tapping the Floridan aquifer system fluctuate seasonally in response to changes in recharge rate and pumping. Near the coast, where the aquifer is deeply buried, water levels respond primarily to pumping, and fluctuations related to recharge are less pronounced. In Georgia, about 655 Mgal/d is pumped from the Floridan aquifer system, mostly for industrial and irrigation purposes (Pierce and Kundell, 1990).

Upper Floridan aquifer

Water-level fluctuations and trends in the Upper Floridan aquifer are monitored in 53 wells, 30 of which are included in this report (fig. 27). The area underlain by the Upper Floridan aquifer is divided into four hydrologic areas for discussion of water-level fluctuations and trends: (1) the southwest area, (2) the south-central area, (3) the east-central area, and (4) the coastal area (fig. 27).

313253081433504 Local number, 32L017.

LOCATION.--Lat 31°32'52", long 81°43'36", Hydrologic Unit 03070106, easternmost of three recorder wells, 0.8 mi north of Gardi Road, 4.3 mi east of Gardi.

Owner: Georgia Geologic Survey, Gardi test well 3.

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.

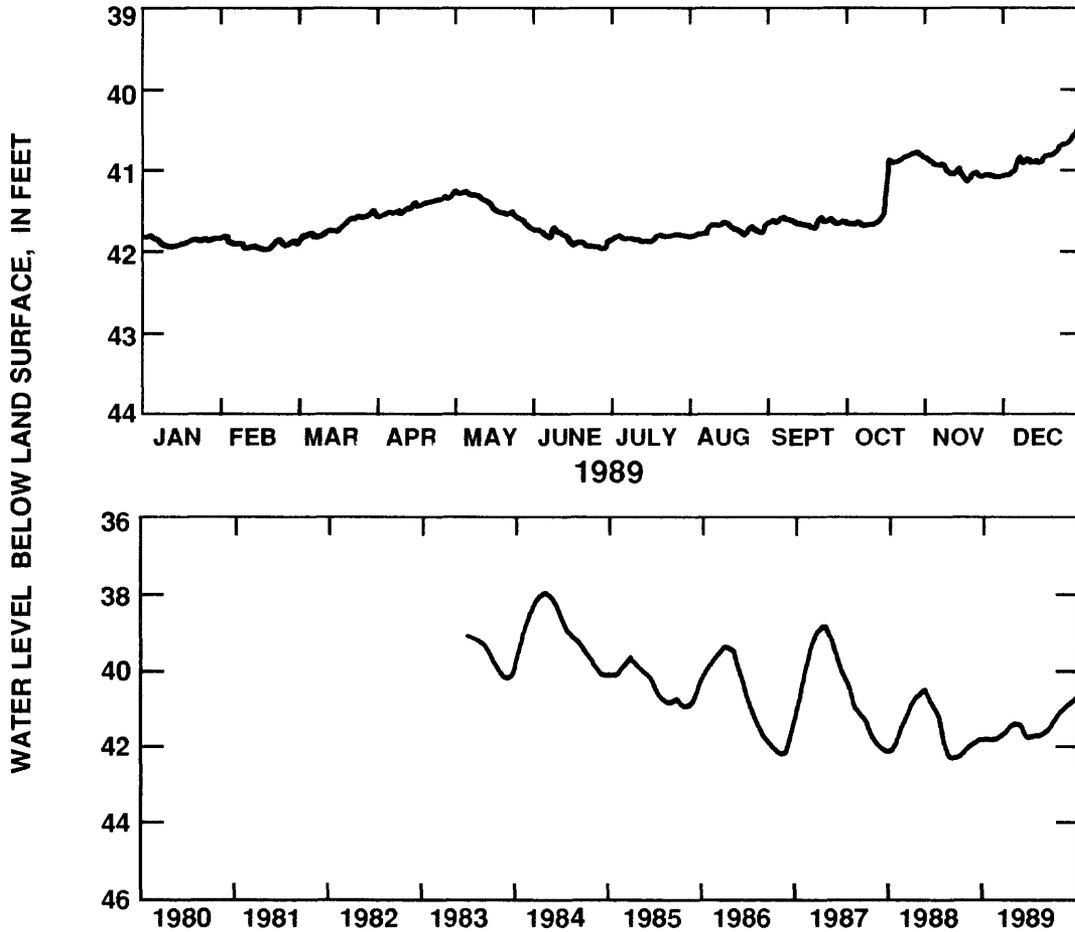
DATUM.--Altitude of land-surface datum is 74 ft.

Measuring point: Top of recorder shelf, 4.0 ft above land-surface datum.

REMARKS.--None.

PERIOD OF RECORD.--June 16, 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.85 ft below land-surface datum, April 16, 1984; lowest, 42.47 ft below land-surface datum, August 27, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	41.85	41.89	41.68	41.44	41.43	41.85	41.83	41.75	41.66	41.31	41.03	40.89
MAX	41.93	41.96	41.89	41.58	41.70	41.98	41.89	41.84	41.74	41.70	41.16	41.12
MIN	41.77	41.78	41.47	41.31	41.23	41.70	41.79	41.64	41.59	40.80	40.85	40.61
CAL YR 1989			MEAN	41.55		HIGH	40.61		LOW	41.98		

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

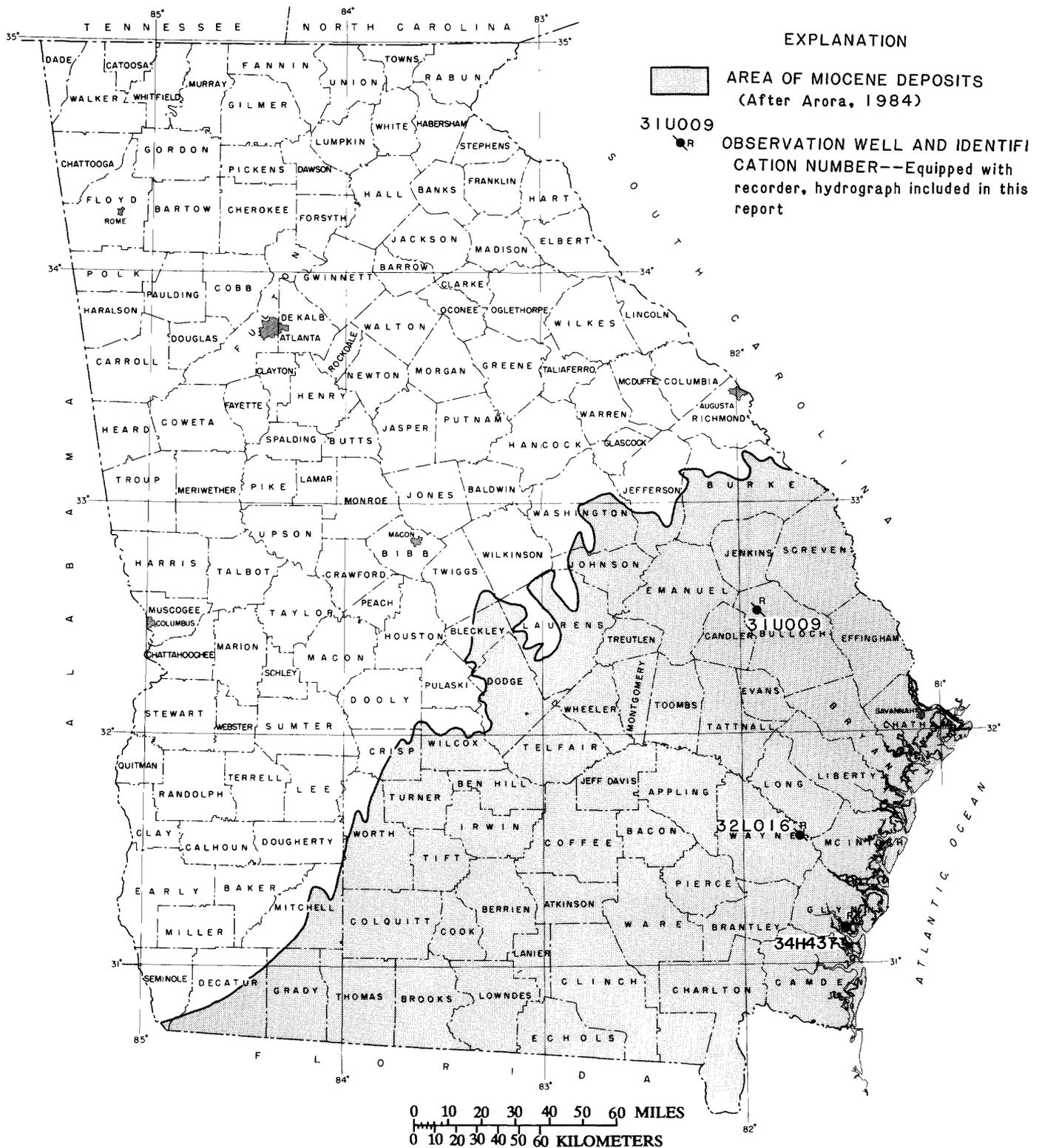


Figure 23.--Locations of observation wells completed in the upper Brunswick aquifer.

323123081511602 Local number, 31U009.

LOCATION.--Lat 32°31'23", long 81°51'16", Hydrologic Unit 03060202, in roadside park on west side of Hopeulikit community, U.S. Highways 25 and 80.

Owner: Georgia Geologic Survey, Hopeulikit test well 2.

AQUIFER.--Upper Brunswick.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 210 ft, cased to 160 ft, screen to 210 ft.

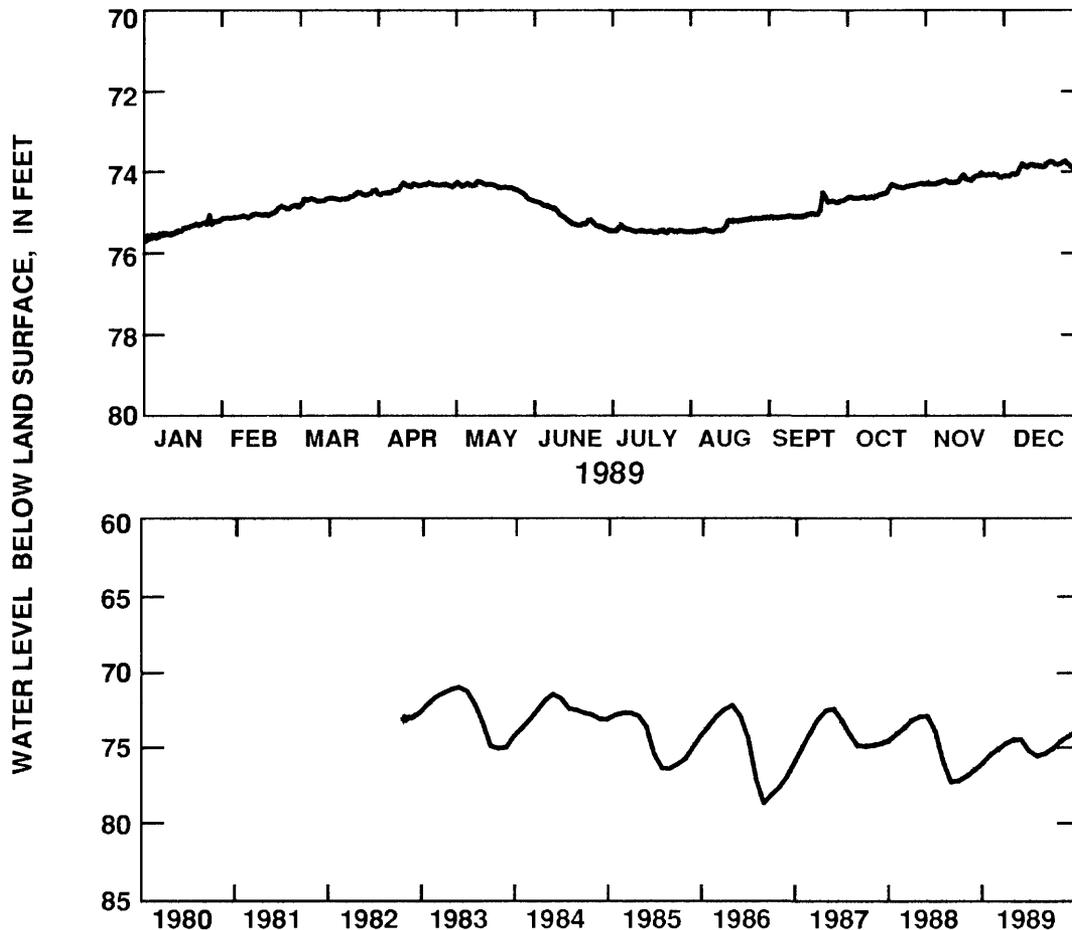
DATUM.--Altitude of land-surface datum is 205 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Well sounded August 1982.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	75.41	75.03	74.65	74.38	74.39	75.14	75.47	75.33	74.99	74.50	74.19	73.90
MAX	75.64	75.16	74.87	74.57	74.71	75.46	75.52	75.50	75.15	74.69	74.31	74.15
MIN	75.08	74.84	74.46	74.28	74.24	74.74	75.33	75.15	74.52	74.30	74.04	73.75
CAL YR 1989			MEAN	74.78		HIGH	73.75		LOW	75.64		

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, middle well of three recorder wells, 0.8 mi north of Gardi Road, on right side of dirt road, 4.3 mi east of Gardi.

Owner: Georgia Geologic Survey, Gardi test well 2.

AQUIFER.--Upper Brunswick.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 340 ft, cased to 320 ft, screen to 340 ft.

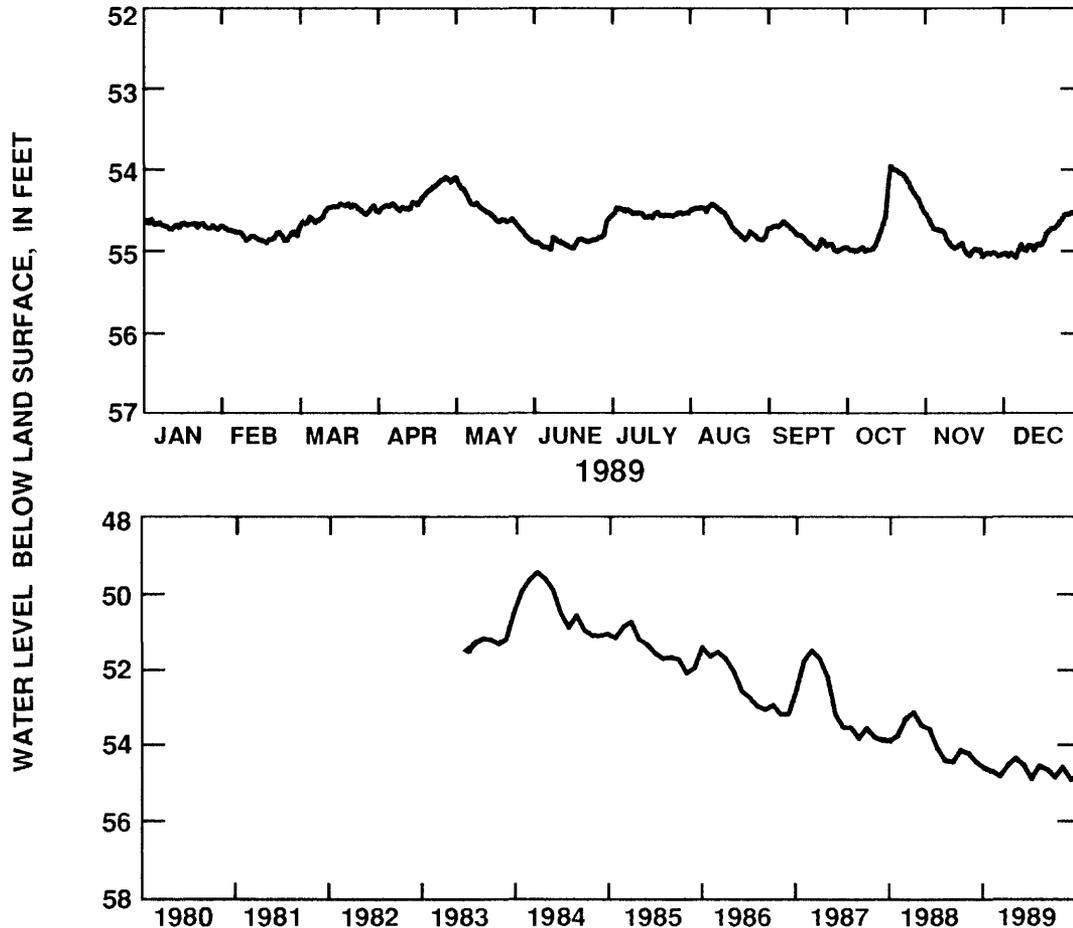
DATUM.--Altitude of land-surface datum is 74 ft.

Measuring point: Top of recorder shelf, 4.0 ft above land-surface datum.

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, 55.10 ft below land-surface datum, December 7, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	54.68	54.82	54.53	54.35	54.52	54.89	54.55	54.64	54.84	54.58	54.91	54.85
MAX	54.73	54.90	54.81	54.52	54.87	54.99	54.60	54.87	55.02	55.02	55.08	55.10
MIN	54.61	54.72	54.42	54.09	54.10	54.64	54.48	54.43	54.65	53.96	54.53	54.50
CAL YR 1989			MEAN	54.68		HIGH	53.96		LOW	55.10		

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, middle well of three recorder wells at the north end of Coffin Park near the intersection of U.S. Highway 17 and U.S. Highway 25.

Owner: Georgia Geologic Survey, Coffin Park test well 2.

AQUIFER.--Upper Brunswick.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 328 ft, cased to 315 ft, screen to 328 ft.

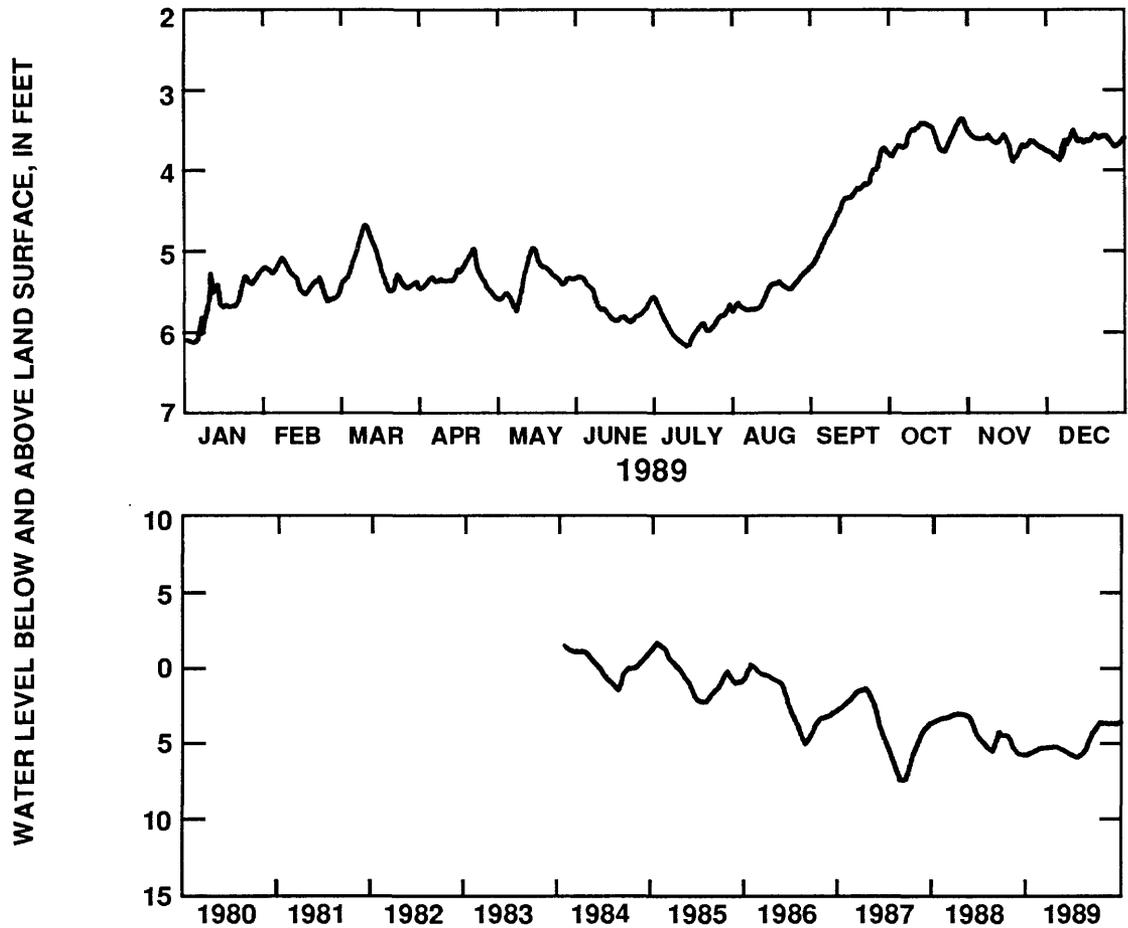
DATUM.--Altitude of land-surface datum is 7 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--None.

PERIOD OF RECORD.--January 21, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.26 ft above land-surface datum, January 7, 1985; lowest, 7.8 ft below land-surface datum, August 30, 1987.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	5.62	5.37	5.22	5.31	5.37	5.68	5.92	5.53	4.43	3.59	3.66	3.66
MAX	6.15	5.64	5.58	5.60	5.72	5.90	6.20	5.75	5.19	3.82	3.90	3.87
MIN	5.21	5.08	4.66	4.96	4.97	5.32	5.55	5.24	3.72	3.34	3.50	3.51
CAL YR 1989			MEAN	4.95		HIGH	3.34		LOW	6.20		

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

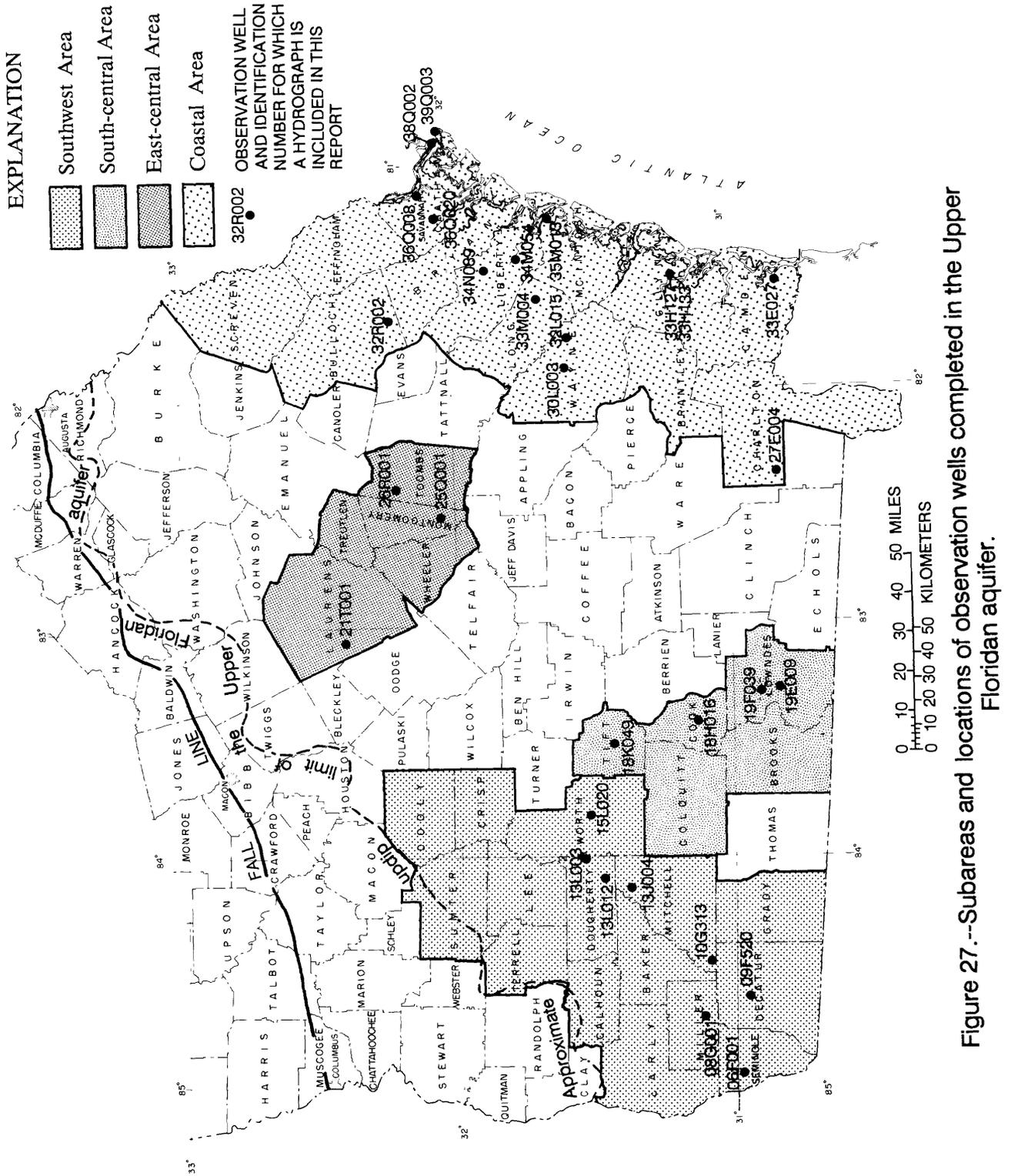


Figure 27.--Subareas and locations of observation wells completed in the Upper Floridan aquifer.

Southwest area

The water levels in the Upper Floridan aquifer in southwestern Georgia are monitored in 23 wells, records from eight are included in this report (fig. 27). In the southwest area, water levels in wells tapping the aquifer respond to variations in precipitation, evapotranspiration, pumping, and streamflow (Hayes and others, 1983, p. 16). During 1987, an estimated 377 Mgal/d was withdrawn from aquifers in southwestern Georgia, much of which was from the Upper Floridan aquifer, primarily for irrigation (Trent and others, 1990). This large withdrawal has not produced a discernible cone of depression over most of the area because wells are widely separated, the transmissivity of the aquifer is high, and the volume of water that flows through the aquifer is large. The large 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 a cone of depression or water-level declines over most of the area, in the Sylvester, Worth County area, a cone of depression has developed as a result of 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).

During November 1989, water levels were measured in 176 wells tapping the Upper Floridan aquifer in the southwest area and a water-level map was constructed (fig. 28). The general configuration of the water-level map changed little between 1988 and 1989.

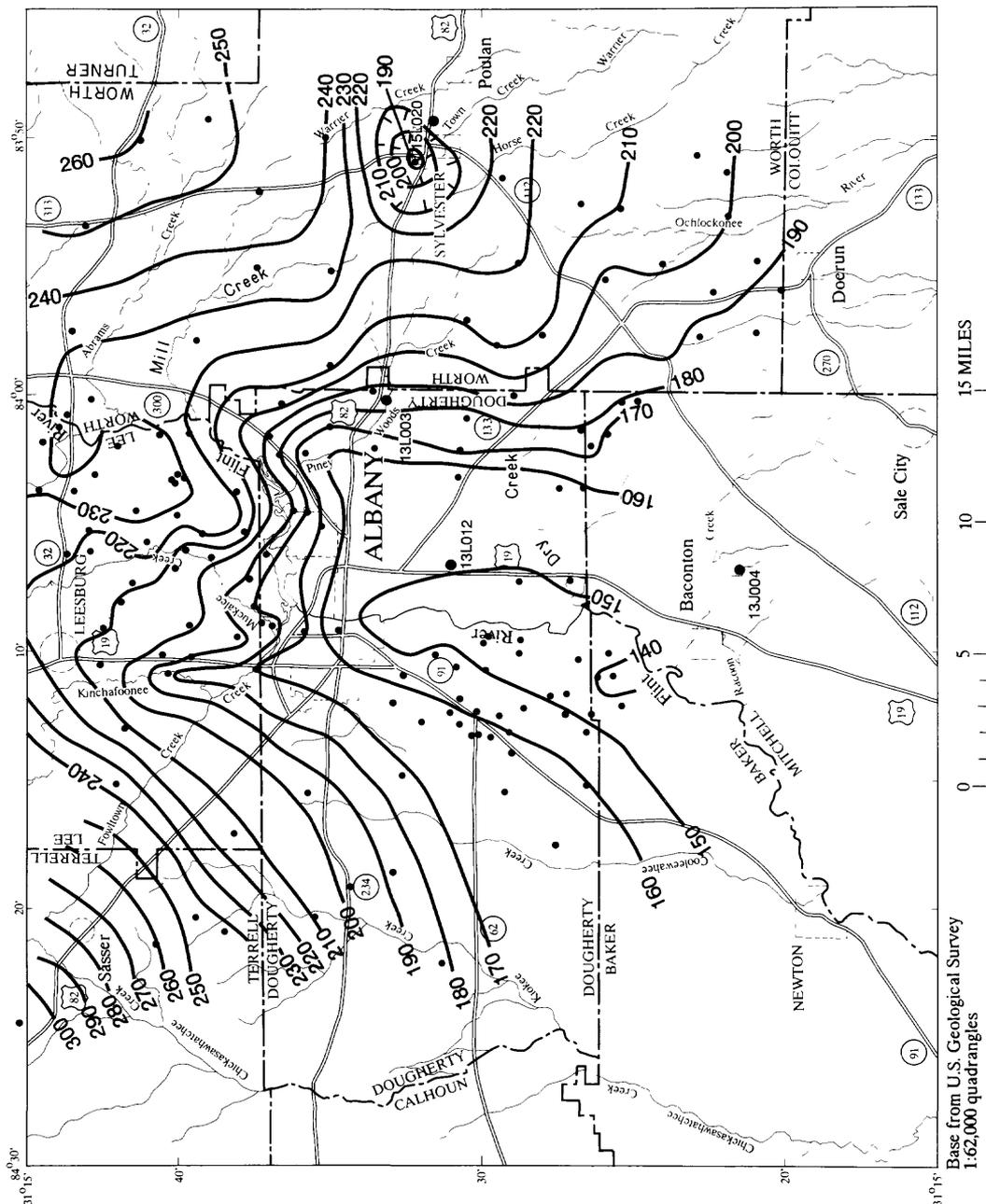
The mean water levels in wells 09F520, 08G001, 06F001, and 13L012 tapping the Upper Floridan aquifer were from 0.6 to 1.1 ft higher in 1989 than in 1988 (figs. 29-32), reversing a general downward trend since 1984. The four wells are located near the Flint River or its tributaries where the aquifer is semiconfined by a thin overburden and there is some hydraulic connection between the aquifer and surface streams. Above-normal precipitation during 1989 resulted in decreased pumping and increased recharge to the aquifer, and thus higher water-levels. (See precipitation graph for Albany, figure 8). Away from the Flint River and its tributaries, the aquifer is more confined by thicker overburden and is not well connected to streams or rapidly influenced by precipitation. Water-level fluctuations and trends in these areas are illustrated by the hydrographs for wells 10G313, 13L003, 13J004, and 15L020 (figs. 33-36). The mean water levels in the four wells were from 0.4 to 4.1 ft lower in 1989 than in 1988, continuing a general downward trend since 1984.

South-central area

The water level in the Upper Floridan aquifer in south-central Georgia is monitored in six wells, records from four are included in this report (figs. 37-40). Water levels in wells tapping the aquifer in this area are affected by 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 during winter and spring rainy seasons, and lowest in the fall. During 1987, an estimated 79 Mgal/d was withdrawn from aquifers in south-central Georgia (Trent and others, 1990), most of which was from the Upper Floridan aquifer. Of this amount, about 6 Mgal/d was withdrawn in the Valdosta area.

A general downward trend in the water level in the Upper Floridan aquifer has been observed in two observation wells in Tift and Cook Counties since at least 1977. The mean water levels in well 18K049 in Tift County (fig. 37) and in well 18H016 in Cook County (fig. 38) were 0.2 and 0.3 ft lower in 1989 than in 1988 respectively. These slight declines represent a continuation of the general downward water-level trend in the area, but at a reduced rate of decline.

The Upper Floridan aquifer receives recharge from the Withlacoochee River north of Valdosta where water from the river flows directly into sinkholes and cave openings in the aquifer (Krause, 1979). In this area, increased precipitation and streamflow in winter and early spring results in high water levels. During most years, decreased precipitation and increased evapotranspiration in the summer results in low streamflow and correspondingly low water levels. However, above normal precipitation in the summer of 1989 resulted in increased recharge to the aquifer and a corresponding rise in water level. This water-level rise is illustrated on the hydrographs for wells 19E009 and 19F039 (figs. 39 and 40), where the mean water levels were 1.2 and 2.0 ft higher in 1989 than in 1988, respectively. Although water levels rose during 1988-89, no trend was apparent.



Base from U.S. Geological Survey
1:62,000 quadrangles

EXPLANATION

—140— WATER-LEVEL CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval 10 feet. Datum is sea level

13J004 WELL AND IDENTIFICATION NUMBER FOR WHICH HYDROGRAPH IS INCLUDED IN THIS REPORT

• DATA POINT

Figure 28. ---Water levels and locations of observation wells completed in the Upper Floridan aquifer in the Albany area, November, 1989.

305736084355801 Local number, 09F520.

LOCATION.--Lat 30°57'42", long 84°35'46", Hydrologic Unit 03130008, 0.5 mi north of intersection of White's Mill Road and railroad track, 1.0 mi east of U.S. Highway 27 north of Bainbridge.

Owner: Graham Bolton.

AQUIFER.--Upper Floridan aquifer.

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

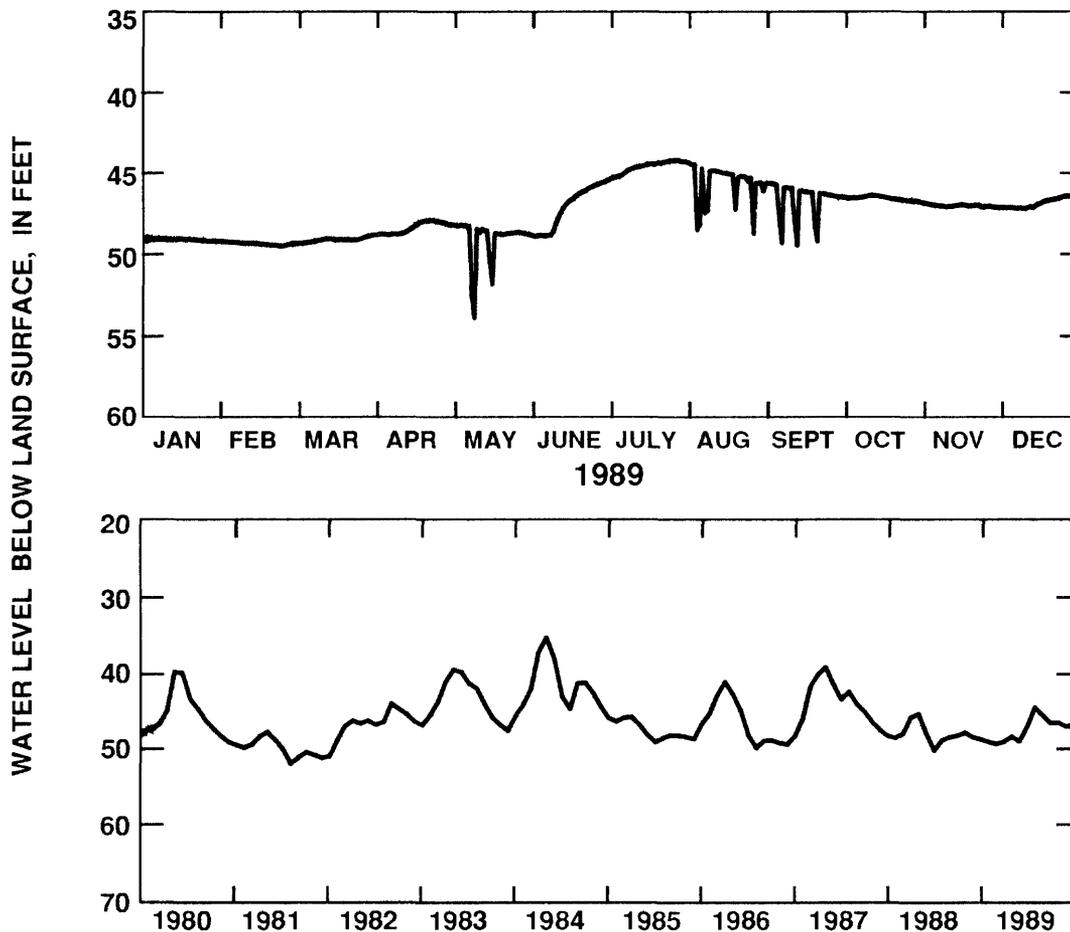
DATUM.--Altitude of land-surface datum is 128 ft.

Measuring point: Top of recorder shelf, 3.50 ft above land-surface datum.

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, 54.78 ft below land-surface datum, August 20, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	49.11	49.37	49.12	48.40	49.07	47.14	44.59	45.69	46.69	46.66	47.14	46.97
MAX	49.22	49.51	49.36	48.83	53.99	48.93	45.39	48.82	49.56	46.94	47.26	47.33
MIN	49.03	49.24	48.84	47.95	48.24	45.46	44.18	44.37	45.67	46.46	46.98	46.49
CAL YR 1989			MEAN	47.48		HIGH	44.18		LOW	53.99		

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, 0.35 mi east of Boykin on County Road 48, north on dirt road 0.6 mi to dirt road, 0.3 mi east to well on north side of road.

Owner: Viercocken.

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled unused irrigation well, diameter 12 in., depth 255 ft, cased to 130 ft, open hole.

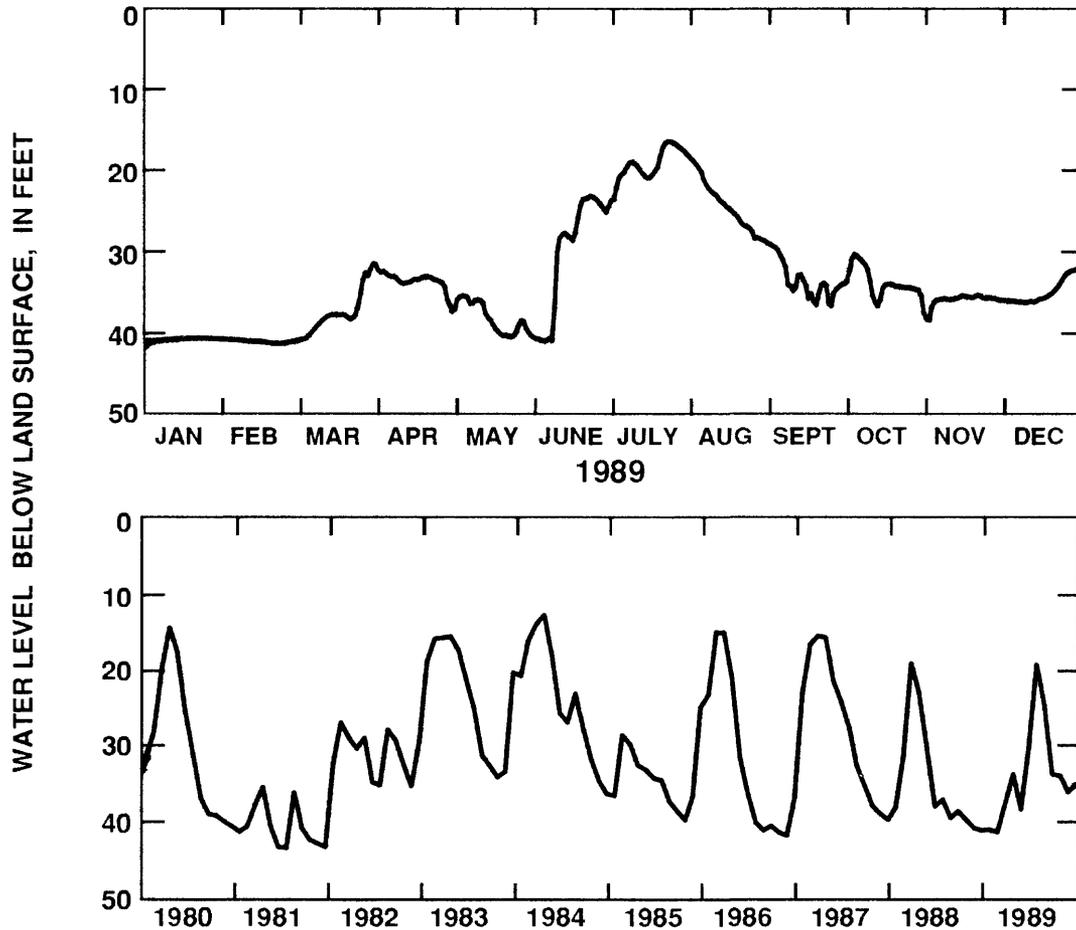
DATUM.--Altitude of land-surface datum is 150 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--None.

PERIOD OF RECORD.--February 1977 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 11.18 ft below land-surface datum, April 11, 1984; lowest, 43.88 ft below land-surface datum, July 17, 1981.



	1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	40.97	41.23	37.49	33.75	38.29	30.20	19.28	24.55	33.73	33.99	36.08	35.09	
MAX	41.28	41.46	41.06	37.50	40.68	41.17	23.78	29.03	36.84	37.74	38.56	36.43	
MIN	40.83	40.95	31.57	32.36	35.56	23.22	16.47	18.57	29.22	30.46	35.56	31.84	
CAL YR 1989			MEAN	33.66		HIGH	16.47		LOW	41.46			

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, 9.8 mi south of Donalsonville, 1.3 mi west of Ga. Highway 39 on County Road 219, north 0.55 mi on Hebrew Road to dirt road, 0.5 mi east on dirt road.

Owner: Roddenbery Company Farms test well 1.

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.

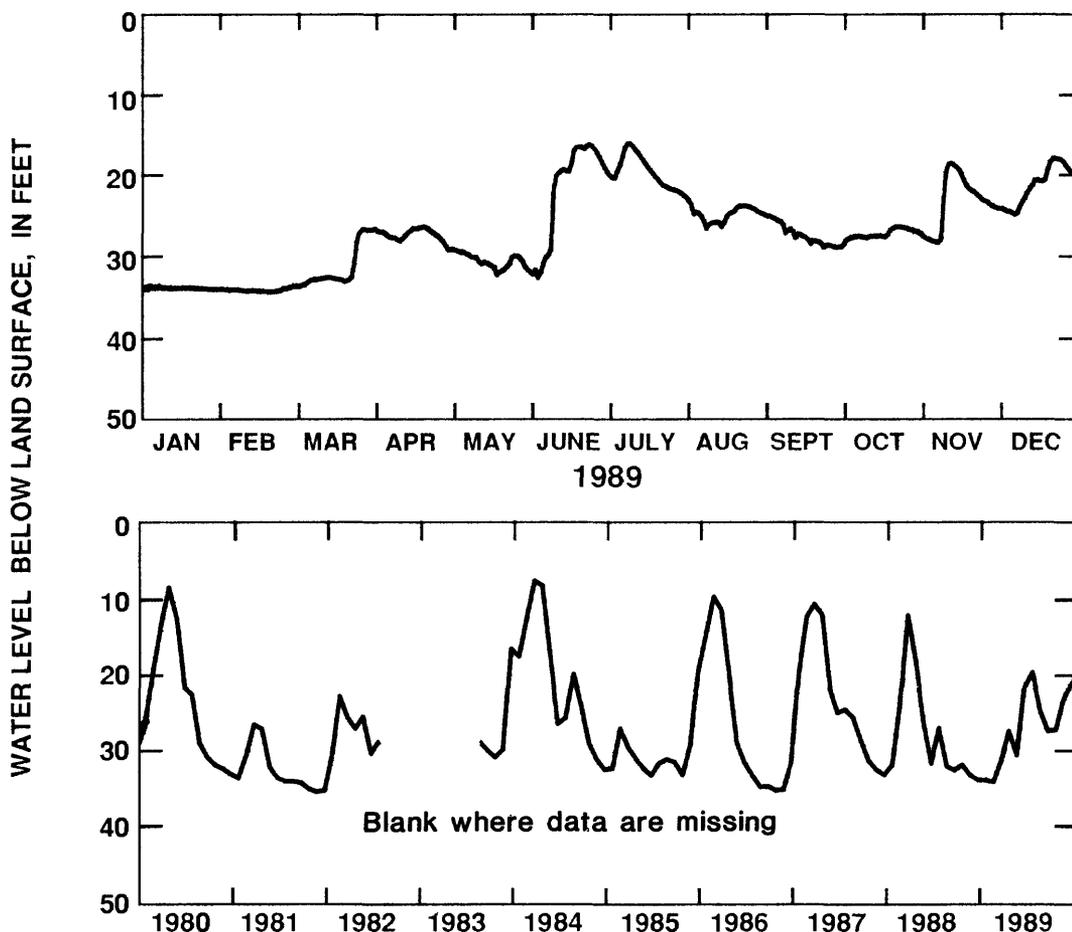
Measuring point: Top of recorder shelf, 3.14 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted August 10, 1983. Well pumped and redeveloped August 10, 1989.

Water levels for period of missing record, May 20 to June 18, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	33.87	34.10	31.29	27.34	30.55	21.55	19.59	24.77	27.39	27.20	23.22	21.22
MAX	34.02	34.31	33.65	29.18	32.21	32.56	22.71	26.57	28.87	28.47	28.27	24.86
MIN	33.67	33.61	26.61	26.33	29.11	16.15	15.99	23.03	25.00	26.33	18.47	17.84
CAL YR 1989			MEAN	26.80		HIGH	15.99		LOW	34.31		

Figure 31.--Water level in observation well 06F0u1, Seminole County.

313105084064302 Local number, 13L012.

LOCATION.--Lat 31°31'05", long 84°06'43", Hydrologic Unit 03130008, about 6.5 mi southeast of Albany, east of U.S.

Highway 19 on dirt road, 0.1 mi north of School Bus Road.

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

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 218 ft, cased to 54 ft, open hole.

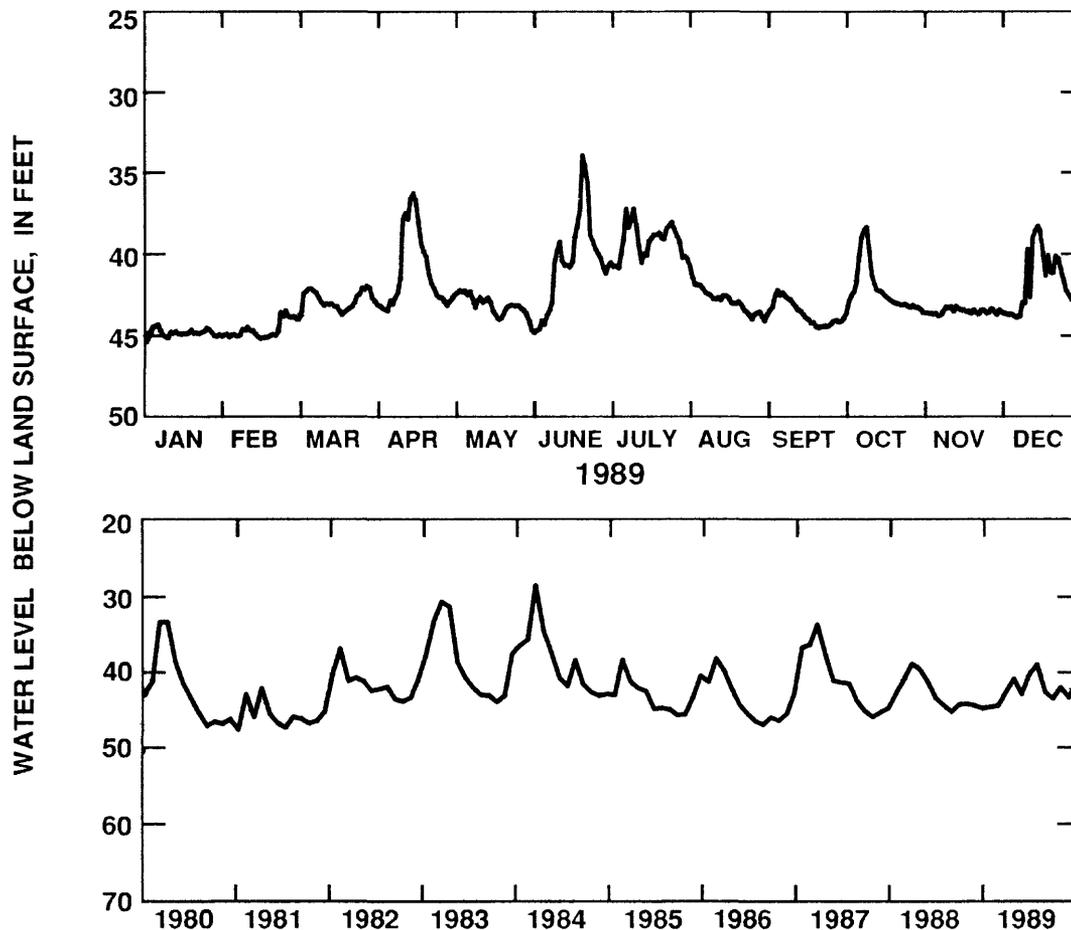
DATUM.--Altitude of land-surface datum is 195 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	44.80	44.61	42.82	41.09	43.11	40.47	39.19	42.86	43.67	42.23	43.57	41.80
MAX	45.11	45.16	43.97	43.48	44.67	44.84	40.84	44.14	44.56	43.67	43.84	43.95
MIN	44.31	43.45	41.94	36.22	42.20	33.89	37.17	40.73	42.23	38.35	43.25	38.32
CAL YR 1989			MEAN	42.50		HIGH	33.89		LOW	45.16		

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, 1.95 mi west of Vada off Decatur-Mitchell County line road, 1.0 mi north in pine tree farm.

Owner: Harvey Meinders.

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Cable-tooled observation well, diameter 12 in., depth 250 ft, cased to 87 ft, open hole.

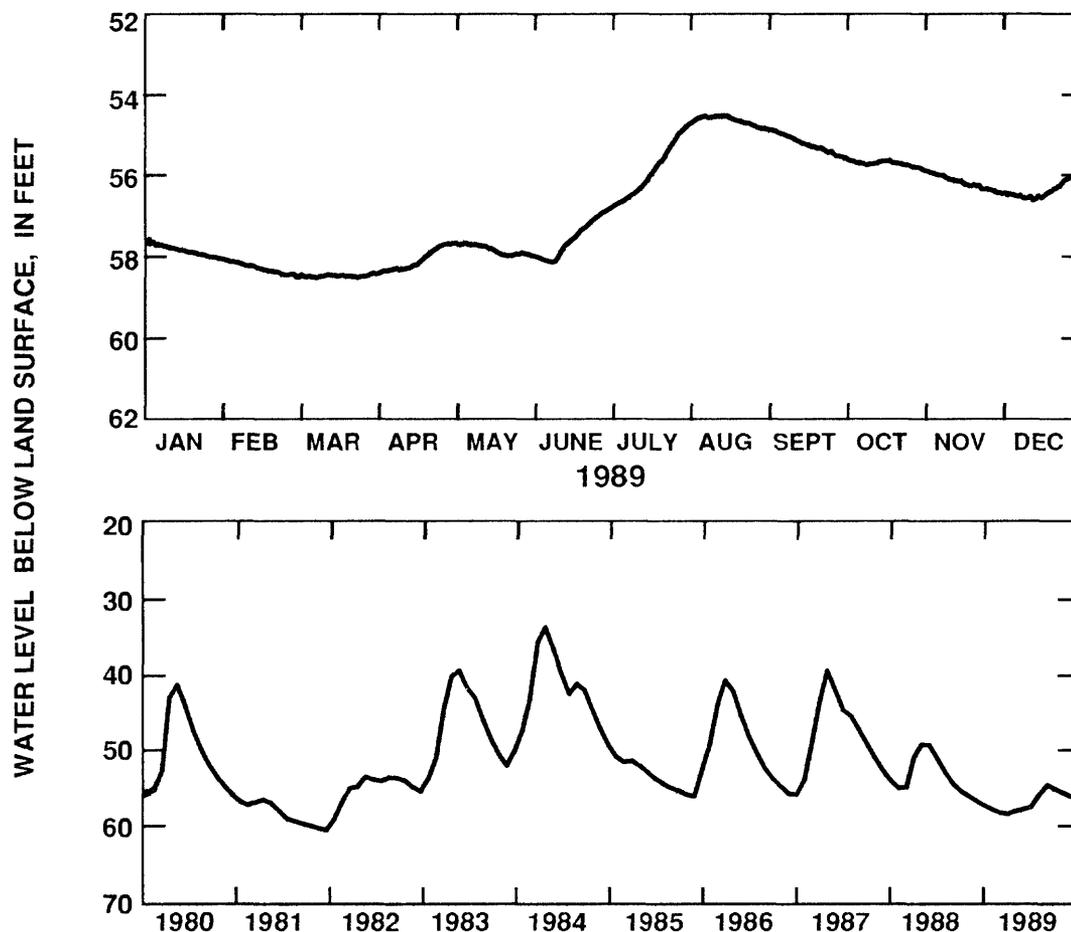
DATUM.--Altitude of land-surface datum is 145 ft.

Measuring point: Top of recorder shelf, 4.17 ft above land-surface datum.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	57.88	58.31	58.49	58.11	57.86	57.59	55.95	54.68	55.26	55.76	56.22	56.43
MAX	58.09	58.50	58.53	58.43	58.00	58.16	56.83	54.90	55.60	55.91	56.49	56.68
MIN	57.64	58.11	58.42	57.70	57.69	56.87	54.78	54.55	54.91	55.62	55.94	55.94
CAL YR 1989			MEAN	56.87		HIGH	54.55		LOW	58.53		

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, near northeast corner of Marine Corps Supply Center, in Acree.

Owner: City of Albany and Dougherty County.

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.

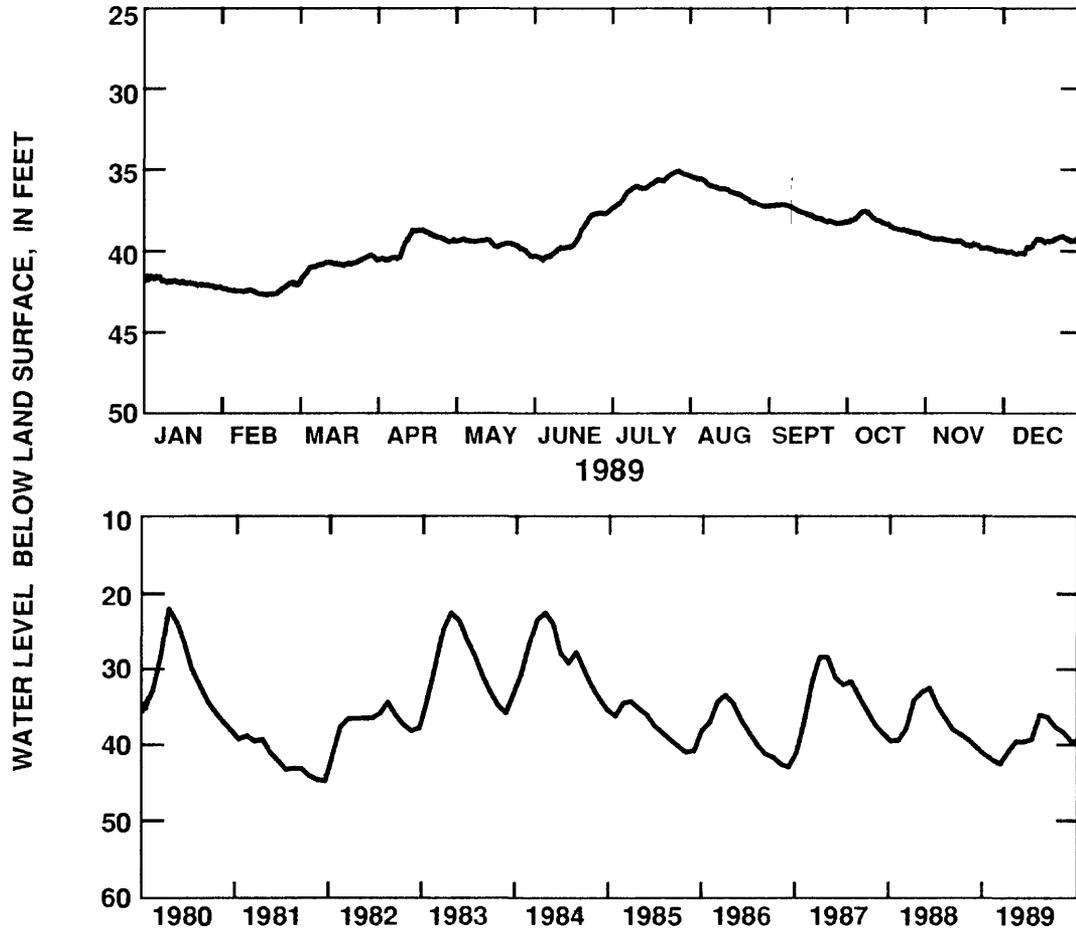
Measuring point: Top of recorder shelf, 4.10 ft above land-surface datum.

REMARKS.--Well pumped and sounded June 21, 1978; water-quality sample collected at conclusion of pumping.

Borehole geophysical survey conducted March 17, 1977.

PERIOD OF RECORD.--January 1963 to current year.

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



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	42.00	42.49	40.90	39.59	39.58	39.26	36.01	36.31	37.70	38.34	39.55	39.63
MAX	42.37	42.76	42.12	40.58	40.33	40.55	37.48	37.25	38.33	39.03	40.04	40.22
MIN	41.63	41.99	40.32	38.75	39.30	37.64	35.07	35.35	37.14	37.56	39.11	39.12
CAL YR 1989			MEAN	39.26		HIGH	35.07		LOW	42.76		

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 03730008, 2.7 mi north of intersection of U.S. Highway 19 and Ga. Highway 112, 0.7 mi west of Stagecoach Road.

Owner: Aurora Dairys, Wright 1.

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled observation well, diameter 12 in., depth 208 ft, cased to 77 ft, open hole.

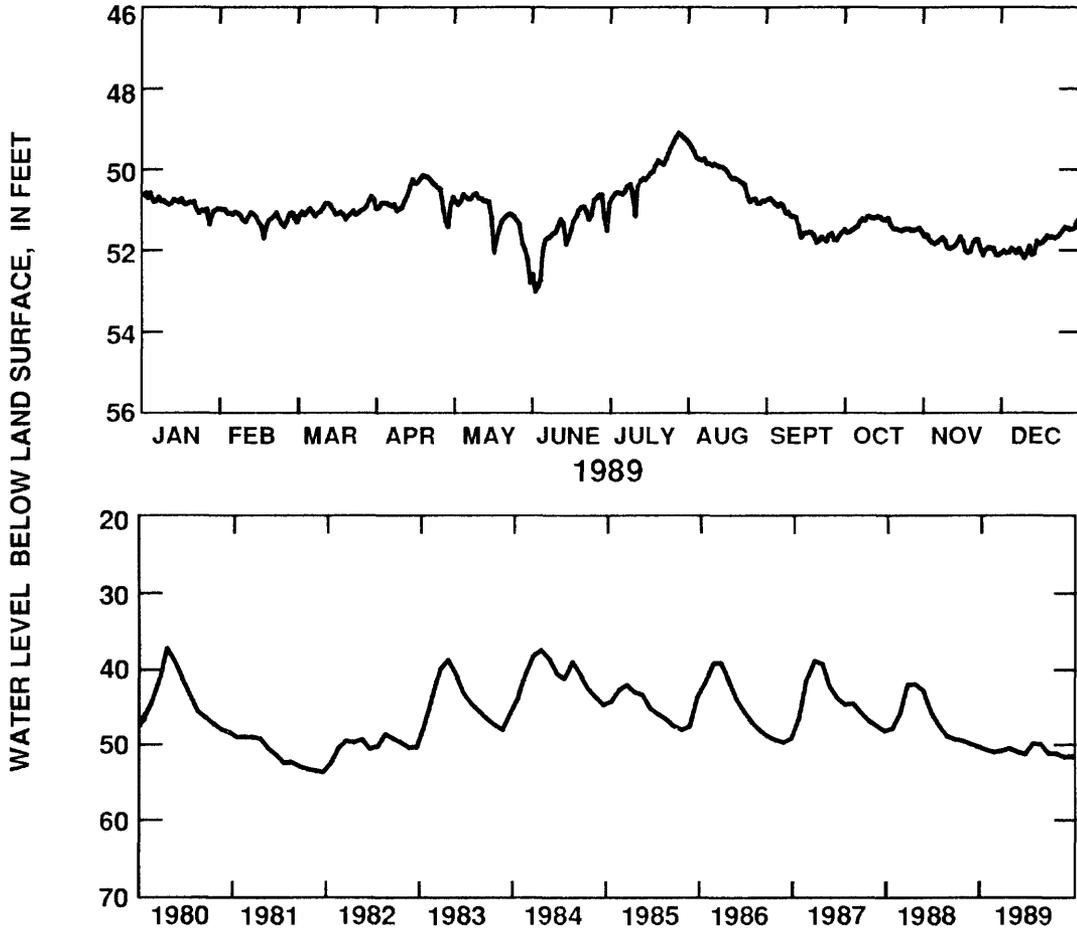
DATUM.--Altitude of land-surface datum is 200 ft.

Measuring point: Top of recorder shelf, 3.60 ft above land-surface datum.

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, 54.00 ft below land-surface datum, September 25, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	50.89	51.23	51.05	50.70	51.19	51.51	50.09	50.18	51.41	51.42	51.92	51.85
MAX	51.39	51.72	51.32	51.45	52.83	53.04	51.18	50.88	51.85	51.60	52.17	52.24
MIN	50.60	51.00	50.69	50.17	50.63	50.66	49.13	49.37	50.76	51.21	51.67	51.33
CAL YR 1989			MEAN	51.12		HIGH	49.13		LOW	53.04		

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, near water tank, behind the VFW on U.S. Highway 82 east, Sylvester.

Owner: City of Sylvester.

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled unused municipal well, diameter 18 in., depth 450 ft, cased to 212 ft, open hole.

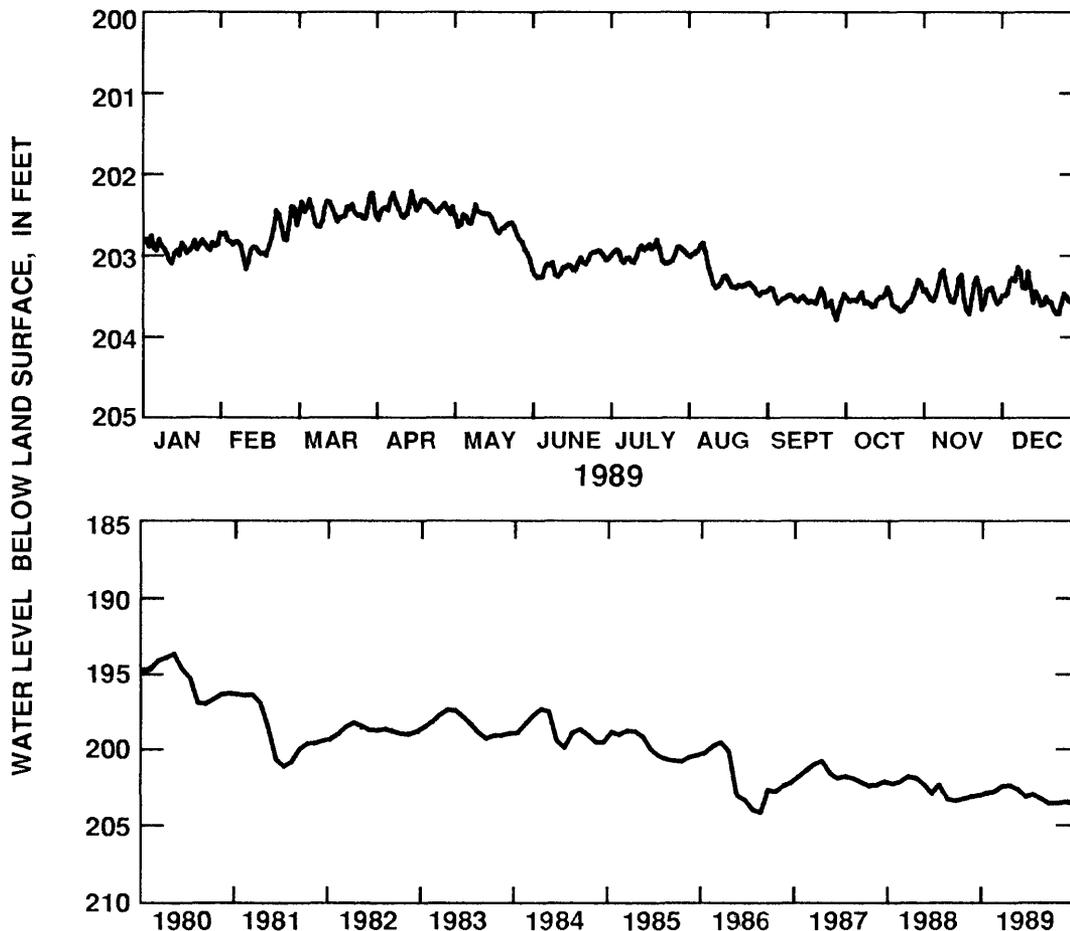
DATUM.--Altitude of land-surface datum is 420 ft.

Measuring point: Top of recorder shelf, 2.90 ft above land-surface datum.

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, 204.67 ft below land-surface datum, August 10, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	202.89	202.81	202.46	202.41	202.63	203.13	202.99	203.27	203.57	203.57	203.49	203.51
MAX	203.09	203.17	202.64	202.56	203.05	203.28	203.11	203.51	203.82	203.72	203.76	203.76
MIN	202.72	202.39	202.23	202.21	202.38	202.95	202.82	202.86	203.42	203.33	203.21	203.18
CAL YR 1989	MEAN		203.06	HIGH		202.21	LOW		203.82			

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

312712082593301 Local number, 18K049.

LOCATION.--Lat 31°27'12", long 82°59'33", Hydrologic Unit 03110203, near the intersection of Goff Street and Ferry Lake Road, at city of Tifton Maintenance and Water Works, on east side of Tifton.

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

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 620 ft, cased to 270 ft, open hole.

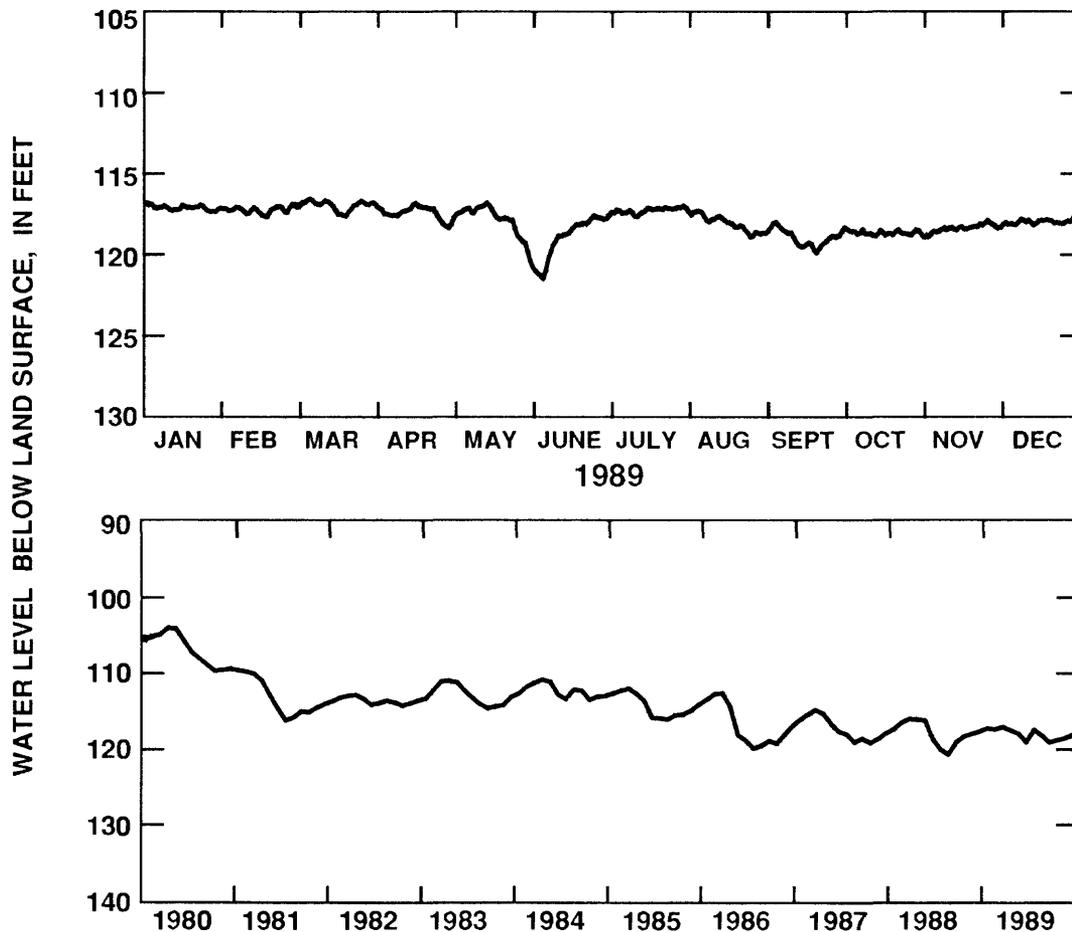
DATUM.--Altitude of land-surface datum is 330 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 18, 1978.

PERIOD OF RECORD.--March 28, 1978 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 102.70 ft below land-surface datum, May 14, 1978; lowest, 121.61 ft below land-surface datum, August 10-11, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	117.16	117.28	117.00	117.47	117.88	119.03	117.33	118.13	119.04	118.74	118.49	118.07
MAX	117.41	117.72	117.68	118.41	120.49	121.56	117.71	119.00	119.98	118.95	119.01	118.45
MIN	116.90	116.92	116.59	116.87	116.85	117.65	117.04	117.36	118.06	118.41	117.98	117.35
CAL YR 1989		MEAN	117.97		HIGH	116.59		LOW	121.56			

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, on west side of the intersection of Second Street and North Elm Street, 0.3 mi north of intersection of Ga. Highway 76 and 37, in Adel.

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.

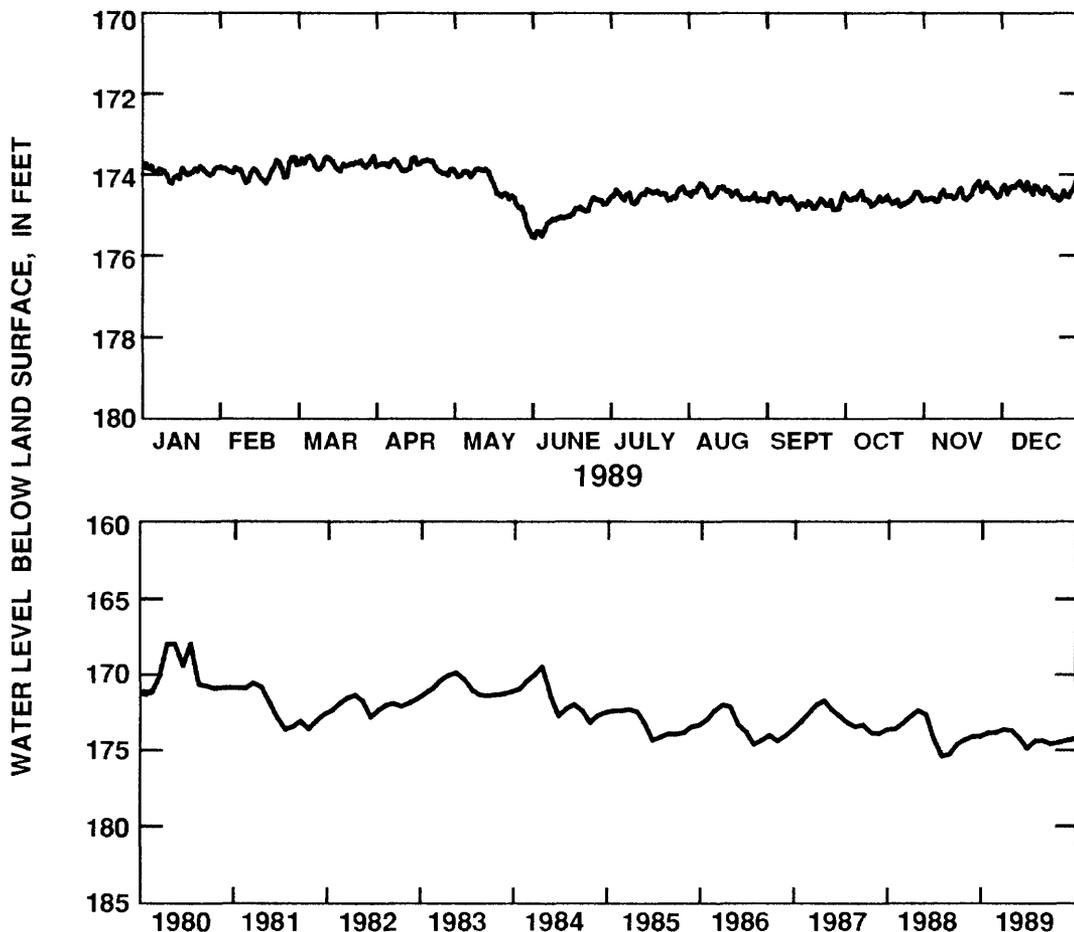
DATUM.--Altitude of land-surface datum is 241 ft.

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, 175.75 ft below land-surface datum, July 22, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	173.93	173.92	173.71	173.77	174.30	175.00	174.49	174.46	174.68	174.60	174.47	174.38
MAX	174.21	174.21	173.91	174.01	175.38	175.55	174.71	174.64	174.85	174.77	174.64	174.63
MIN	173.78	173.57	173.53	173.58	173.85	174.56	174.29	174.21	174.45	174.40	174.17	174.16
CAL YR 1989			MEAN	174.31		HIGH	173.53		LOW	175.55		

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

304949083165301 Local number, 19E009.

LOCATION.--Lat 30°49'51", long 83°16'58", Hydrologic Unit 03110202, N. Oak Street, one block north of intersection with U.S. Highway 84, Valdosta.

Owner: City of Valdosta.

AQUIFER.--Upper Floridan aquifer.

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

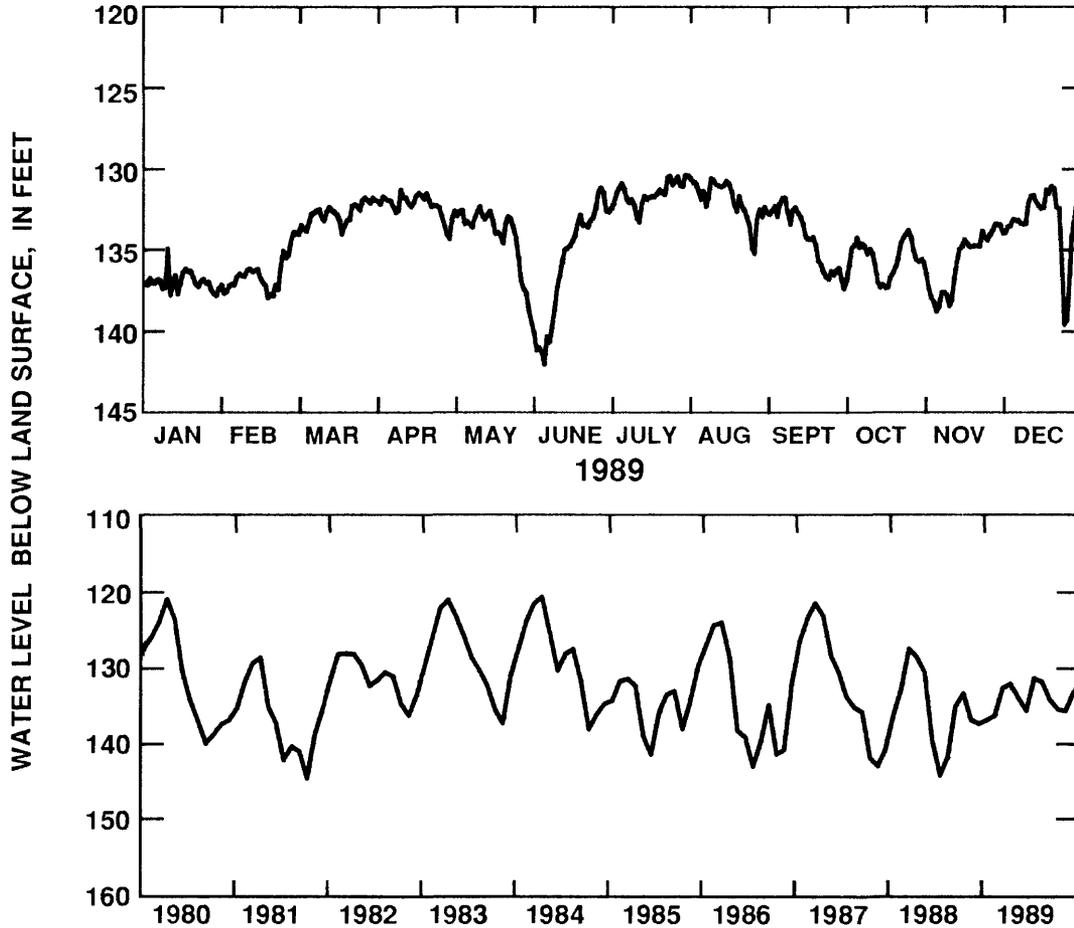
DATUM.--Altitude of land-surface datum is 217 ft.

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

REMARKS.--Well pumped July 18, 1978: water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted April 11, 1963.

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, 146.60 ft below land-surface datum, July 18, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	136.97	136.39	132.73	132.22	134.06	135.74	131.46	131.94	134.31	135.57	135.81	133.33
MAX	137.78	137.93	134.00	134.28	139.42	142.07	133.27	135.22	137.42	137.36	138.85	139.71
MIN	134.87	133.87	131.72	131.23	132.31	131.11	130.33	130.52	131.78	133.83	133.45	131.09
CAL YR 1989			MEAN	134.19		HIGH	130.33		LOW	142.07		

Figure 39.--Water level in observation well 19E009, Lowndes County.

305241083154401 Local number, 19F039.

LOCATION.--Lat 30°52'41", long 83°15'46", Hydrologic Unit 03110203, at water tank by Valdosta High School.

Owner: City of Valdosta well 8.

AQUIFER.--Upper Floridan aquifer.

WELL CHARACTERISTICS.--Drilled unused municipal supply well, diameter 16 in., depth 450 ft, cased to 350 ft, open hole.

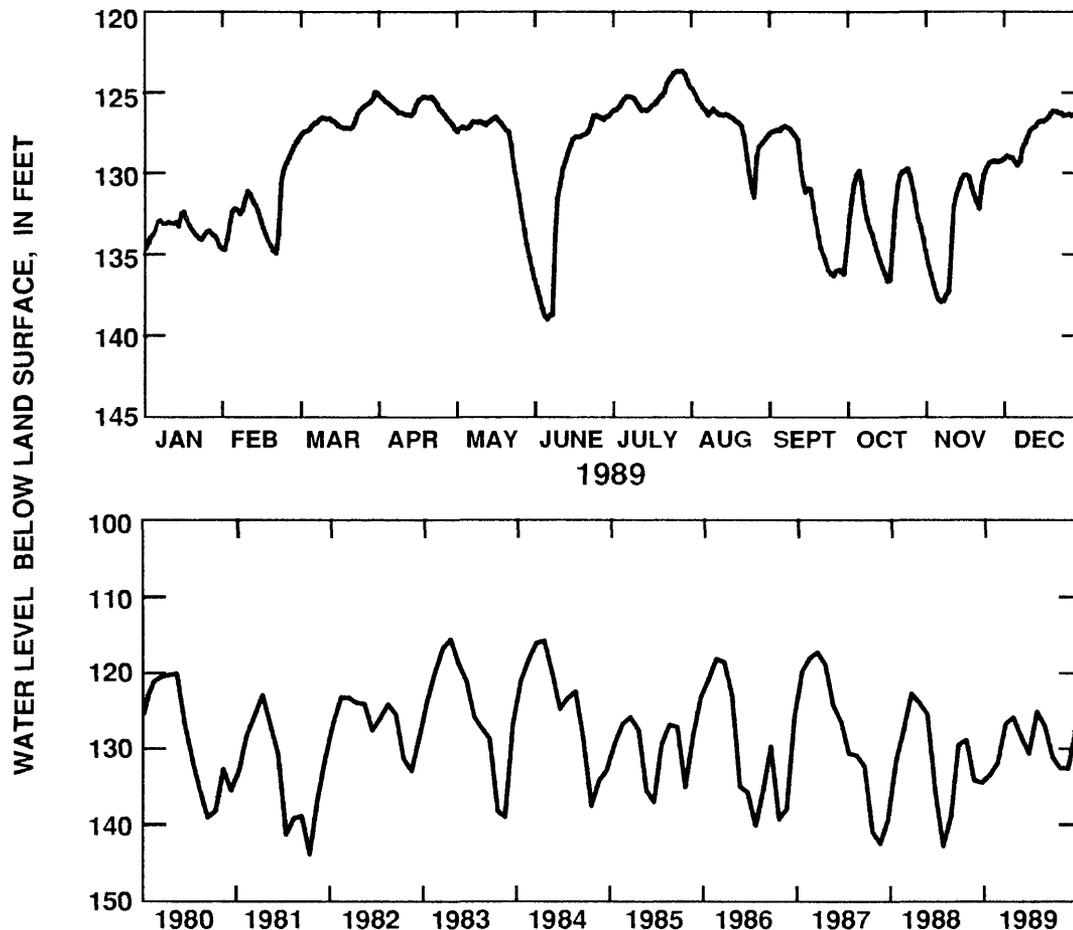
DATUM.--Altitude of land-surface datum is 222 ft.

Measuring point: Pump base, 1.40 ft above land-surface datum.

REMARKS.--None.

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, 145.67 ft below land-surface datum, October 24, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	133.57	131.99	126.71	125.90	128.56	130.76	125.15	127.03	131.27	132.68	132.74	127.36
MAX	134.75	134.95	127.85	126.97	135.89	139.01	126.22	131.50	136.34	136.66	137.92	129.52
MIN	132.42	128.10	124.95	125.04	126.51	126.39	123.63	124.64	127.06	129.75	129.25	126.13
CAL YR 1989			MEAN	129.45		HIGH	123.63		LOW	139.01		

Figure 40.--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, all of which are included in this report (figs. 41-43). During 1987, an estimated 16 Mgal/d was withdrawn from aquifers in east-central Georgia (Trent and others, 1990), much of which was from the Upper Floridan aquifer. Well 21T001 (fig. 41) in Laurens County is near the recharge area for the Upper Floridan aquifer and the water level in this well responds primarily to seasonal fluctuations in precipitation. The mean water level in well 21T001 was 2.3 ft higher in 1989 than in 1988. This water-level rise is a result of increased recharge due to above-normal precipitation during the summer of 1989 (see precipitation graph for Macon, fig. 12).

In Montgomery and Toombs Counties, the water level in the Upper Floridan aquifer is affected primarily by changes in local and regional pumping. This response is shown on the hydrographs for well 25Q001 in Montgomery County (fig. 42) and well 26R001 in Toombs County (fig. 43). The mean water levels in wells 25Q001 and 26R001 were 0.4 ft higher in 1989 than in 1988. Although wells in this area showed a slight water-level rise during 1989, the long-term trend is a general decline.

Coastal area

The water level in the Upper Floridan aquifer in the coastal area is monitored in 22 wells, records from 15 are included in this report (figs. 44-59). Water levels in wells tapping the aquifer in this area are influenced primarily by local and regional pumping. Because the Upper Floridan aquifer is deeply buried and far from the outcrop area, the ground-water level is not influenced by concurrent precipitation, but rather by increased withdrawal during dry periods and decreased withdrawal during wet periods (Clarke and others, 1990).

In this area and adjacent parts of Florida and South Carolina, the water-level map of the Upper Floridan aquifer is characterized by cones of depression that are caused by large ground-water withdrawal primarily in the Savannah, Jesup-Riceboro, Brunswick, and St Marys, Ga.-Fernandina Beach, Fla., areas. Pumpage in the coastal area of Georgia in 1987 was about 321 Mgal/d, about 69 percent of which was used for industrial purposes (Trent and others, 1990). In the coastal area of Georgia, nearly all the ground-water withdrawal is from the Floridan aquifer system. The coastal area is divided into four hydrologic subareas on the basis of major pumping centers (1) the Savannah area, (2) the Jesup-Riceboro area, (3) the Brunswick area, and (4) the Kings Bay-Okefenokee Swamp area (fig. 27).

Savannah Area

The water levels in the Upper Floridan aquifer in the Savannah area are monitored in eight wells, records from five are included in this report (figs. 45-49). In this area, the water level in the Upper Floridan aquifer primarily is affected by pumping for municipal and industrial uses. As a result of pumping, a cone of depression has developed in the water-level surface at Savannah. In 1987, withdrawal from the Floridan aquifer system exceeded 78 Mgal/d in the Savannah area (Trent and others, 1990).

Hydrographs for observation wells near the center of pumping, and in outlying areas, illustrate the effects of pumping on the ground-water levels. The mean water levels in wells 36Q008, 36Q020, 38Q002 and 39Q003 in the area of the cone of depression at Savannah were from 0.7 to 2.0 ft lower in 1989 than in 1988, which continued a general downward trend that began in 1983 (figs. 45-48). Water-level declines in these wells are attributed to regional pumping and below-normal precipitation during much of the year. (See precipitation graph for Savannah, fig. 11.) Observation well 32R002 (fig. 49), located west of the pumping center at Savannah in Bulloch County, responds to changes in pumping at Savannah, but to a lesser degree than those wells in the area of the cone of depression. The mean water level in well 32R002 was 0.3 ft lower in 1989 than in 1988, continuing the general downward trend since monitoring of the well began in 1983.

322652083033001 Local number, 21T001.

LOCATION.--Lat 32°27'06", long 83°03'28", Hydrologic Unit 03070102, 1.0 mi east of Ga. Highway 338 on dirt road, 1.5 mi northwest of Dexter.

Owner: Danny Hogan.

AQUIFER.--Upper Floridan aquifer.

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

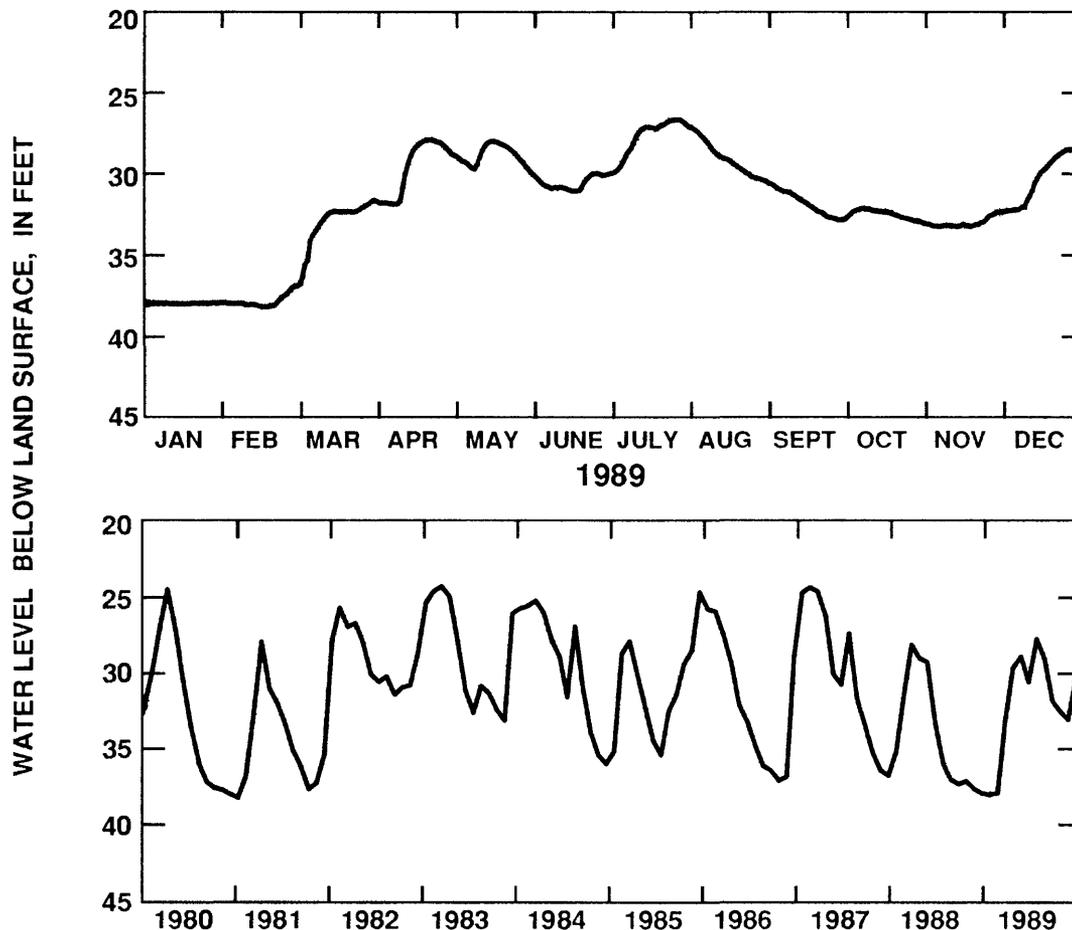
DATUM.--Altitude of land-surface datum is 259 ft.

Measuring point: Top of recorder shelf, 2.57 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted November 1973.

PERIOD OF RECORD.--March 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.62 ft below land-surface datum, January 26, 1987; lowest, 39.58 ft below land-surface datum, November 12, 1968.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	38.04	37.94	33.13	29.64	28.88	30.59	27.74	29.05	31.83	32.53	33.07	30.37
MAX	38.06	38.26	36.96	31.92	29.93	31.11	30.02	30.51	32.87	33.01	33.27	32.36
MIN	37.99	36.97	31.68	27.92	28.00	30.01	26.65	27.11	30.61	32.16	32.39	28.53
CAL YR 1989			MEAN	31.86		HIGH	26.65		LOW	38.26		

Figure 41.--Water level in observation well 21T001, Laurens County.

320226082301101 Local number, 25Q001.

LOCATION.--Lat 32°02'25", long 82°30'05", Hydrologic Unit 03070106, well is located behind the Uvalda School, in Uvalda.

Owner: Montgomery County Board of Education.

AQUIFER.--Upper Floridan aquifer.

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

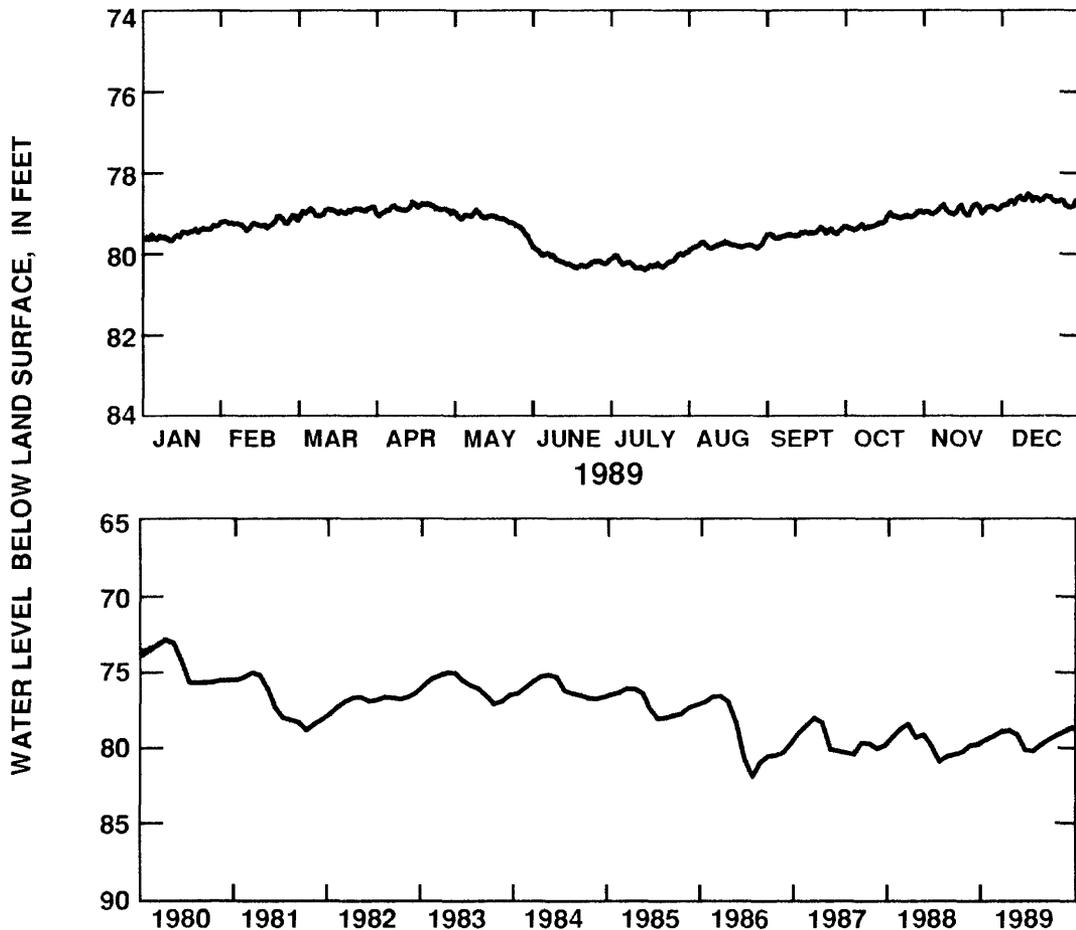
DATUM.--Altitude of land-surface datum is 190 ft.

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

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

PERIOD OF RECORD.--June 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 64.13 ft below land-surface datum, June 10, 1966; lowest, 82.27 ft below land-surface datum, July 17, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	79.51	79.27	78.99	78.92	79.20	80.21	80.27	79.85	79.55	79.25	78.97	78.76
MAX	79.70	79.46	79.20	79.10	79.75	80.39	80.45	80.00	79.67	79.47	79.10	78.95
MIN	79.24	79.08	78.88	78.76	78.94	79.87	80.03	79.67	79.40	79.00	78.83	78.58
CAL YR 1989			MEAN	79.40		HIG ⁴	78.58		LOW	80.45		

Figure 42.--Water level in observation well 25Q001, Montgomery County.

321302082243601 Local number, 26R001.

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

Owner: City of Vidalia well 2.

AQUIFER.--Upper Floridan aquifer.

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

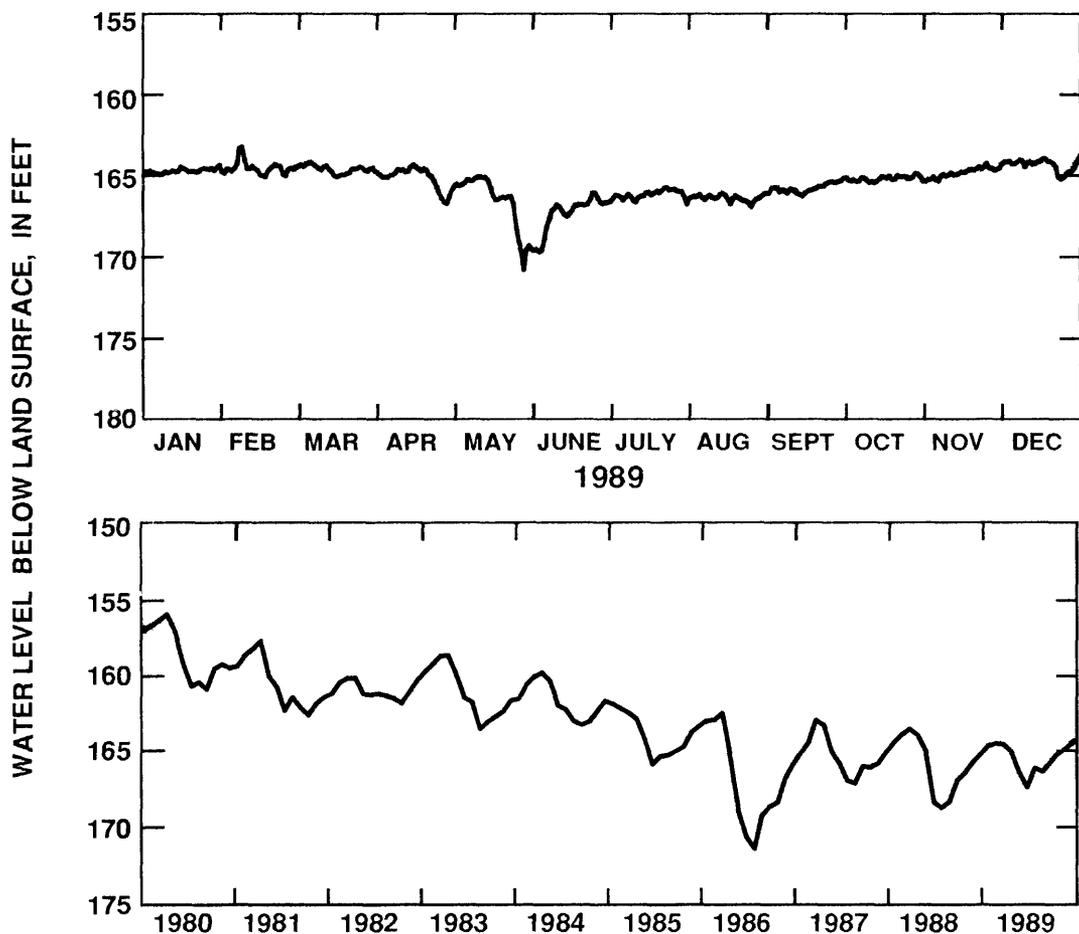
DATUM.--Altitude of land-surface datum is 285 ft.

Measuring point: Top of 12 in. casing.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	164.76	164.57	164.66	165.16	166.53	167.50	166.24	166.48	165.87	165.27	164.94	164.47
MAX	164.99	165.13	165.14	166.77	170.88	169.78	166.73	167.00	166.32	165.55	165.46	165.32
MIN	164.40	163.28	164.25	164.40	165.14	166.14	165.80	166.17	165.39	164.97	164.35	164.08
CAL YR 1989			MEAN	165.54		HIGH	163.28		LOW	170.88		

Figure 43.--Water level in observation well 26R001, Toombs County.

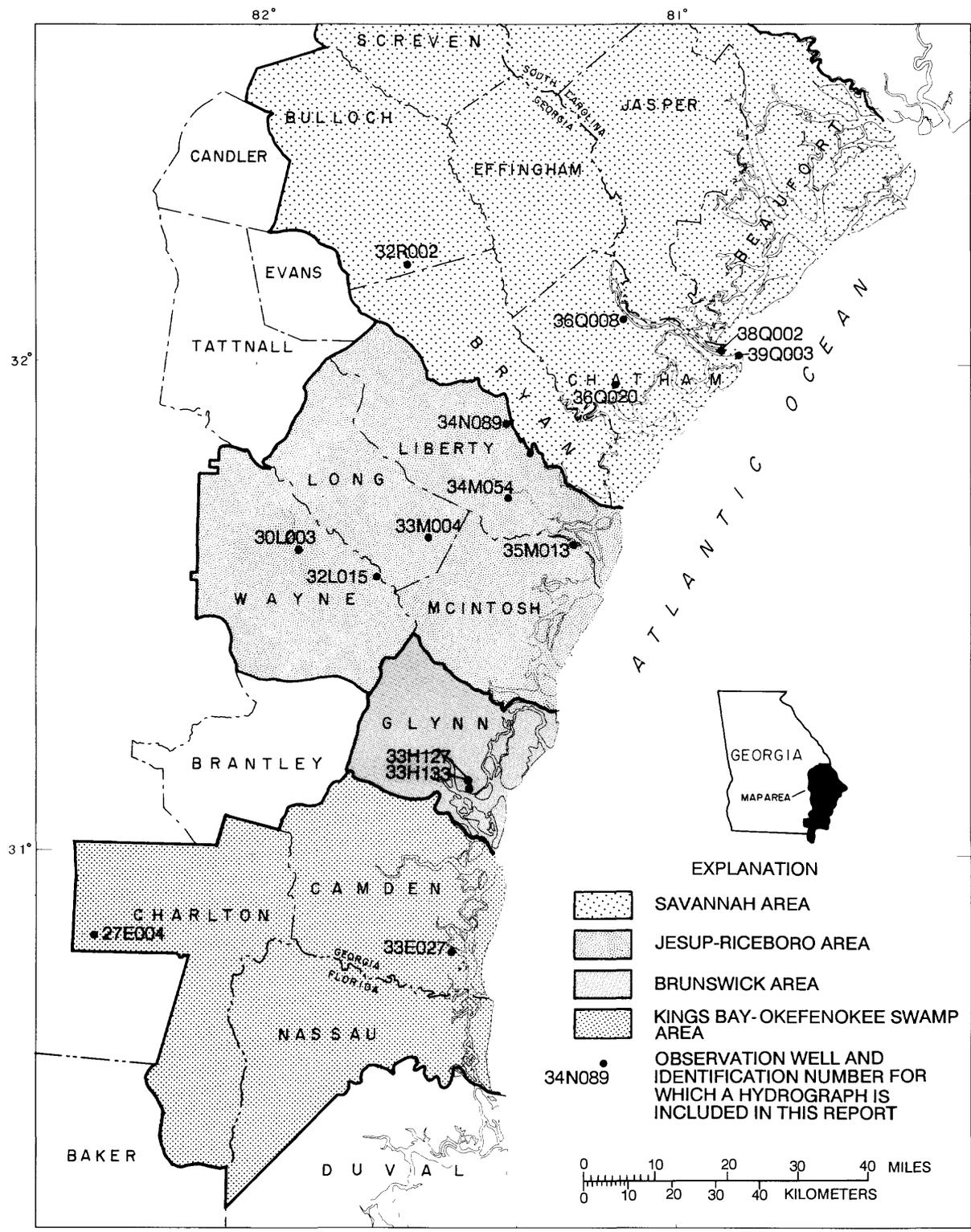


Figure 44.--Locations of observation wells completed in the Upper Floridan aquifer in the coastal area.

320530081085001 Local number, 36Q008.

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

Owner: Layne-Atlantic Co.

AQUIFER.--Upper Floridan

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

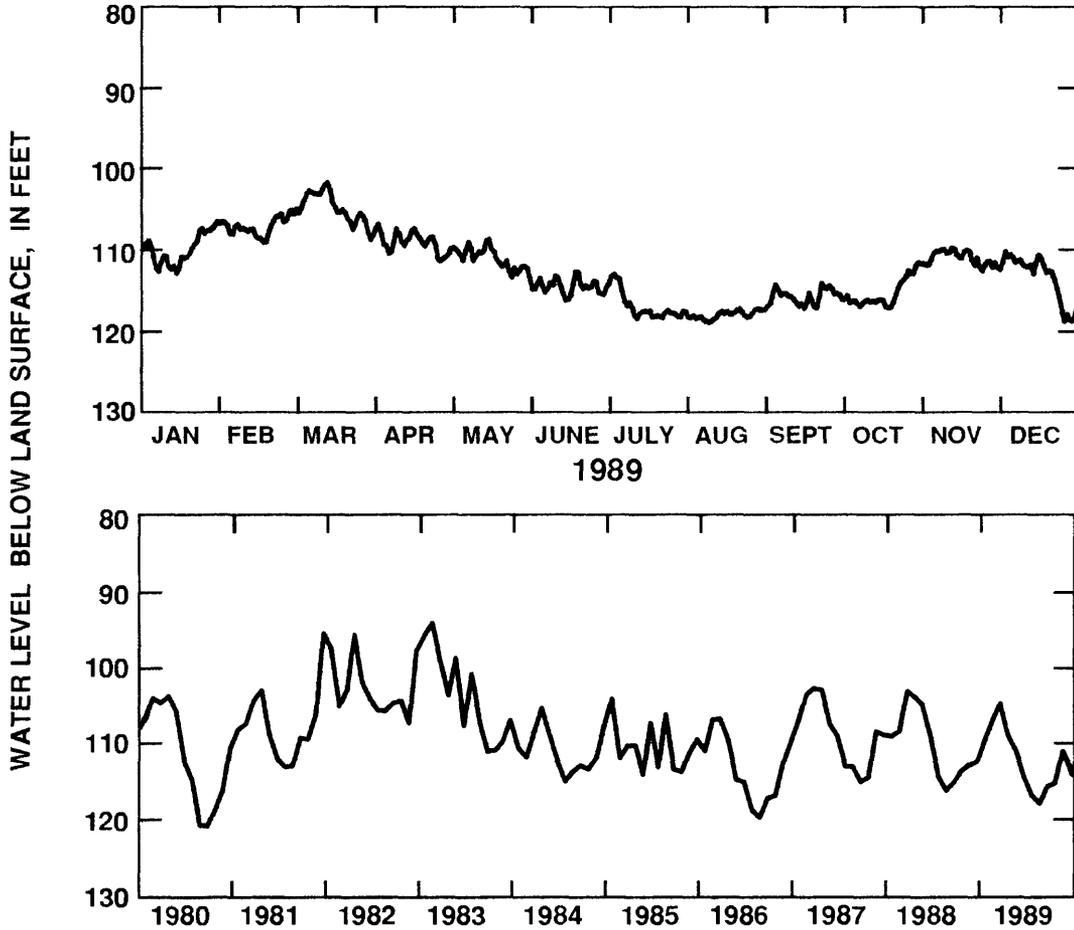
DATUM.--Altitude of land-surface datum is 9.91 ft.

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

REMARKS.--None.

PERIOD OF RECORD.--February 1954 to current year.

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



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	109.70	107.10	104.84	109.08	111.09	114.56	117.03	118.09	115.87	115.44	111.17	113.62
MAX	112.82	109.02	108.76	111.43	113.42	116.28	118.54	119.04	117.29	117.30	112.76	119.05
MIN	106.46	105.01	101.64	106.80	108.74	112.74	113.06	117.34	114.20	111.70	109.94	110.40
CAL YR 1989	MEAN		112.34	HIGH		101.64	LOW		119.05			

Figure 45.--Water level in observation well 36Q008, Chatham County.

320021081124801 Local number, 36Q020.

LOCATION.--Lat 32°00'18", long 81°12'48", Hydrologic Unit 03060204, 2.7 mi south of intersection of U.S. Highway 17 with Dean Forest Road.

Owner: H. J. Morrison.

AQUIFER.--Upper Floridan

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

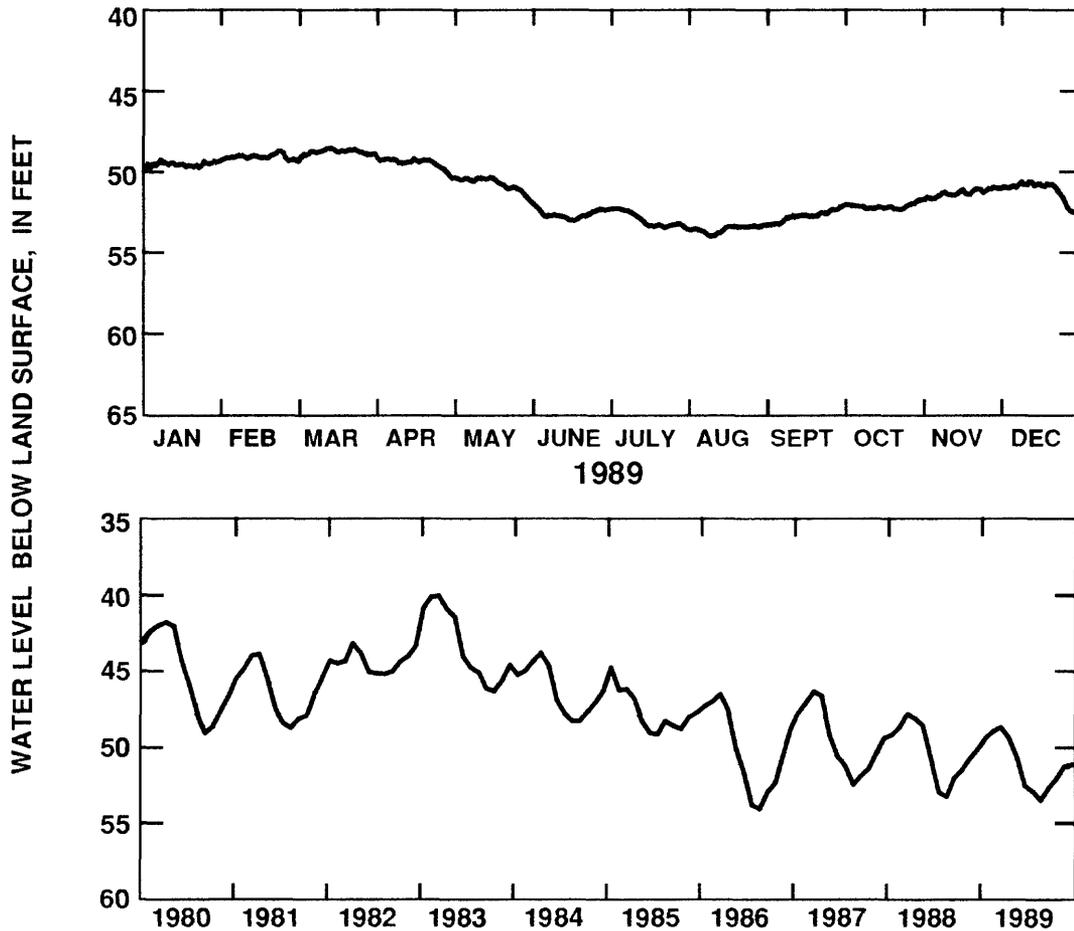
DATUM.--Altitude of land-surface datum is 13 ft.

Measuring point: Top of recorder shelf, 3.88 ft above land-surface datum.

REMARKS.--Borehole geophysical survey, May 7, 1985. Water levels for period of missing record, January 4-23, 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, 54.45 ft below land-surface datum, July 23, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	49.44	49.00	48.73	49.43	50.72	52.61	52.98	53.56	52.75	52.15	51.33	51.21
MAX	49.70	49.28	49.27	50.37	51.85	53.02	53.57	54.01	53.29	52.35	51.73	52.55
MIN	49.13	48.66	48.48	49.11	50.32	51.99	52.26	53.31	52.14	51.74	51.00	50.65
CAL YR 1989	MEAN		51.17			HIGH		48.48		LOW		54.01

Figure 46.--Water level in observation well 36Q020, Chatham County.

320202080541201 Local number, 38Q002.

LOCATION.--Lat 32°02'01", long 80°54'11", Hydrologic Unit 03060204, Cockspur Island, near pilot house.

Owner: U.S. Department of the Interior, National Park Service test well 6.

AQUIFER.--Upper Floridan

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

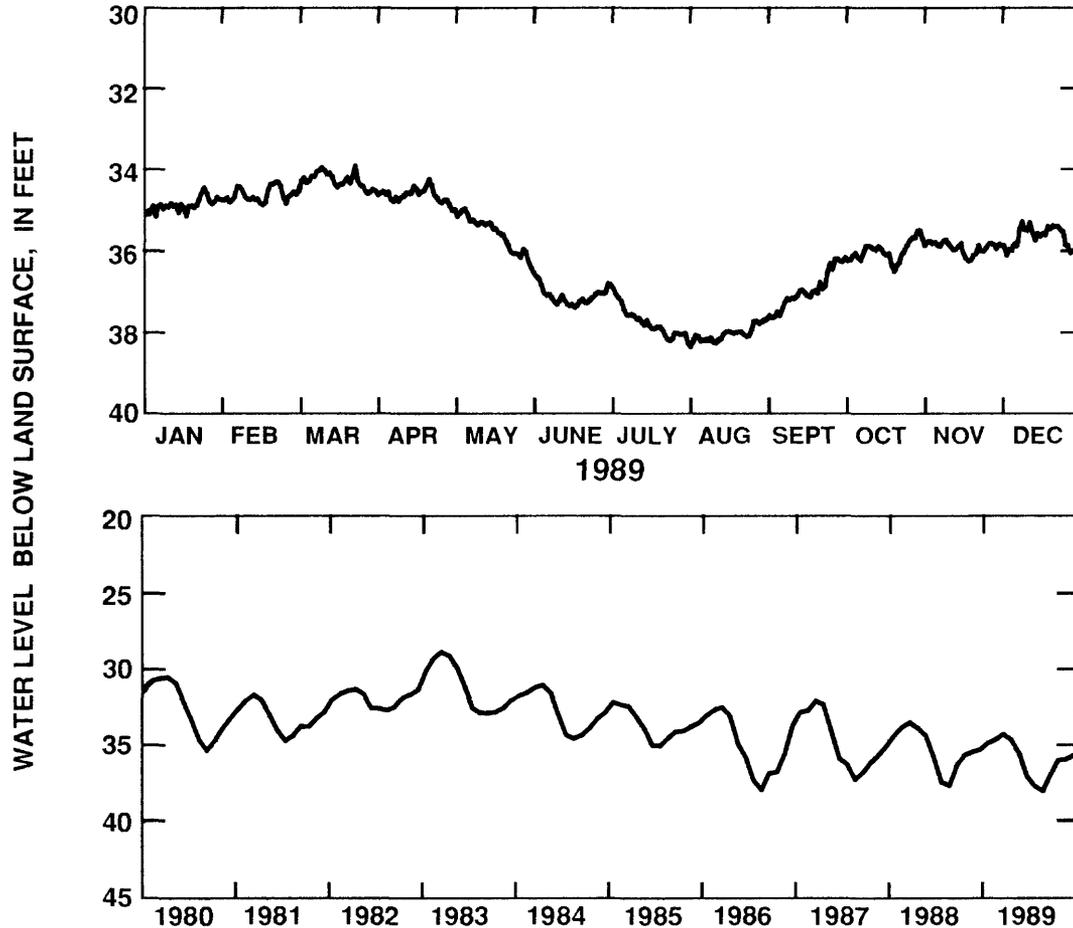
DATUM.--Altitude of land-surface datum is 8.0 ft.

Measuring point: Top of recorder shelf, 3.62 ft above land-surface datum.

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

PERIOD OF RECORD.--February 1956 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.00 ft below land-surface datum, March 5, 1956; lowest, 38.48 ft below land-surface datum, August 4, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	34.85	34.62	34.29	34.64	35.58	37.12	37.75	38.05	37.01	36.03	35.96	35.71
MAX	35.15	34.87	34.61	35.02	36.41	37.40	38.28	38.37	37.66	36.53	36.29	36.15
MIN	34.44	34.31	33.91	34.25	34.98	36.54	36.84	37.70	36.23	35.54	35.76	35.32
CAL YR 1989			MEAN	35.98		HIGH	33.91		LOW	38.37		

Figure 47.--Water level in observation well 38Q002, Chatham County.

320122080510204 Local number, 39Q003.

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

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

AQUIFER.--Upper Floridan aquifer.

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

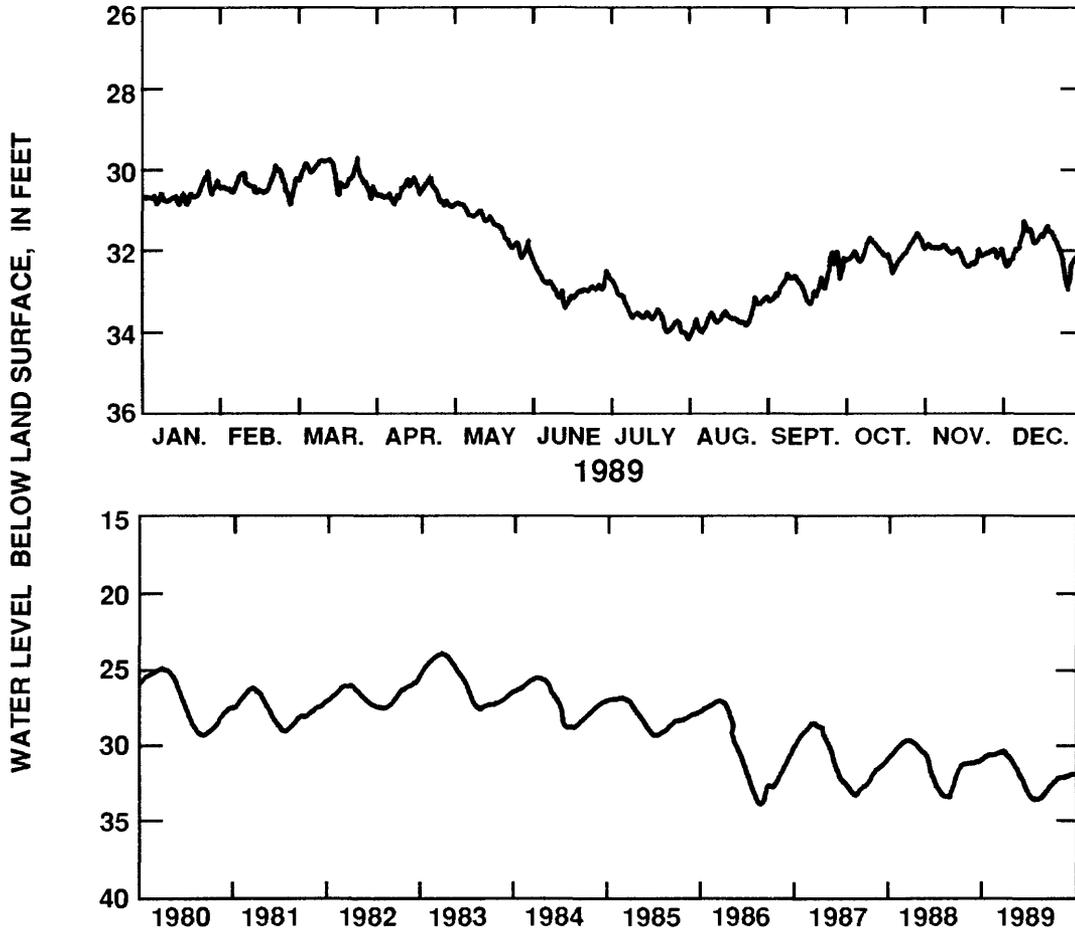
DATUM.--Altitude of land-surface datum is 7.0 ft.

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

REMARKS.--Borehole geophysical survey conducted January 24, 1962. Water levels for period of missing record, October 18 to November 17, were estimated.

PERIOD OF RECORD.--May 1952 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.80 ft below land-surface datum, April 11, 1963; lowest, 34.33 ft below land-surface datum, August 3, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	30.58	30.38	30.15	30.59	31.43	32.89	33.56	33.63	32.77	32.01	32.06	31.93
MAX	30.88	30.90	30.77	30.94	32.21	33.34	34.08	34.12	33.31	32.53	32.44	32.95
MIN	30.03	29.94	29.66	30.19	30.74	32.28	32.55	33.17	32.04	31.58	31.85	31.22
CAL YR 1989			MEAN	31.84		HIGH	29.66		LOW	34.12		

Figure 48.--Water level in observation well 39Q003, Chatham County.

321240081411501 Local number, 32R002.

LOCATION.--Lat 32°12'40", long 81°41'15", Hydrologic Unit 03060202, 2.6 mi north along Ga. Highway 67 from the Bulloch-Bryan County line, approximately 100 ft east of center line of road.

Owner: Georgia Geologic Survey, Bulloch South test well 1.

AQUIFER.--Upper Floridan

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 804 ft, cased to 420 ft, open hole.

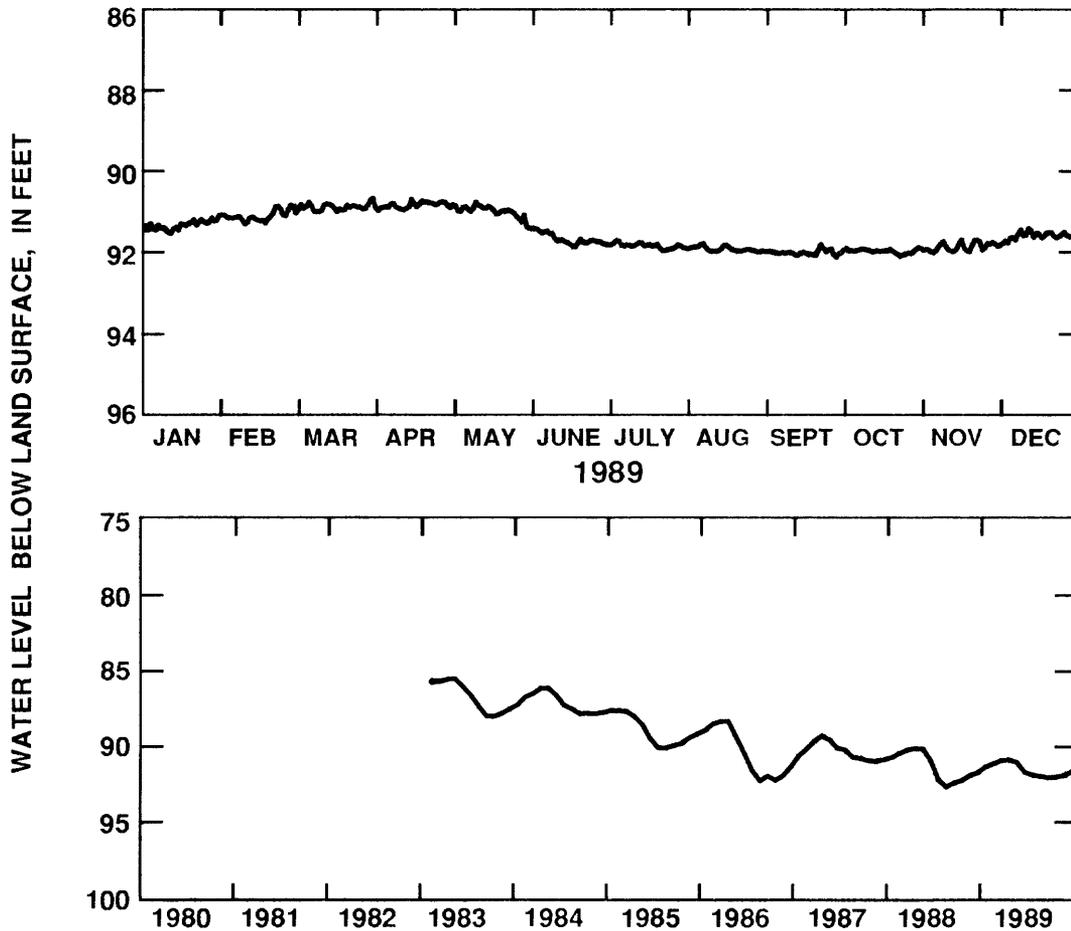
DATUM.--Altitude of land-surface datum is 120 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey and well sounded August 1982.

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, 92.72 ft below land-surface datum, August 4, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	91.33	91.12	90.91	90.87	91.02	91.70	91.88	91.97	92.06	92.03	91.93	91.66
MAX	91.53	91.32	91.05	91.00	91.44	91.90	92.00	92.04	92.17	92.16	92.07	91.89
MIN	91.09	90.86	90.69	90.72	90.79	91.45	91.75	91.83	91.86	91.94	91.76	91.48
CAL YR 1989			MEAN	91.54		HIGH	90.69		LOW	92.17		

Figure 49.--Water level in observation well 32R002, Bulloch County.

Jesup-Riceboro Area

The water level in the Upper Floridan aquifer in the Jesup-Riceboro area is monitored in six wells, all of which are included in this report (figs. 50-55). In this area, water levels in wells tapping the aquifer are affected mainly by industrial pumping at Doctortown (near Jesup) and at Riceboro, and to a lesser extent by pumping in the Savannah area. In 1987, pumpage was about 74 Mgal/d at Doctortown and about 16 Mgal/d at Riceboro (Trent and others, 1990). Hydrographs for wells 30L003 (fig. 50), 32L015 (fig. 51), 33M004 (fig. 52) and 34M054 (fig. 53) illustrate the effects that a partial industrial shutdown had on the water levels in the Jesup-Riceboro area in May 1989. The water levels in wells 34N089 (fig. 54) and 35M013 (fig. 55) were not affected by the industrial shutdowns because these wells are farther from the centers of pumping.

In the Jesup-Riceboro area, a general downward water-level trend in the Upper Floridan aquifer has been monitored since 1983. Mean water levels in six wells were from 0.1 to 1.3 ft lower in 1989 than in 1988, and record low water levels were measured in wells 30L003, 32L015, 33M004, and 35M013 (figs. 50-52 and 55) during August, September, and December 1989. These declines continued the downward trend that began in 1983, and may be attributed to regional pumping and below-normal precipitation.

Kings Bay-Okefenokee Swamp area

The water level in the Upper Floridan aquifer in the Kings Bay area is monitored in two wells, both of which are included in this report (figs. 56 and 57). Water levels in wells tapping the aquifer in this area are affected by industrial pumping totaling about 34 Mgal/d at St Marys, Ga. (Trent and others, 1990), and about 37 Mgal/d 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.

The mean water level in well 33E027 (fig. 56) at Kings Bay was 0.8 ft lower in 1989 than in 1988, and in well 27E004 (fig. 57) in western Charlton County, the mean water level was 1.6 ft lower in 1989 than in 1988. A record low water level was measured in well 27E004 in June 1989. These declines continued the general downward water-level trend in the area since 1983, and may be attributed to increased regional pumping and below-normal precipitation.

Brunswick Area

The water level in the Upper Floridan aquifer in the Brunswick area is monitored in six wells, two of which are included in this report (figs. 58 and 59). In this area, the water level in wells tapping the aquifer is affected primarily by industrial pumping, which totalled about 70 Mgal/d in 1987 (Trent and others, 1990). This pumping has resulted in the development of a cone of depression centered at Brunswick. The water-level response to pumping is illustrated on the hydrographs for wells 33H127 tapping the lower water-bearing zone of the upper Floridan aquifer (fig. 58), and well 33H133 tapping the upper water-bearing zone of the upper Floridan aquifer (fig. 59). In 1989, reduced pumping related to partial industrial shutdowns are reflected by sharp water-level rises during May and October. The mean water levels in wells 33H133 and 33H127 were 1.3 and 1.7 ft lower in 1989 than in 1988, respectively. These declines continued the downward trend in the area since 1983.

313701081543501 Local number, 30L003.

LOCATION.--Lat 31°37'01", long 81°54'34", Hydrologic Unit 03070106, about 0.5 mi west of Jesup city limits near intersection of U.S. Highway 341 and Sunset Drive.

Owner: City of Jesup Housing Authority.

AQUIFER.--Upper Floridan

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

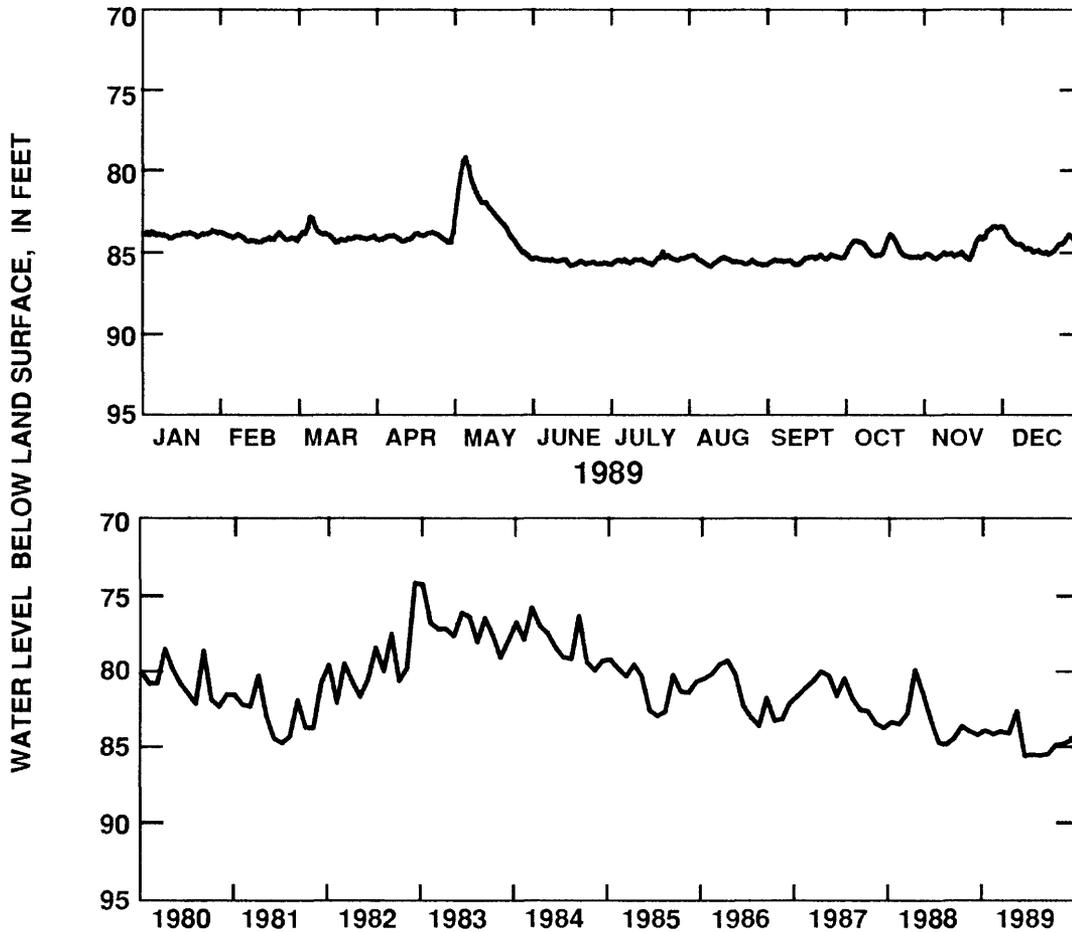
DATUM.--Altitude of land-surface datum is 107 ft.

Measuring point: Top of recorder shelf, 2.88 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted August 19, 1963. Water levels for period of missing record, June 3-14, were estimated.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 59.98 ft below land-surface datum, April 19, 1964; lowest, 85.89 ft below land-surface datum, August 10, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	83.94	84.17	84.00	84.11	82.64	85.63	85.52	85.60	85.49	84.87	84.81	84.56
MAX	84.18	84.40	84.44	84.43	85.35	85.87	85.81	85.89	85.81	85.38	85.52	85.17
MIN	83.72	83.82	82.84	83.82	79.18	85.40	85.00	85.20	85.19	83.94	83.48	83.49
CAL YR 1989			MEAN	84.61		HIGH	79.18		LOW	85.89		

Figure 50.--Water level in observation well 30L003, Wayne County.

313253081433502 Local number, 32L015.

LOCATION.--Lat 31°32'52", long 81°43'36", Hydrologic Unit 03070106, westernmost of three recorder wells, 0.8 mi north of Gardi Road, on right side of dirt road, 4.3 mi east of Gardi.

Owner: Georgia Geologic Survey, Gardi test well 1.

AQUIFER.--Upper Floridan

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 750 ft, cased to 545 ft, open hole.

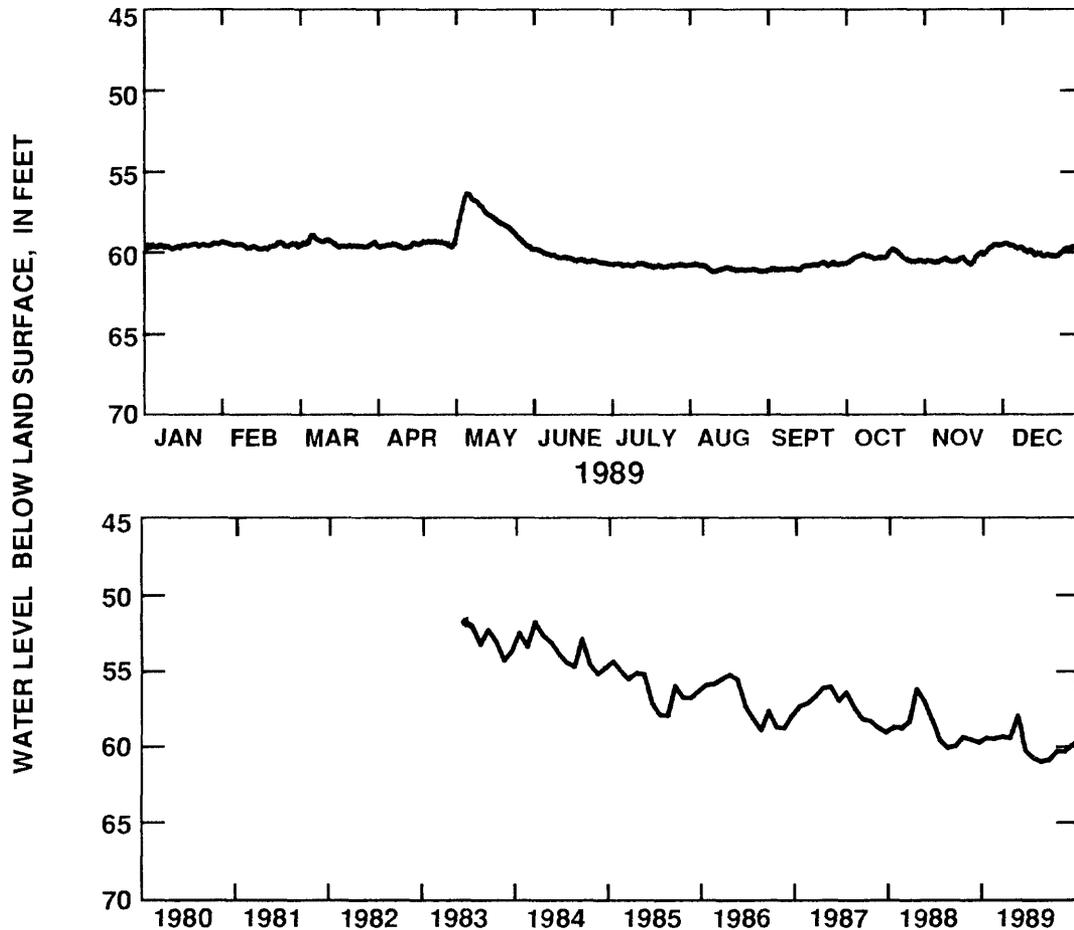
DATUM.--Altitude of land-surface datum is 74 ft.

Measuring point: Top of recorder shelf, 4.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted April 20, 1983.

PERIOD OF RECORD.--April 20, 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.12 ft below land-surface datum, March 19, 1984; lowest, 61.29 ft below land-surface datum, August 10, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	59.56	59.59	59.47	59.54	58.10	60.41	60.89	61.12	61.01	60.44	60.46	60.04
MAX	59.77	59.79	59.71	59.78	59.81	60.77	61.03	61.29	61.21	60.79	60.90	60.43
MIN	59.35	59.38	58.93	59.36	56.34	59.88	60.77	60.84	60.75	59.93	59.68	59.61
CAL YR 1989			MEAN	60.05		HIGH	56.34		LOW	61.29		

Figure 51.--Water level in observation well 32L015, Wayne County.

313845081361701 Local number, 33M004.

LOCATION.--Lat 31°38'54", long 81°36'04", Hydrologic Unit 03070106, 9.0 mi southeast of Ludowici, at Hope Cemetery.

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

AQUIFER.--Upper Floridan

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

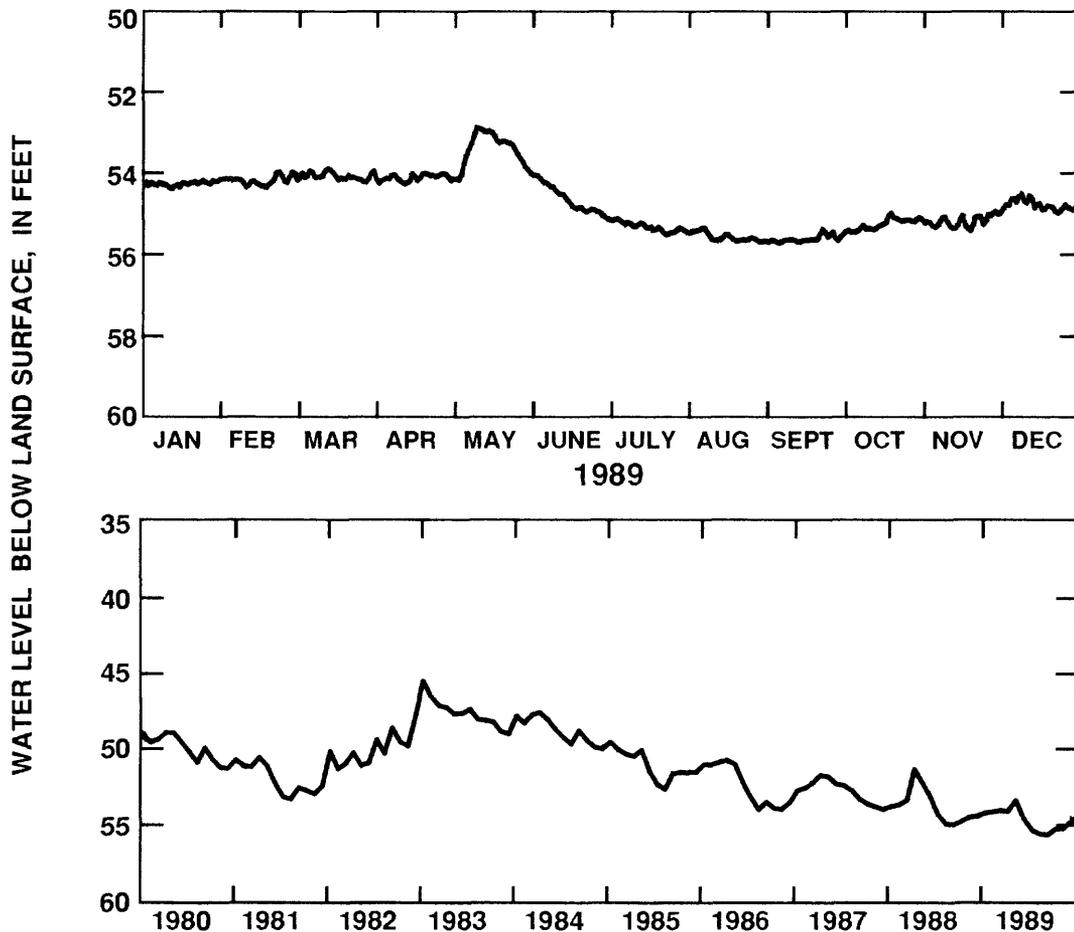
DATUM.--Altitude of land-surface datum is 61.2 ft.

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

REMARKS.--Well pumped and sounded June 17, 1976, to depth of 861 ft; water-quality sample collected. Borehole geophysical survey conducted July 28, 1976.

PERIOD OF RECORD.--January 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.04 ft below land-surface datum, January 14, 1968; lowest, 55.74 ft below land-surface datum, September 5, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	54.23	54.16	54.06	54.10	53.40	54.63	55.33	55.59	55.64	55.28	55.22	54.83
MAX	54.36	54.34	54.21	54.26	54.16	55.14	55.53	55.71	55.74	55.48	55.45	55.02
MIN	54.12	53.95	53.87	53.99	52.85	54.04	55.14	55.37	55.41	55.02	54.99	54.55
CAL YR 1989			MEAN	54.71		HIGH	52.85		LOW	55.74		

Figure 52.--Water level in observation well 33M004, Long County.

314343081251901 Local number, 34M054.

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

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

AQUIFER.--Upper Floridan

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

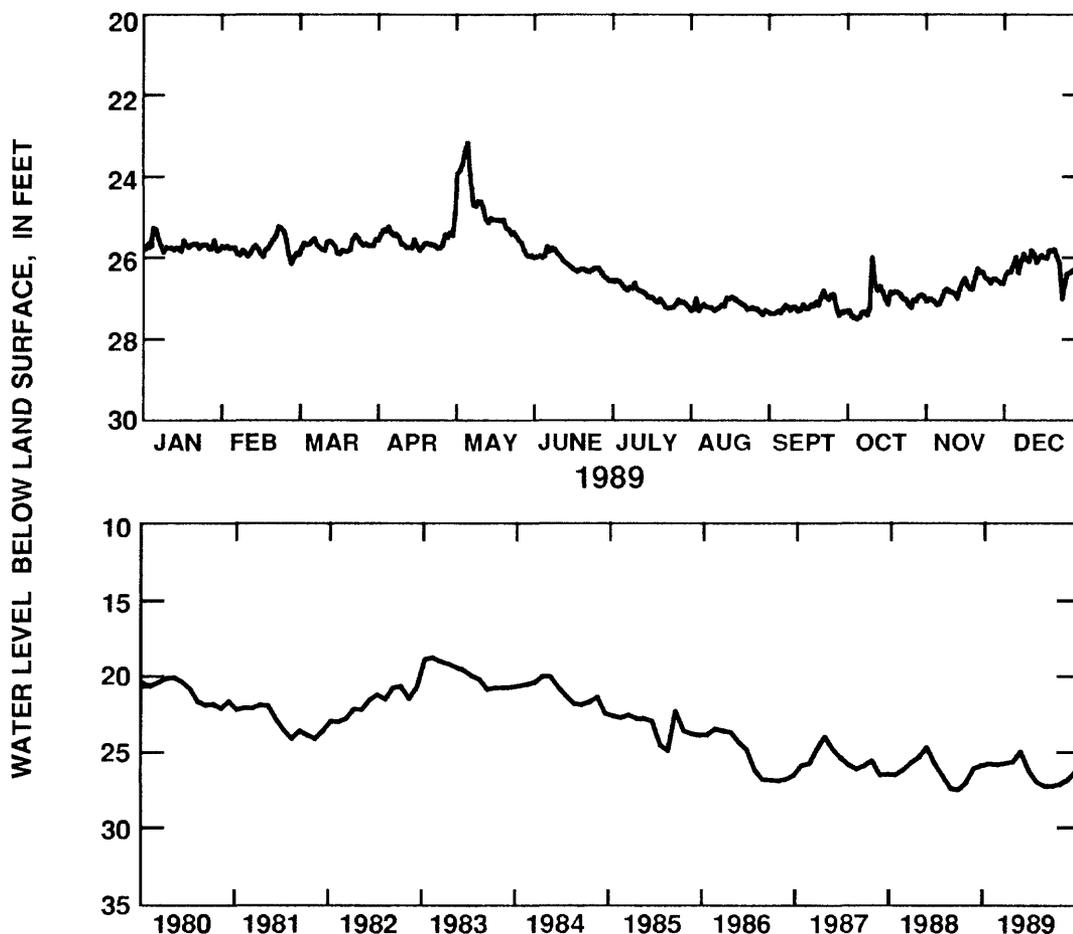
DATUM.--Altitude of land-surface datum is 19 ft.

Measuring point: Top of recorder shelf, 3.4 ft above land-surface datum.

REMARKS.--Well pumped July 11, 1979; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 15, 1976. Water levels for period of missing record, June 15-25, 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, 27.59 ft below land-surface datum, September 16-17, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	25.70	25.75	25.70	25.59	24.93	26.17	26.94	27.21	27.21	27.08	26.77	26.21
MAX	25.86	26.15	25.92	25.83	25.98	26.58	27.25	27.41	27.44	27.53	27.19	27.05
MIN	25.26	25.24	25.45	25.25	23.16	25.74	26.58	26.98	26.84	26.01	26.30	25.84
CAL YR 1989			MEAN	26.27		HIGH	23.16		LOW	27.53		

Figure 53.--Water level in observation well 34M054, Liberty County.

315214081235301 Local number, 34N089.

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

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

AQUIFER.--Upper Floridan

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

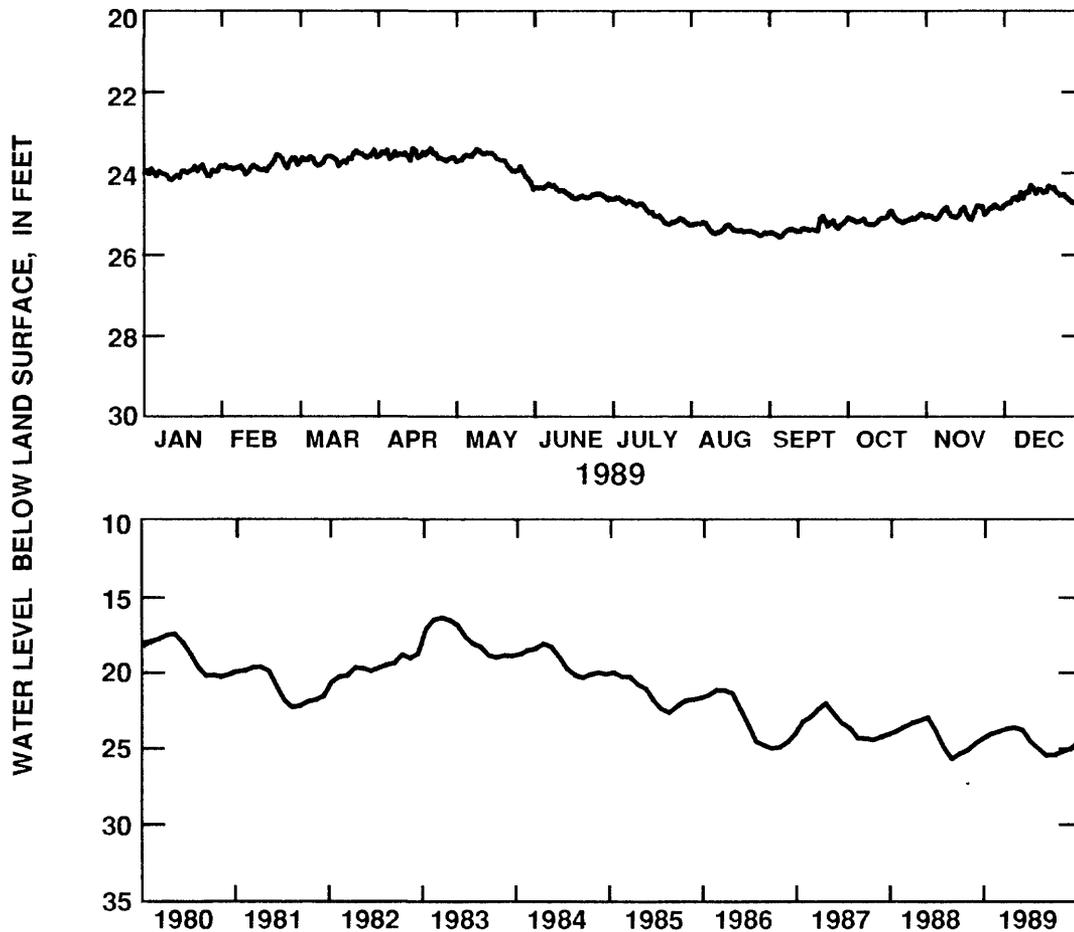
DATUM.--Altitude of land-surface datum is 17 ft.

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

REMARKS.--Well pumped July 11, 1979; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted June 15, 1976. Water levels for periods of missing record, April 1 to May 2, and May 12-26, were estimated.

PERIOD OF RECORD.--February 1967 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.34 ft below land-surface datum, March 6, 1967; lowest, 25.82 ft below land-surface datum, August 5, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	23.99	23.83	23.65	23.57	23.72	24.51	24.97	25.41	25.40	25.17	25.01	24.59
MAX	24.18	24.04	23.84	23.72	24.24	24.68	25.28	25.56	25.60	25.30	25.18	24.89
MIN	23.80	23.55	23.44	23.39	23.42	24.30	24.63	25.24	25.09	24.98	24.82	24.34
CAL YR 1989			MEAN	24.49		HIGH	23.39		LOW	25.60		

Figure 54.--Water level in observation well 34N089, Liberty County.

313823081154201 Local number, 35M013.

LOCATION.--Lat 31°38'23", long 81°15'42", Hydrologic Unit 03060204, 8.5 mi east of U.S. Highway 17 at Harris Neck Wildlife Refuge.

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

AQUIFER.--Upper Floridan

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

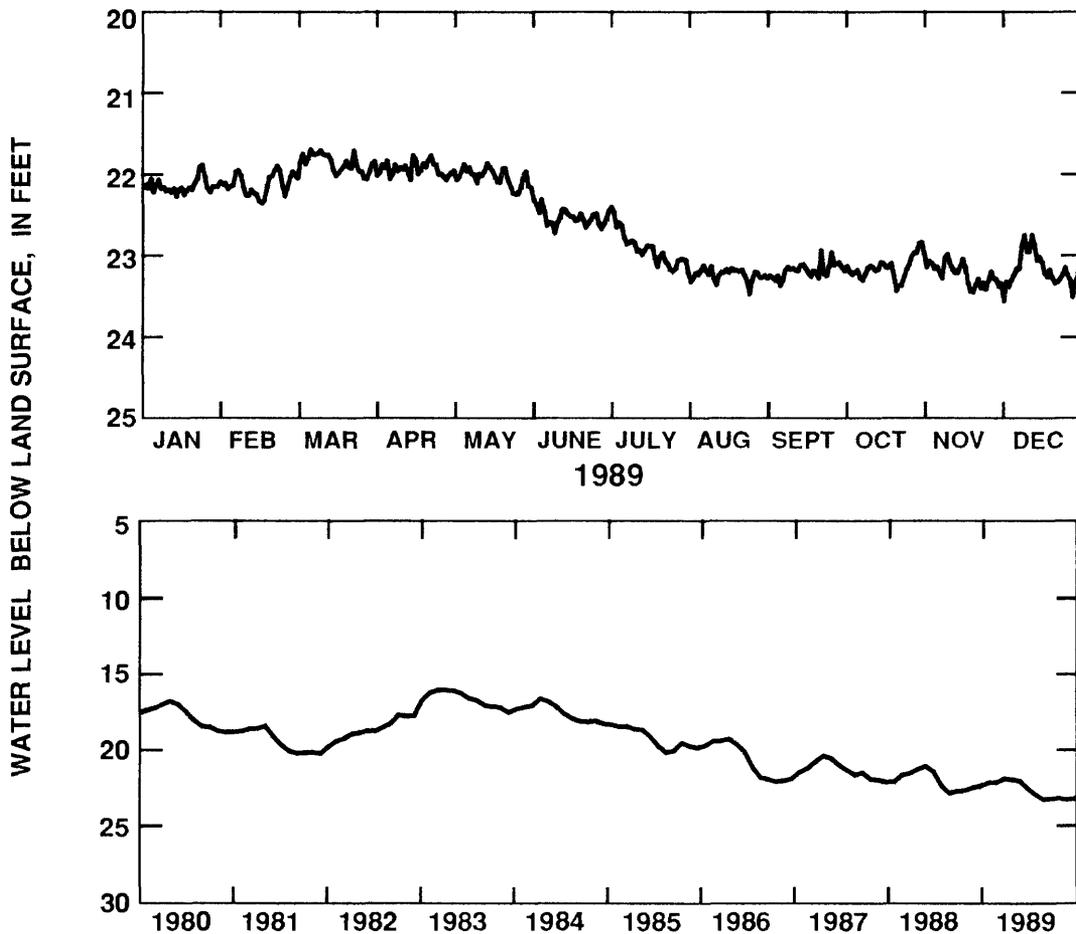
DATUM.--Altitude of land-surface datum is 16.3 ft.

Measuring point: Top of recorder shelf, 3.2 ft above land-surface datum.

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, December 13-20, 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, 23.59 ft below land-surface datum, December 1, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	22.13	22.11	21.85	21.93	22.03	22.53	22.94	23.25	23.20	23.18	23.26	23.21
MAX	22.26	22.35	22.05	22.06	22.24	22.73	23.23	23.49	23.39	23.46	23.48	23.59
MIN	21.87	21.88	21.68	21.75	21.86	22.31	22.41	23.14	22.95	22.86	23.01	22.77
CAL YR 1989			MEAN	22.64		HIGH	21.68		LOW	23.59		

Figure 55.--Water level in observation well 35M013, McIntosh County.

304756081311101 Local number, 33E027.

LOCATION.--Lat 30°47'56", long 81°31'11", Hydrologic Unit 03070203, Naval Submarine Base, Kings Bay.

Owner: U.S. Department of the Navy, Kingsbay test well 1.

AQUIFER.--Upper Floridan

WELL CHARACTERISTICS.--Drilled test well, diameter 8 in., depth 1,306 ft, cased to 555 ft, backfilled to 990 ft, open hole.

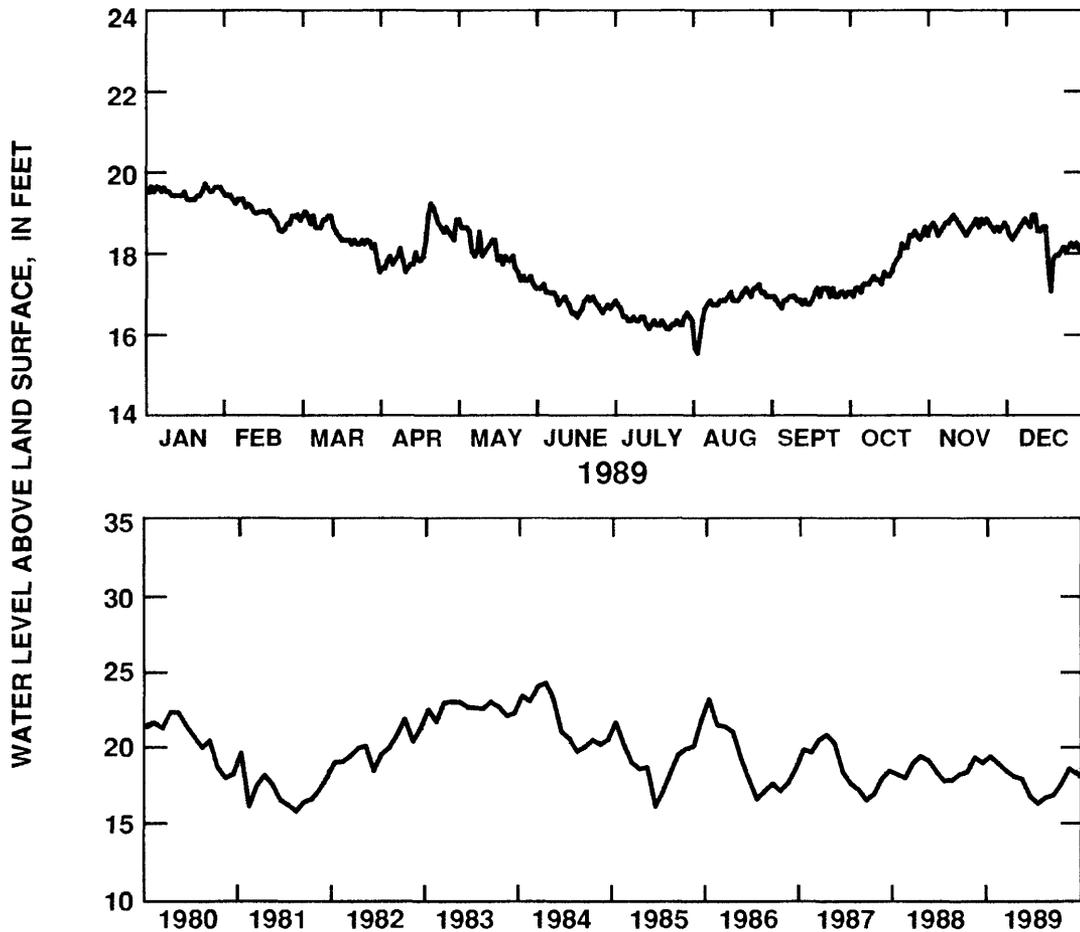
DATUM.--Altitude of land-surface datum is 10.0 ft.

Measuring point: Top of flange at land-surface datum.

REMARKS.--Borehole geophysical survey conducted February 9, 1979. Water levels for periods of missing record, January 1-6, February 9-23, March 21-27, and October 27 to November 28, were estimated.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	-19.48	-18.99	-18.49	-18.12	-17.96	-16.79	-16.33	-16.73	-16.88	-17.64	-18.63	-18.30
MAX	-19.30	-18.52	-17.80	-17.50	-17.20	-16.40	-16.10	-15.50	-16.60	-16.90	-18.40	-17.00
MIN	-19.70	-19.40	-19.00	-19.20	-18.80	-17.20	-16.80	-17.20	-17.10	-18.60	-18.90	-18.90
CAL YR 1989			MEAN	-17.86		HIGH	-19.70		LOW	-15.50		
			[Negative value indicates water level above land surface]									

Figure 56.--Water level in observation well 33E027, Camden County.

304942082213801 Local number, 27E004.

LOCATION.--Lat 30°49'43", long 82°21'38", Hydrologic Unit 03110201, end of Ga. Highway 177, east of Stephen C. Foster State Park.

Owner: U.S. Geological Survey test well OK-9.

AQUIFER.--Upper Floridan

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 700 ft, cased to 498 ft, open hole.

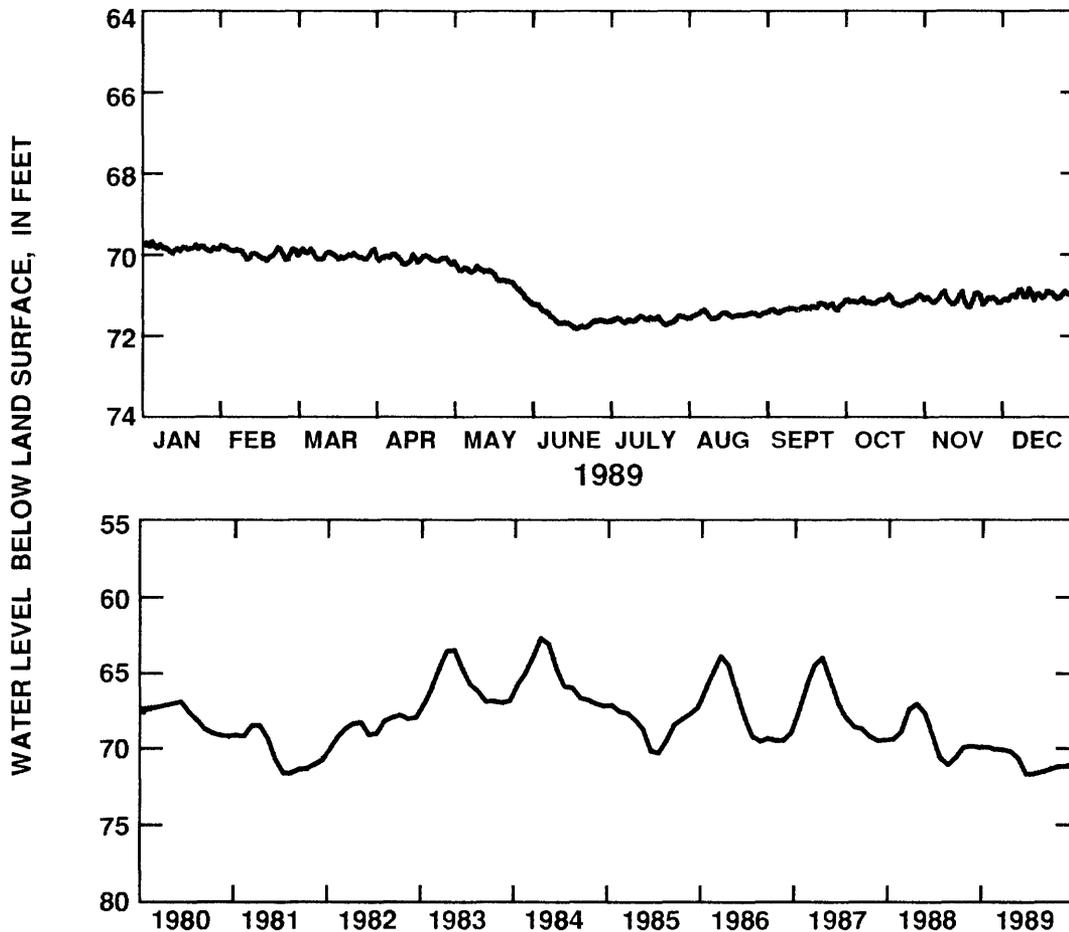
DATUM.--Altitude of land-surface datum is 116 ft.

Measuring point: Top of recorder shelf, 4.3 ft above land-surface datum.

REMARKS.--Well drilled in May, 1978 to replace U.S. Geological Survey 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, 71.87 ft below land-surface datum, June 18, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	69.87	70.02	70.05	70.15	70.62	71.65	71.64	71.53	71.36	71.19	71.15	71.05
MAX	70.00	70.18	70.16	70.29	71.23	71.87	71.78	71.63	71.48	71.30	71.35	71.23
MIN	69.72	69.85	69.90	70.04	70.22	71.27	71.56	71.41	71.25	71.04	70.96	70.89
CAL YR 1989			MEAN	70.86		HIGH	69.72		LOW	71.87		

Figure 57.--Water level in observation well 27E004, Charlton County.

311007081301701 Local number, 33H127.

LOCATION.--Lat 31°10'06", long 81°30'16", Hydrologic Unit 03070203, in south corner of Greenwood Cemetery, in Brunswick.

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

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.

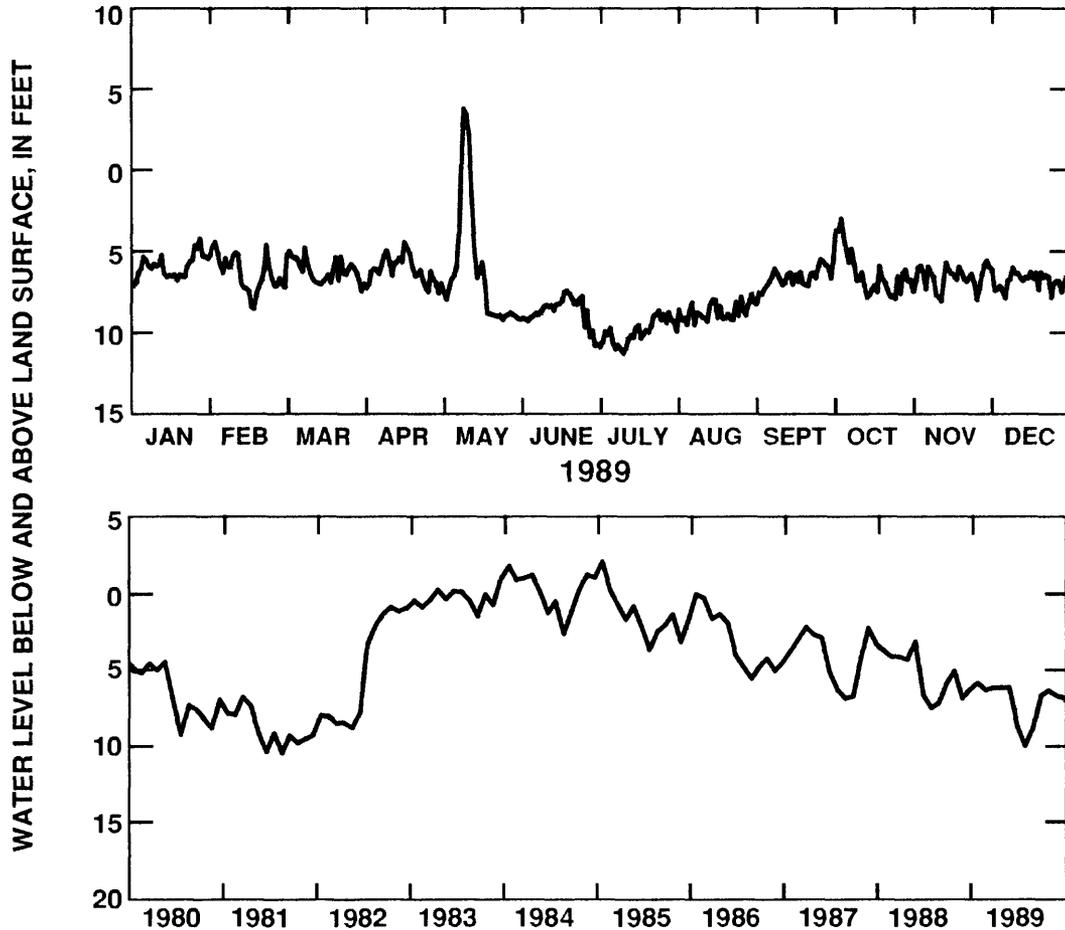
Measuring point: Top of recorder shelf, 8.00 ft above land-surface datum.

REMARKS.--Water levels for periods of missing record, May 20 to June 10, and June 27 to July 13, were estimated.

Well pumped and sampled for analysis of chloride concentration semi-annually.

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, 11.19 ft below land-surface datum, July 14, 1977.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	5.86	6.33	6.18	6.17	6.18	8.68	9.99	8.80	6.70	6.37	6.72	6.87
MAX	6.96	8.51	7.44	7.57	9.20	10.81	11.18	9.97	8.28	7.98	8.14	7.96
MIN	4.20	4.42	4.74	4.46	-3.88	7.45	8.68	7.71	5.56	3.03	5.66	6.06
CAL YR 1989	MEAN 7.08				HIGH -3.88				LOW 11.18			
[Negative value indicates water level above land surface]												

Figure 58.--Water level in observation well 33H127, Glynn County.

311007081301702 Local number, 33H133.

LOCATION.--Lat 31°10'08", long 81°30'16", Hydrologic Unit 03070203, in south corner of Greenwood Cemetery, in Brunswick.

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

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.

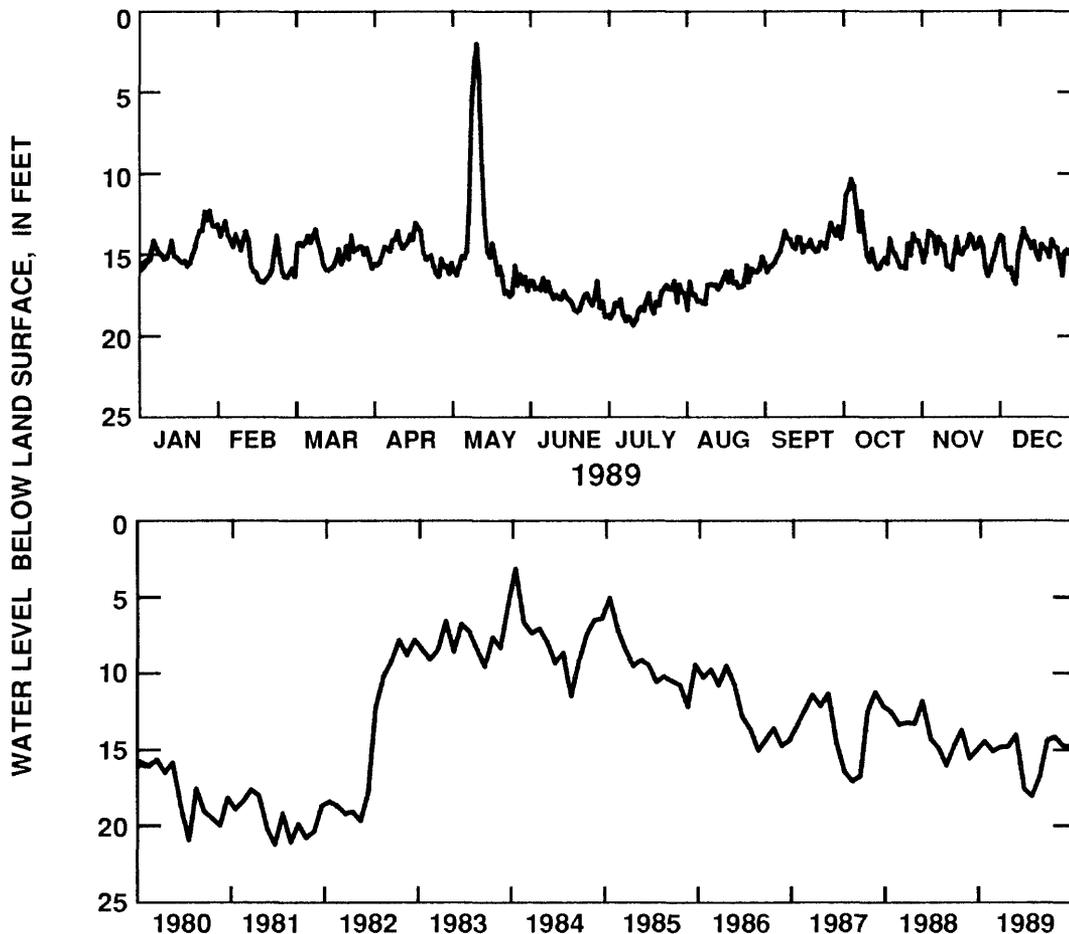
DATUM.--Altitude of land-surface datum is 6.7 ft.

Measuring point: Top of recorder shelf, 5.1 ft above land-surface datum.

REMARKS.--Well pumped and sampled for analysis of chloride concentration semi-annually. Borehole geophysical survey conducted September 26, 1977.

PERIOD OF RECORD.--January 1963 to current year.

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



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	14.46	15.15	14.86	14.81	14.05	17.58	18.07	16.79	14.45	14.19	14.77	14.89
MAX	15.71	16.70	16.34	16.38	17.59	18.83	19.35	18.43	16.09	15.92	16.38	16.87
MIN	12.24	12.89	13.40	12.99	1.87	16.47	16.66	15.17	13.07	10.35	13.56	13.44
CAL YR 1989			MEAN	15.34		HIGH	1.87		LOW	19.35		

Figure 59.--Water level in observation well 33H133, Glynn 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 included in this report (figs. 60-62). The water level in wells tapping the Lower Floridan aquifer in this area primarily is influenced by pumping from the Floridan aquifer system. This response is shown on the hydrographs for wells 34H391 (fig. 61) and 33J044 (fig. 62). Partial industrial shutdowns in pumping from the Floridan aquifer system during May resulted in sharp rises in water level in the two wells. The two wells also show a downward trend in water levels since 1983 similar to that observed in the Upper Floridan aquifer. The mean water level in well 34H391 was 1.7 ft lower in 1989 than in 1988, and in well 33J044 the mean water level was 1.4 ft lower.

Claiborne Aquifer

The water level in the Claiborne aquifer is monitored in 22 wells, records from 11 are included in this report (figs. 63-74). Water levels in the aquifer are affected primarily by precipitation and by local and regional pumping. During 1985, the aquifer supplied 62 Mgal/d, primarily for industrial and agricultural uses (Pierce and Kundell, 1990, p. 219). The water level generally is highest during winter and spring rainy seasons, and lowest in the fall following the summer irrigation season.

November 1989 water-level measurements from 88 wells tapping the Claiborne aquifer were used to construct a water-level map (fig. 63). This map indicates that a cone of depression is centered at Albany. The configuration of the water-level surface showed little change during 1988-89. However, a cone of depression at Cordele, Crisp County, formed as a result of localized pumping during 1989.

During 1989, the water levels in seven wells (11L001, 12L019, 06K010, 09G001, 09M009, 14P015, and 15R007, figs 64-70) continued to recover from the effects of the 1986 drought. In these seven wells, the mean water level was from 0.1 to 2.7 ft higher in 1989 than 1988, which is attributed to decreased regional pumping and above-normal precipitation. (See precipitation graph for Albany, figure 8.) In four wells (13L011, 11K002, 11P015, and 13M005, figs. 71-74), the mean water level was from 0.2 to 0.9 ft lower in 1989 than in 1988. The lower water levels in the four wells are attributed to localized decreased precipitation and increased pumping. Although water levels in the four wells were lower in 1989 than 1988, the overall trend during 1986-89 has been upward.

Clayton Aquifer

Water-level fluctuations and trends in the Clayton aquifer are monitored in 12 wells, records from eight are included in this report (figs. 75-83). Water levels in the aquifer are affected primarily by seasonal changes in local and regional pumping. During 1985, the aquifer supplied more than 33 Mgal/d, primarily for agricultural use (Pierce and Kundell, 1990, p. 219). Pumping from the Clayton aquifer has resulted in the development of a cone of depression centered at Albany (fig. 75).

During November 1989, water levels were measured in 74 wells tapping the Clayton aquifer. From these measurements, a water-level map was constructed showing the configuration of the water-level surface (fig. 75). The areal extent of the cone of depression at Albany was smaller in November 1989 than during 1988, which may be the result of a reduction in pumping in that area. In addition, the mean water levels in seven of the wells (wells 14P014, 07N001, 09M007, 09N001, 11L002, 13L002, and 06K009, figs. 76-82) were from 1.1 to 10.8 ft higher in 1989 than in 1988.

At well 11K005 (fig. 83) southwest of Albany, the mean water level was 1.4 ft lower in 1989 than in 1988, and a record low water level was measured in February 1989. The water level continued to decline in this area.

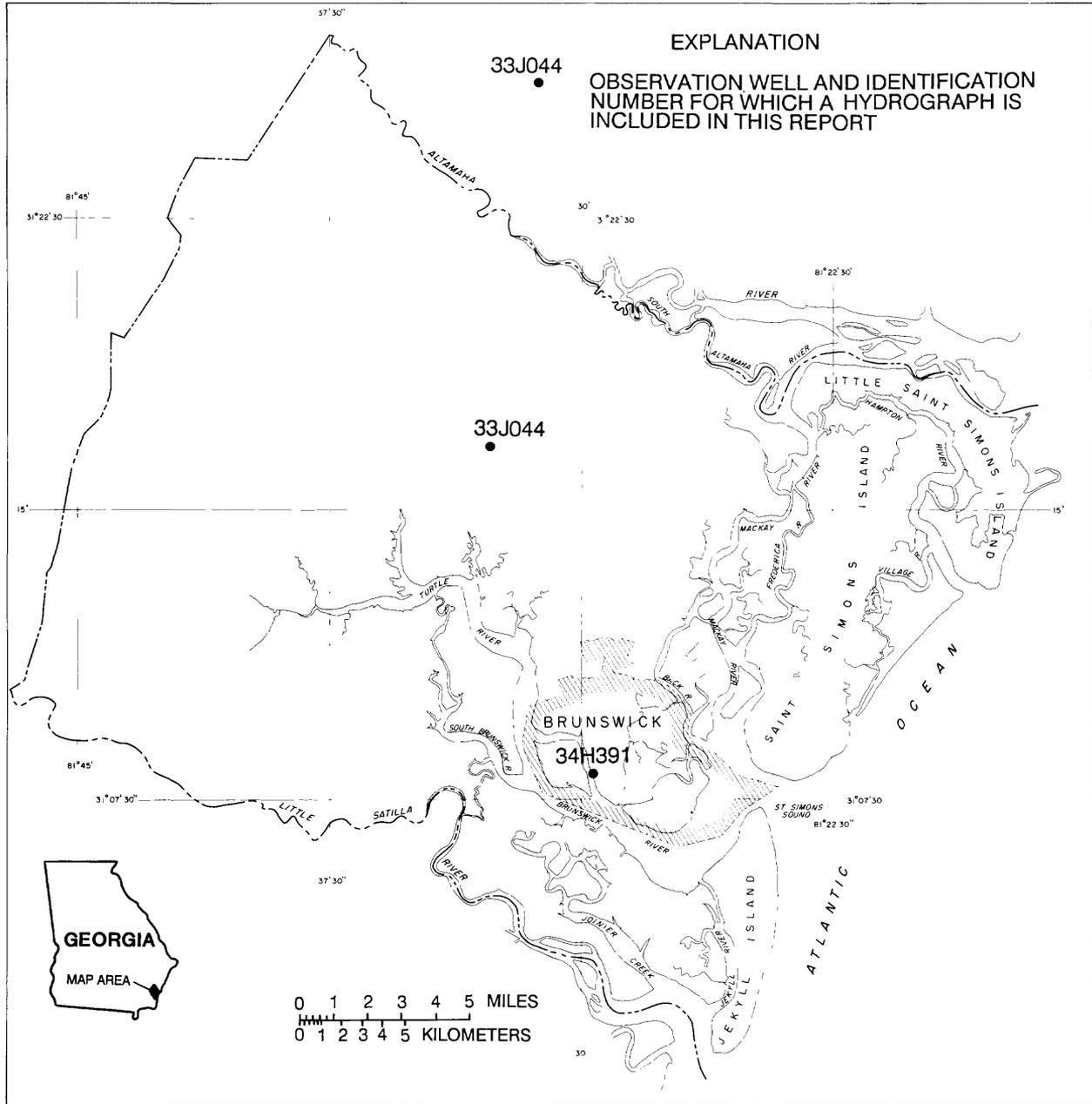


Figure 60.--Locations of observation wells completed in the Lower Floridan aquifer.

310818081294201 Local number, 34H391.

LOCATION.--Lat 31°08'18", long 81°29'42", Hydrologic Unit 03070203, located near intersection of Albermarle Street and Bay Street, in Brunswick.

Owner: U.S. Geological Survey test well 16.

AQUIFER.--Lower Floridan

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 1,150 ft, cased to 1,070 ft, open hole.

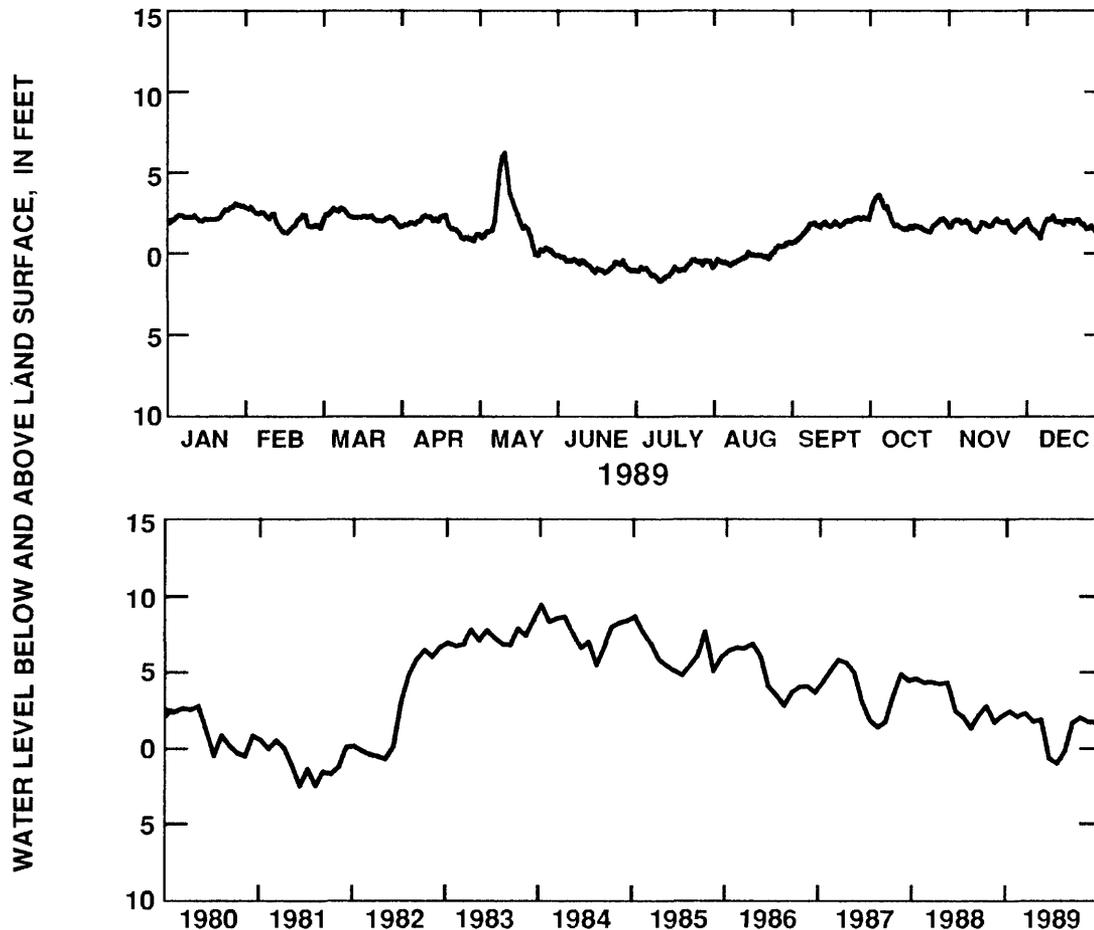
DATUM.--Altitude of land-surface datum is 7.13 ft.

Measuring point: Top of recorder shelf, 12.5 ft above land-surface datum.

REMARKS.--Well pumped and sampled for analysis of chloride concentration semi-annually. Water levels for periods of missing record, January 1-4, February 13-19, February 24 to March 1, May 15-18, June 5-30, and October 2-5, were estimated.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	-2.47	-2.12	-2.34	-1.78	-1.92	.65	.97	.18	-1.71	-2.06	-1.76	-1.75
MAX	-2.03	-1.34	-1.65	-.82	.10	1.17	1.68	.88	-.63	-1.32	-1.30	-.89
MIN	-3.17	-2.95	-2.89	-2.42	-6.33	.10	.40	-.68	-2.23	-3.65	-2.12	-2.29
CAL YR 1989	MEAN			-1.34	HIGH			-6.33	LOW			1.68

[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, 1.2 mi east of Sterling, off Ga. Highway 99 at the Brunswick Pulp and Paper Company, Sterling Wood Products Division.

Owner: Brunswick Pulp and Paper Co., USGS test well 27.

AQUIFER.--Lower Floridan

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.

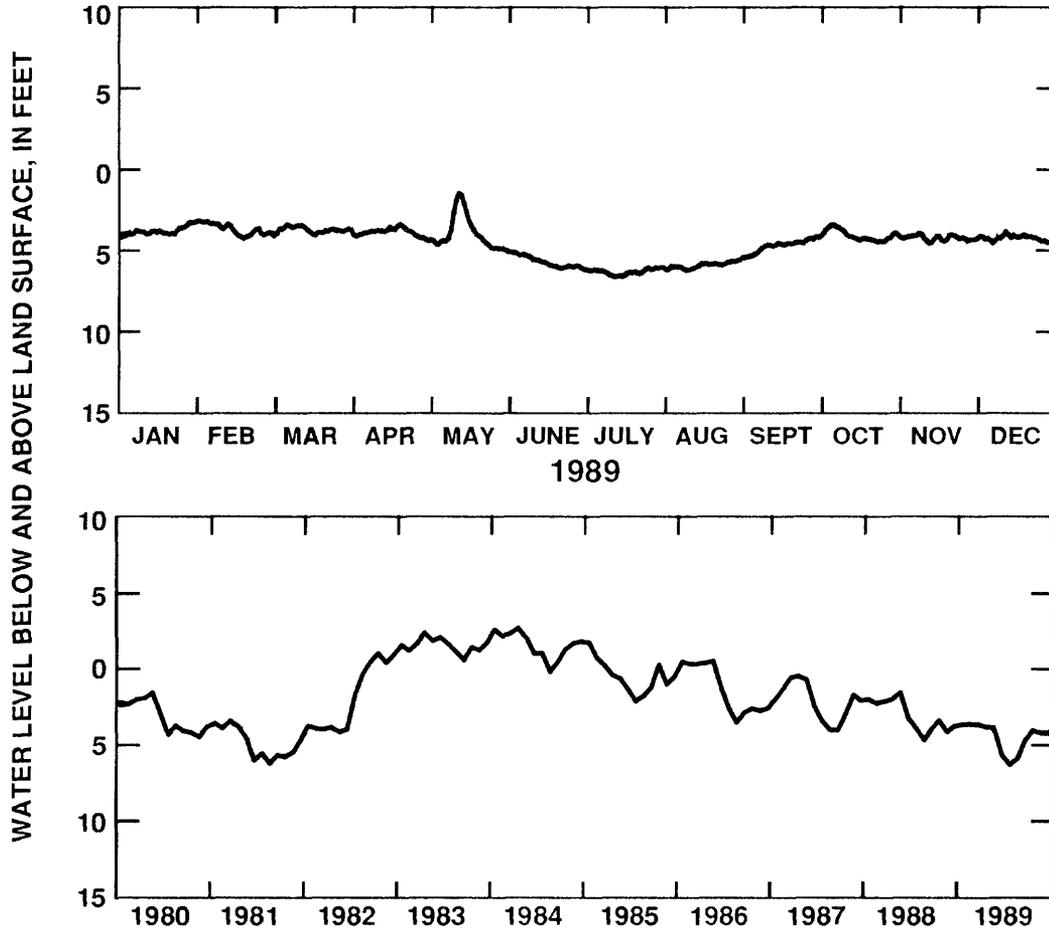
DATUM.--Altitude of land-surface datum is 20 ft.

Measuring point: Top of recorder shelf, 9.5 ft above land-surface datum.

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, 6.63 ft below land-surface datum, July 12, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	3.68	3.66	3.67	3.83	3.90	5.70	6.33	5.92	4.70	4.07	4.25	4.26
MAX	3.99	4.21	4.05	4.37	4.99	6.17	6.63	6.24	5.43	4.48	4.57	4.59
MIN	3.10	3.14	3.35	3.33	1.41	5.08	6.06	5.46	4.16	3.41	3.97	3.87
CAL YR 1989			MEAN	4.50		HIGH	1.41		LOW	6.63		

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

313530084203202 Local number, 11L001.

LOCATION.--Lat 31°35'30", long 84°20'34", Hydrologic Unit 03130008, Tallahassee Plantation, 1.3 mi north of Ga. Highway 234, 10.4 mi west of Albany.

Owner: U.S. Geological Survey test well 4.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 251 ft, cased to 233 ft, screen to 251 ft.

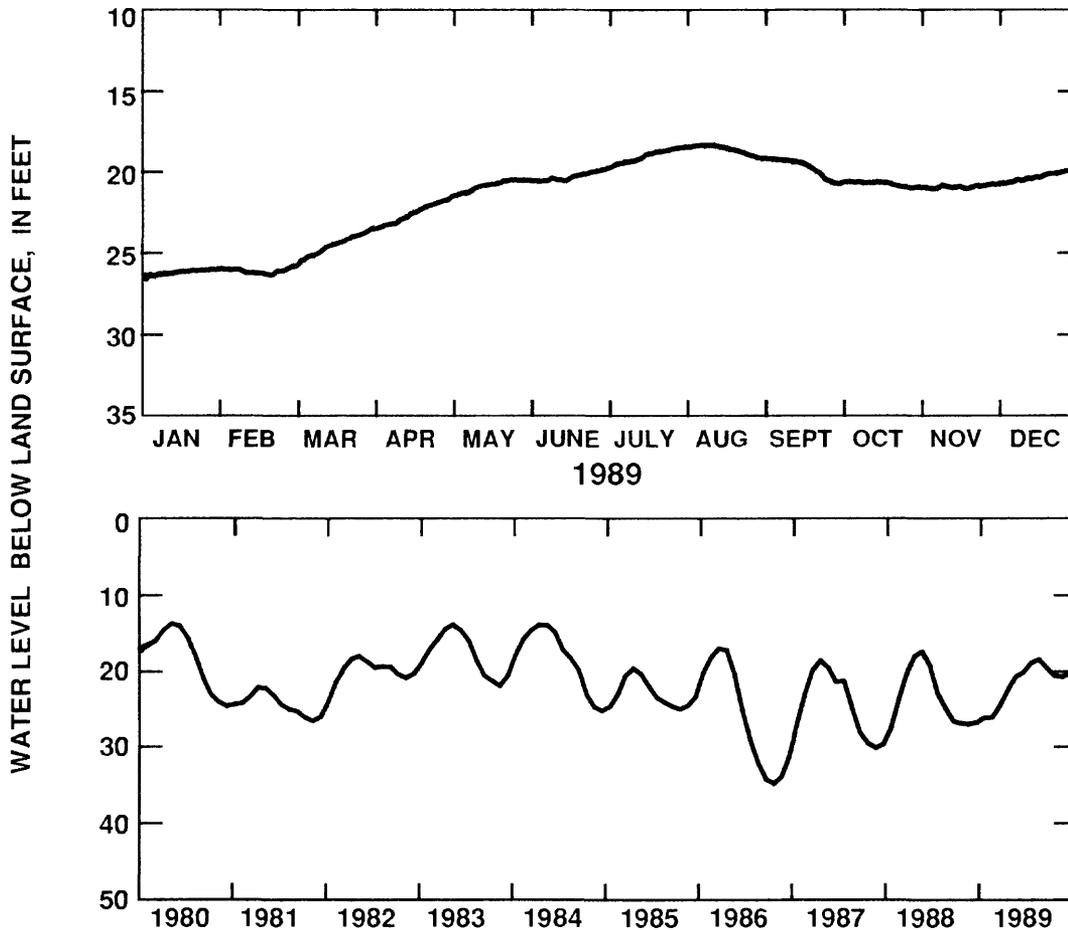
DATUM.--Altitude of land-surface datum is 220 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 14, 1988.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	26.17	26.11	24.52	22.55	20.81	20.24	18.99	18.57	19.69	20.70	20.87	20.26
MAX	26.43	26.34	25.79	23.46	21.47	20.52	19.70	19.13	20.69	20.94	20.99	20.71
MIN	25.98	25.79	23.45	21.63	20.44	19.75	18.42	18.29	19.11	20.56	20.71	19.61
CAL YR 1989			MEAN	21.60		HIGH	18.29		LOW	26.43		

Figure 64.--Water level in observation well 11L001, Dougherty County.

313534084103001 Local number, 12L019.

LOCATION.--Lat 31°35'36", long 84°10'30", Hydrologic Unit 03130008, located in southwest corner of park, 500 ft east of intersection of Slappay Drive and Fifth Avenue.

Owner: U.S. Geological Survey test well 5.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 257 ft, cased to 241 ft, screen to 257 ft.

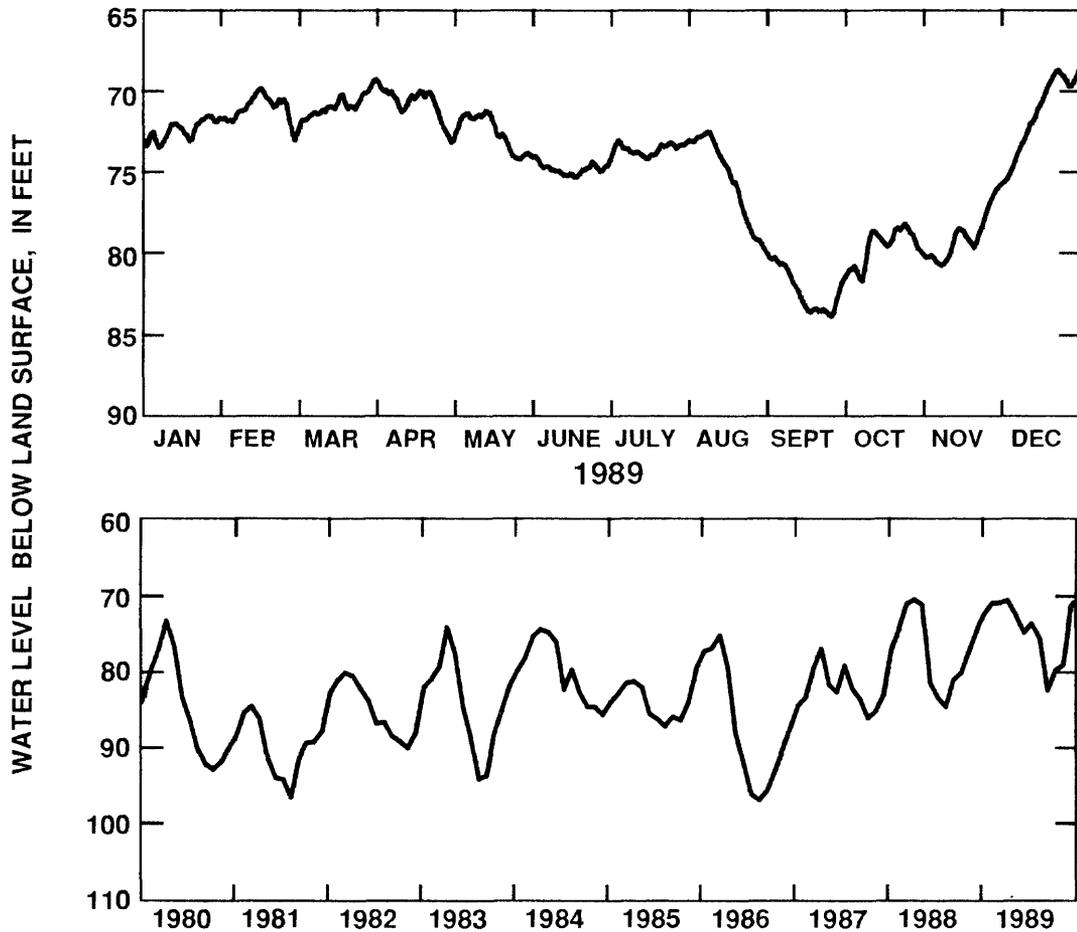
DATUM.--Altitude of land-surface datum is 198 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 15, 1988. Water levels for period of missing record, May 26 to June 21, were estimated.

PERIOD OF RECORD.--March 1978 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 68.63 ft below land-surface datum, December 31, 1989; lowest, 99.53 ft below land-surface datum, August 1-2, 1978.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	72.21	70.85	70.80	70.52	72.45	74.75	73.54	75.51	82.39	79.68	79.03	71.39
MAX	73.33	72.84	72.43	73.04	74.12	75.25	74.20	80.07	83.97	81.78	80.83	75.73
MIN	71.36	69.62	69.23	69.09	71.10	73.99	72.96	72.45	80.33	78.28	75.89	68.63
CAL YR 1989			MEAN	74.43		HIGH	68.63		LOW	83.97		

Figure 65.--Water level in observation well 12L019, Dougherty County.

312827084551503 Local number, 06K010.

LOCATION.--Lat 31°28'24", long 84°55'09", Hydrologic Unit 03130004, easternmost of two recorder wells, 300 yds north of the pool at Kolomoki Mounds State Park, 4.2 mi north of the city limits of Blakely, on Kolomoki Road.

Owner: Georgia Geologic Survey, Kolomoki Mounds State Park test well 3.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 140 ft, cased to 120 ft, screen to 140 ft.

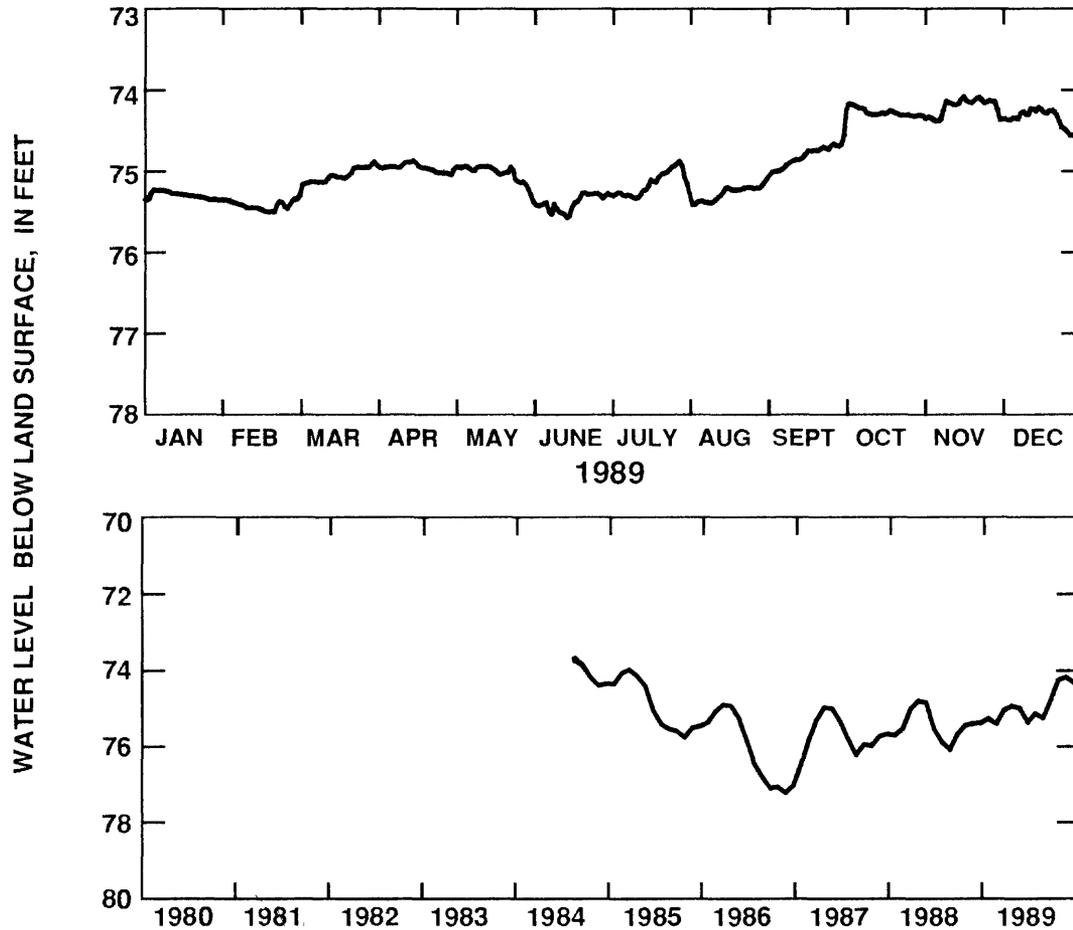
DATUM.--Altitude of land-surface datum is 310 ft.

Measuring point: Top of recorder shelf, 3.56 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 8, 1989.

PERIOD OF RECORD.--August 31, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.72 ft below land-surface datum, August 31, 1984; lowest, 77.35 ft below land-surface datum, November 14, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	75.30	75.43	75.07	74.96	75.02	75.39	75.16	75.28	74.82	74.28	74.21	74.36
MAX	75.35	75.50	75.34	75.04	75.30	75.58	75.34	75.42	75.05	74.33	74.39	74.58
MIN	75.22	75.34	74.88	74.87	74.94	75.27	74.88	75.10	74.57	74.17	74.09	74.23
CAL YR 1989			MEAN	74.94		HIGH	74.09		LOW	75.58		

Figure 66.--Water level in observation well 06K010, Early County.

310428084310501 Local number, 09G001.

LOCATION.--Lat 31°04'28", long 84°31'05", Hydrologic Unit 03130008, westernmost of two recorder wells, 2,500 ft east of Ga. highway 253, 0.2 mi south of the Decatur-Baker County line.

Owner: Earl Nichols, U.S. Geological Survey test well DP-4.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 455 ft, cased to 382 ft, open hole.

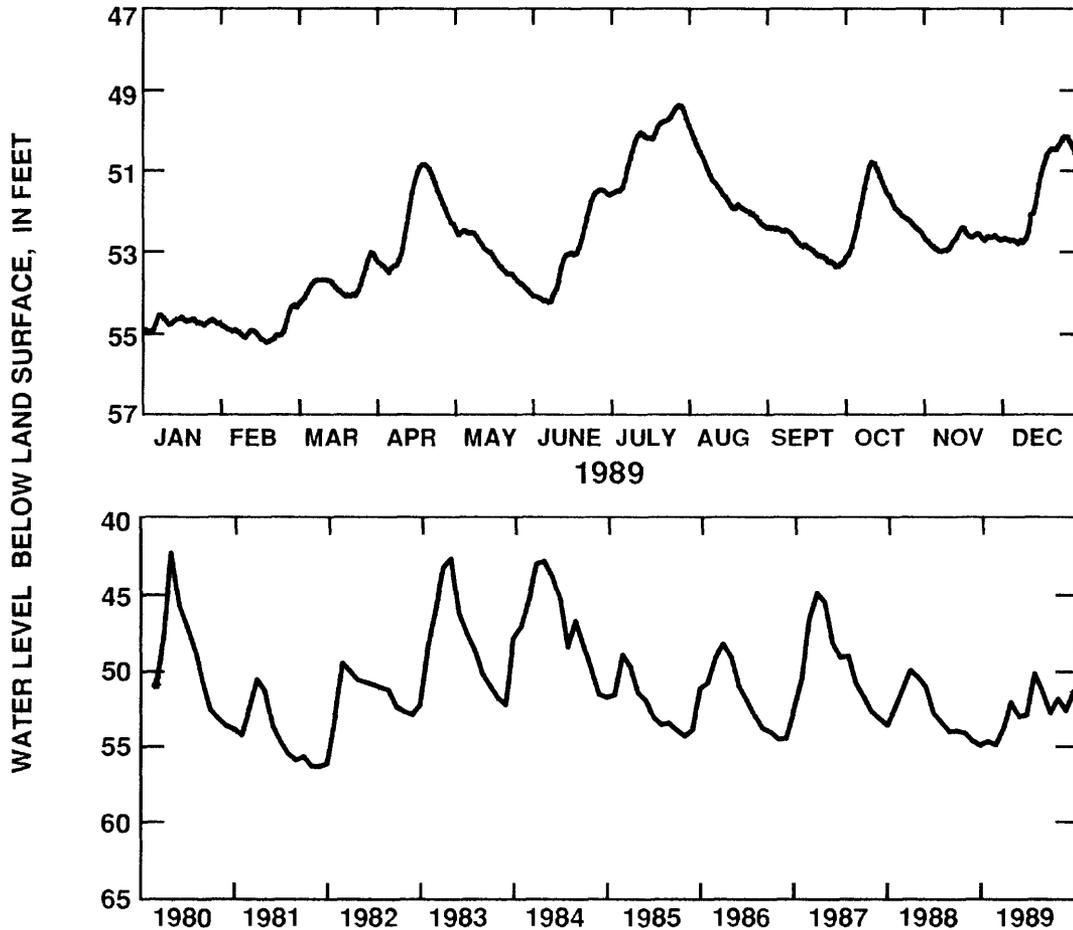
DATUM.--Altitude of land-surface datum is 145 ft.

Measuring point: Top of recorder shelf, 3.1 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 10, 1989.

PERIOD OF RECORD.--February 20, 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 41.3 ft below land-surface datum, April 8, 1980; lowest, 56.41 below land-surface datum, October 20, 1981.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	54.74	54.96	53.83	52.17	53.13	53.01	50.29	51.48	52.90	51.95	52.76	51.47
MAX	55.00	55.23	54.36	53.52	54.05	54.26	51.59	52.43	53.41	53.17	53.04	52.85
MIN	54.56	54.32	53.02	50.81	52.31	51.46	49.35	49.86	52.42	50.79	52.46	50.17
CAL YR 1989			MEAN	52.71		HIGH	49.35		LOW	55.23		

Figure 67.--Water level in observation well 09G001, Decatur County.

313953084361201 Local number, 09M009.

LOCATION.--Lat 31°39'52", long 84°36'10", Hydrologic Unit 03130009, easternmost of two observation wells, 0.2 mi east of Ga. Highway 41, 7.2 mi south of the intersection of U.S. Highway 82 and Ga. Highway 41 in Shellman.

Owner: C.T. Martin test well 1.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 94 ft, cased to 77 ft, screen to 94 ft.

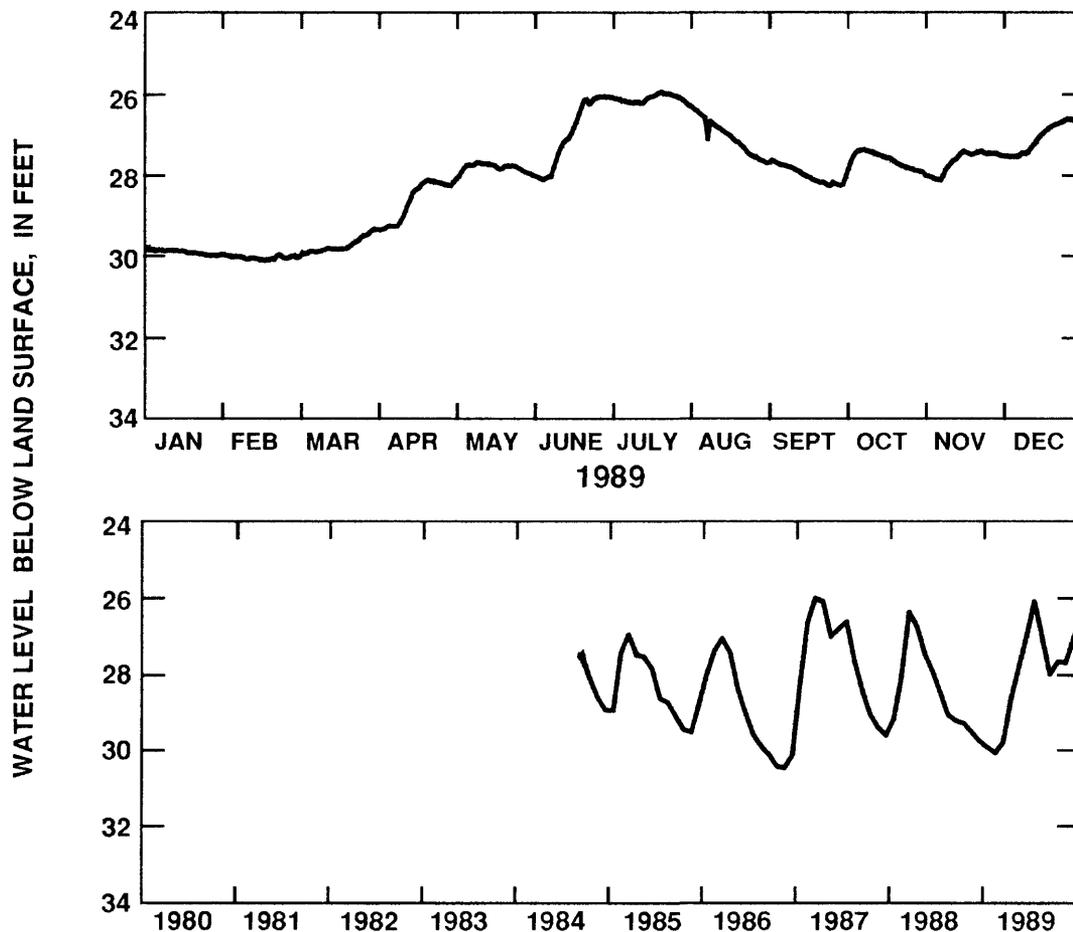
DATUM.--Altitude of land-surface datum is 322 ft.

Measuring point: Top of recorder shelf, 3.27 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 8, 1989.

PERIOD OF RECORD.--September 14, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.75 ft below land-surface datum, April 6, 1987; lowest, 30.50 ft below land-surface datum, November 3, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	29.92	30.07	29.79	28.67	27.83	27.02	26.11	27.05	28.02	27.68	27.71	27.12
MAX	30.01	30.13	30.06	29.37	28.17	28.13	26.24	27.73	28.29	28.08	28.17	27.60
MIN	29.83	29.99	29.35	28.13	27.70	26.06	25.95	26.30	27.66	27.40	27.45	26.62
CAL YR 1989			MEAN	28.07		HIGH	25.95		LOW	30.13		

Figure 68.--Water level in observation well 09M009, Randolph County.

315731083542302 Local number, 14P015.

LOCATION.--Lat 31°57'31", long 83°54'23", Hydrologic Unit 03130006, in the Georgia Veterans Memorial State Park, 500 ft east of park maintenance facility, about 7.5 mi west of Cordele on U.S. Highway 280.

Owner: Georgia Geologic Survey, Veterans Memorial State Park test well 2.

AQUIFER.-- Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 340 ft, cased to 240 ft, screen to 340 ft.

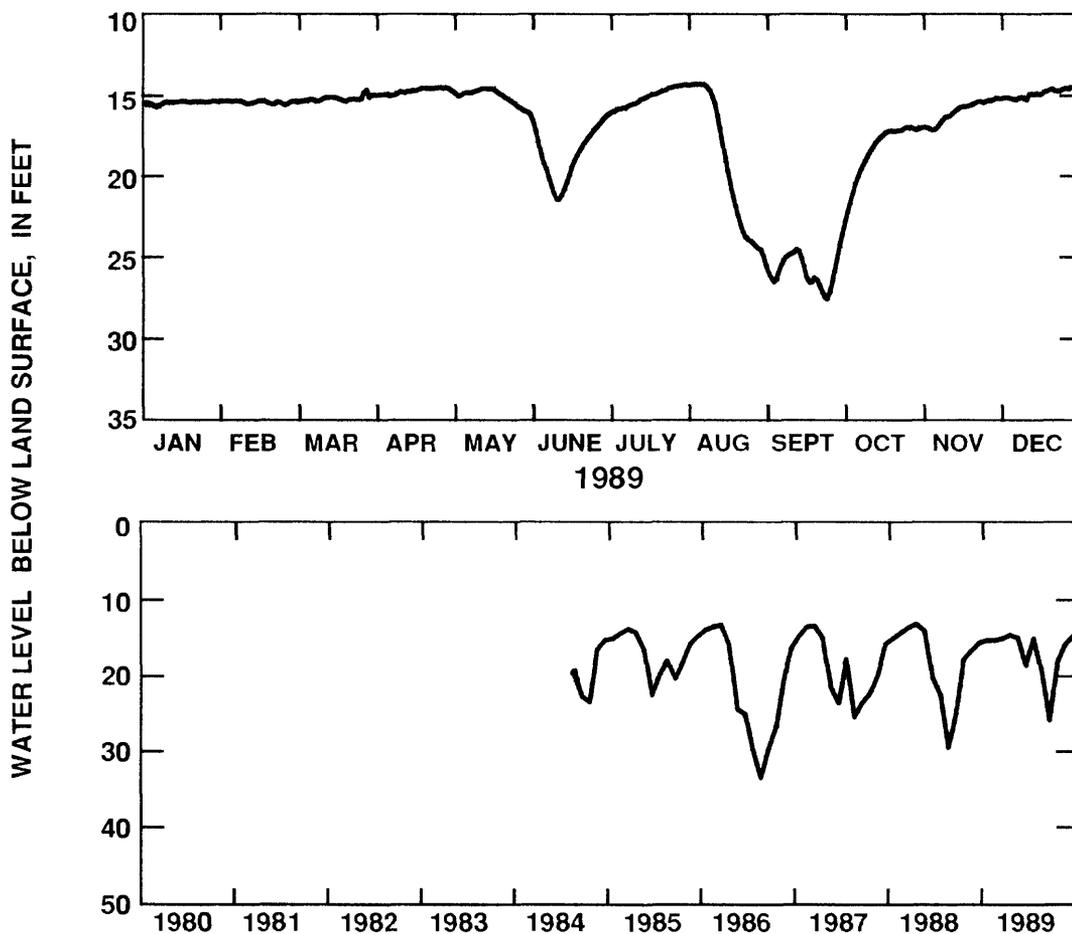
DATUM.--Altitude of land-surface datum is 252 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Aquifer test conducted on April 22, 1982. Well Pumped and sampled by Georgia Geologic Survey, March 22, 1989.

PERIOD OF RECORD.--August 30, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.97 ft below land-surface datum, March 9, 1987; lowest, 34.27 ft below land-surface datum, August 29, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	15.44	15.42	15.20	14.74	15.09	18.71	15.14	19.46	25.91	18.41	16.04	14.93
MAX	15.72	15.60	15.40	15.05	16.18	21.53	16.12	25.59	27.66	22.98	17.19	15.31
MIN	15.32	15.33	14.66	14.53	14.57	16.22	14.37	14.33	23.73	17.00	15.22	14.46
CAL YR 1989			MEAN	17.03		HIGH	14.33		LOW	27.66		

Figure 69.--Water level in observation well 14P015, Crisp County.

321110083462701 Local number, 15R007.

LOCATION.--Lat 32°11'10", long 83°46'27", Hydrologic Unit 03130006, southside of Horne Road, 3,300 ft southwest of intersection of Horne Road and U.S. Highway 41.

Owner: William Horne.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 330 ft, cased to 241 ft, screen from 241 to 309 ft, cased from 309 to 330 ft.

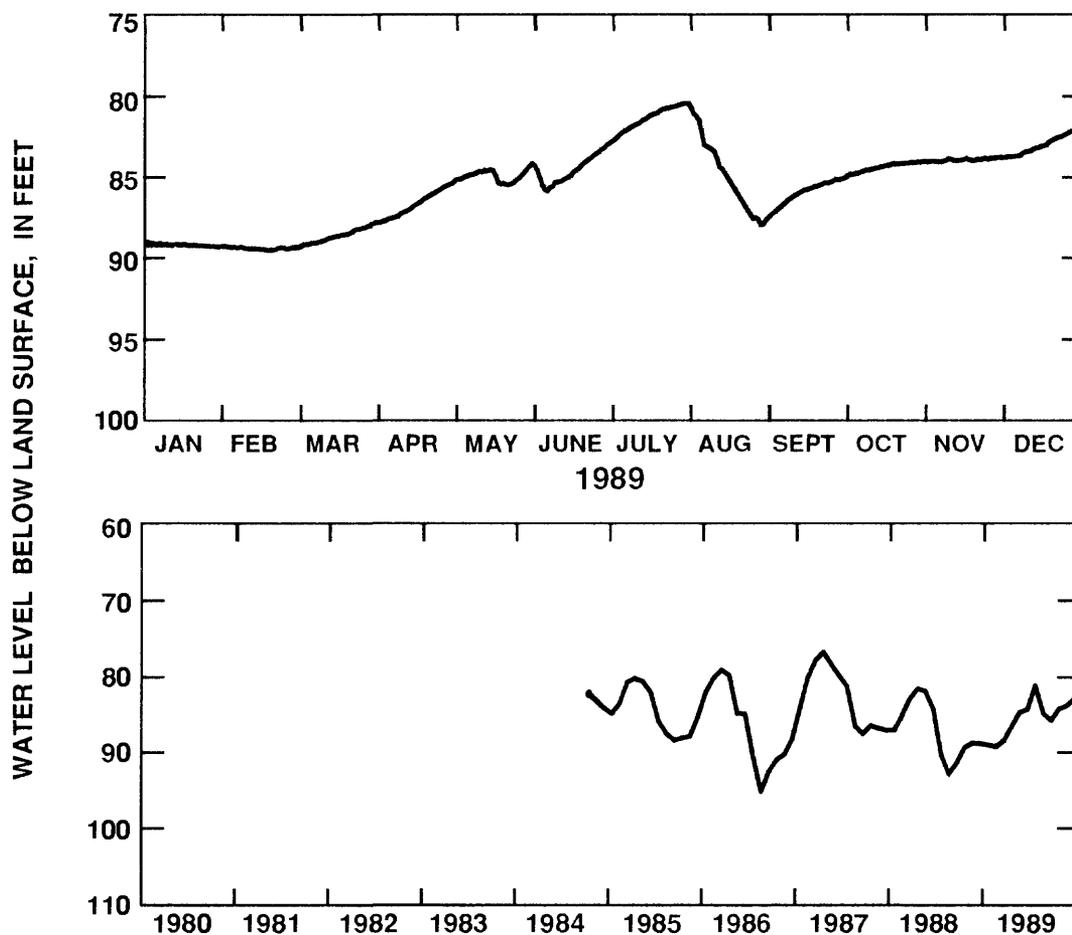
DATUM.--Altitude of land-surface datum is 412 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted May 6, 1982. Aquifer test conducted May 21, 1982. Water levels for periods of missing record, May 25 to June 5, and August 15-23, were estimated.

PERIOD OF RECORD.--October 1, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 76.71 ft below land-surface datum, April 17, 1987; lowest, 96.25 ft below land-surface datum, August 22, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	89.15	89.37	88.60	86.65	84.89	84.48	81.31	85.03	85.96	84.41	84.00	83.03
MAX	89.27	89.49	89.30	87.79	85.44	85.84	82.76	87.99	87.38	84.94	84.12	83.86
MIN	89.03	89.25	87.79	85.34	84.13	82.88	80.41	80.68	85.08	84.09	83.87	81.80
CAL YR 1989			MEAN	85.55		HIGH	80.41		LOW	89.49		

Figure 70.--Water level in observation well 15R007, Dooly County.

313105084064301 Local number, 13L011.

LOCATION.--Lat 31°31'05", long 84°06'43", Hydrologic Unit 03130008, about 6.5 mi southeast of Albany, east of U.S. Highway 19 on dirt road, 0.1 mi north of School Bus Road.

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.

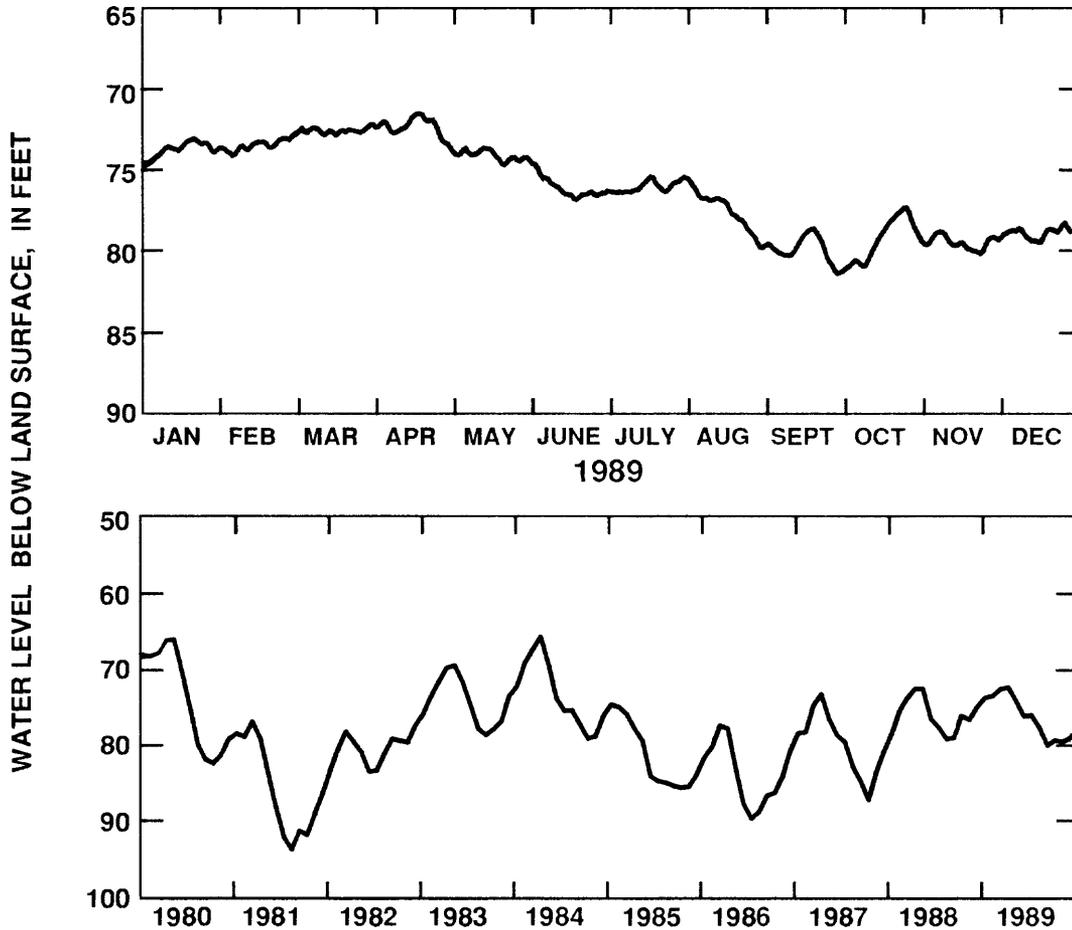
DATUM.--Altitude of land-surface datum is 195 ft.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	73.76	73.51	72.62	72.38	74.16	76.17	76.08	77.66	80.00	79.35	79.58	78.96
MAX	74.69	74.18	72.87	73.66	74.73	76.87	76.45	79.88	81.48	81.20	80.25	79.57
MIN	73.11	72.85	72.24	71.57	73.70	74.68	75.48	75.61	78.72	77.40	78.89	78.37
CAL YR 1989			MEAN	76.20		HIGH	71.57		LOW	81.48		

Figure 71.--Water level in observation well 13L011, Dougherty County.

312654084210102 Local number, 11K002.

LOCATION.--Lat 31°26'54", long 84°21'01", Hydrologic Unit 03130008, westernmost of two recorder wells, 50 ft east of logging road, 0.65 mi west and 0.65 mi south of main gate into St. Joe Paper Company woodland on Tarva Road, 3.6 mi south of Ga. Highway 62, about 12 mi west of Albany.

Owner: U.S. Geological Survey test well 11.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 320 ft, cased to 300 ft, screen to 320 ft.

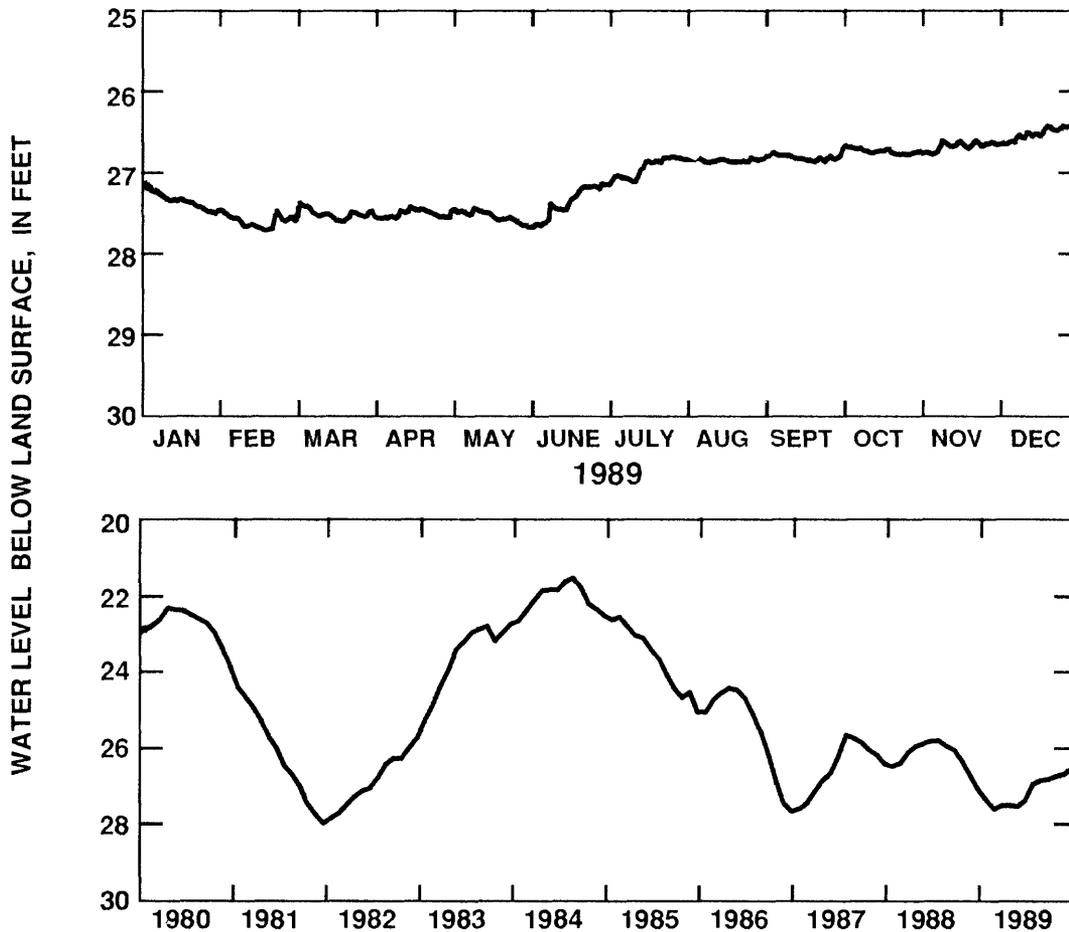
DATUM.--Altitude of land-surface datum is 183.5 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 11, 1980.

PERIOD OF RECORD.--May 16, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	27.35	27.60	27.51	27.51	27.53	27.38	26.94	26.84	26.81	26.73	26.67	26.51
MAX	27.50	27.71	27.60	27.56	27.67	27.67	27.14	26.87	26.86	26.77	26.77	26.65
MIN	27.15	27.47	27.37	27.42	27.44	27.13	26.80	26.81	26.75	26.66	26.60	26.29
CAL YR 1989			MEAN	27.11		HIGH	26.29		LOW	27.71		

Figure 72.--Water level in observation well 11K002, Dougherty County.

315353084192502 Local number, 11P015.

LOCATION.--Lat 31°53'50", long 84°19'21", Hydrologic Unit 03130007, easternmost of two observation wells, 4.2 mi west of the intersection of County Road 53 and U.S. Highway 19 in Smithville, 700 ft south of County Road 53.

Owner: Pete Long test well 2.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 151 ft, cased to 111 ft, screen to 151 ft.

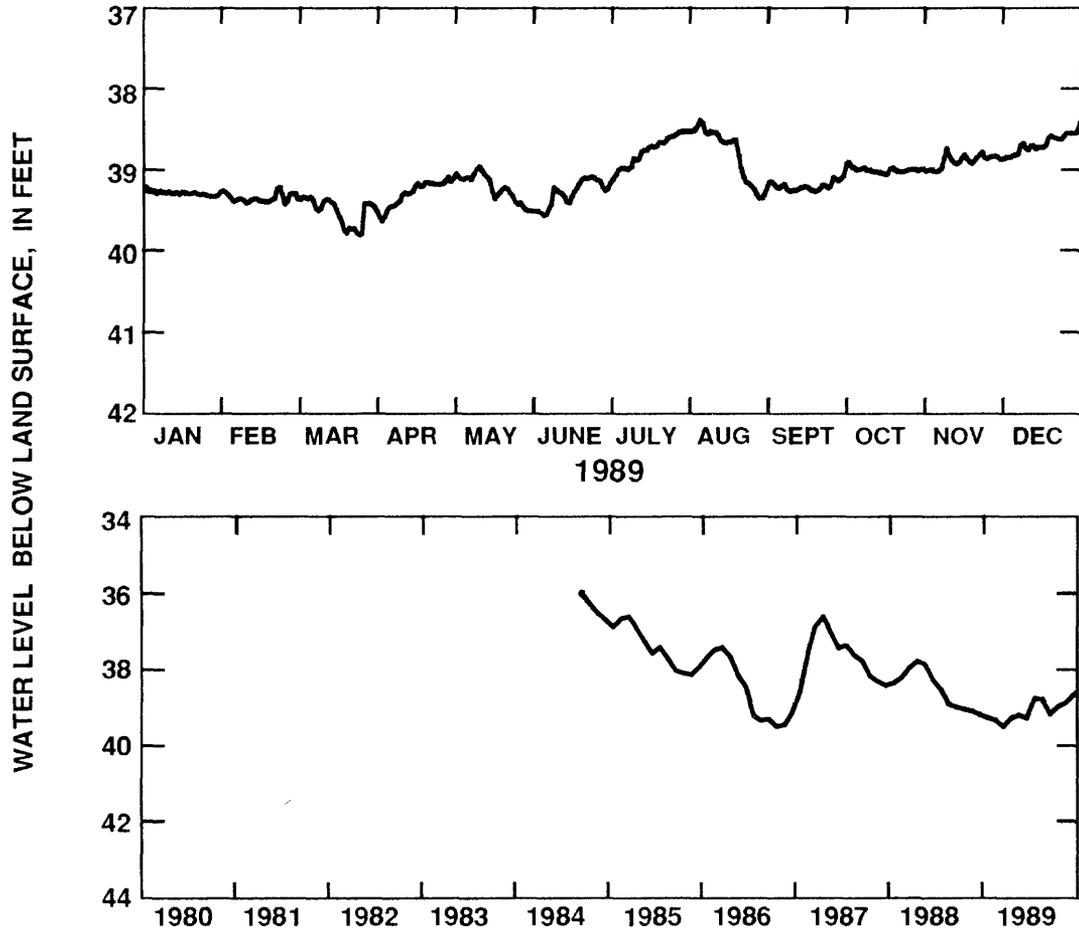
DATUM.--Altitude of land-surface datum is 338 ft.

Measuring point: Top of recorder shelf, 3.2 ft above land-surface datum .

REMARKS.--Well pumped and redeveloped August 7, 1989. Water levels for periods of missing record, February 23 to March 26, and October 10-16, were estimated.

PERIOD OF RECORD.--September 14, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 35.89 ft below land-surface datum, September 14, 1984; lowest, 39.66 ft below land-surface datum, October 28, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	39.29	39.35	39.47	39.30	39.22	39.30	38.78	38.80	39.20	39.01	38.90	38.69
MAX	39.33	39.43	39.63	39.64	39.51	39.57	39.17	39.35	39.27	39.06	39.03	38.87
MIN	39.24	39.22	39.34	39.09	38.96	39.09	38.53	38.39	39.08	38.91	38.74	38.46
CAL YR 1989			MEAN	39.11		HIGH	38.39		LOW	39.64		

Figure 73.--Water level in observation well 11P015, Lee County.

314330084005401 Local number, 13M005.

LOCATION.--Lat 31°43'30", long 84°00'54", Hydrologic Unit 03130006, easternmost of three observation wells, 50 ft north of Ga. Highway 32, 1,400 ft east of the Flint River, 1.7 mi east of the intersection of Ga. Highway 32 and Ga. Highway 91.

Owner: U.S. Geological Survey test well DP-7.

AQUIFER.--Claiborne.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 345 ft, cased to 330 ft, screen to 345 ft.

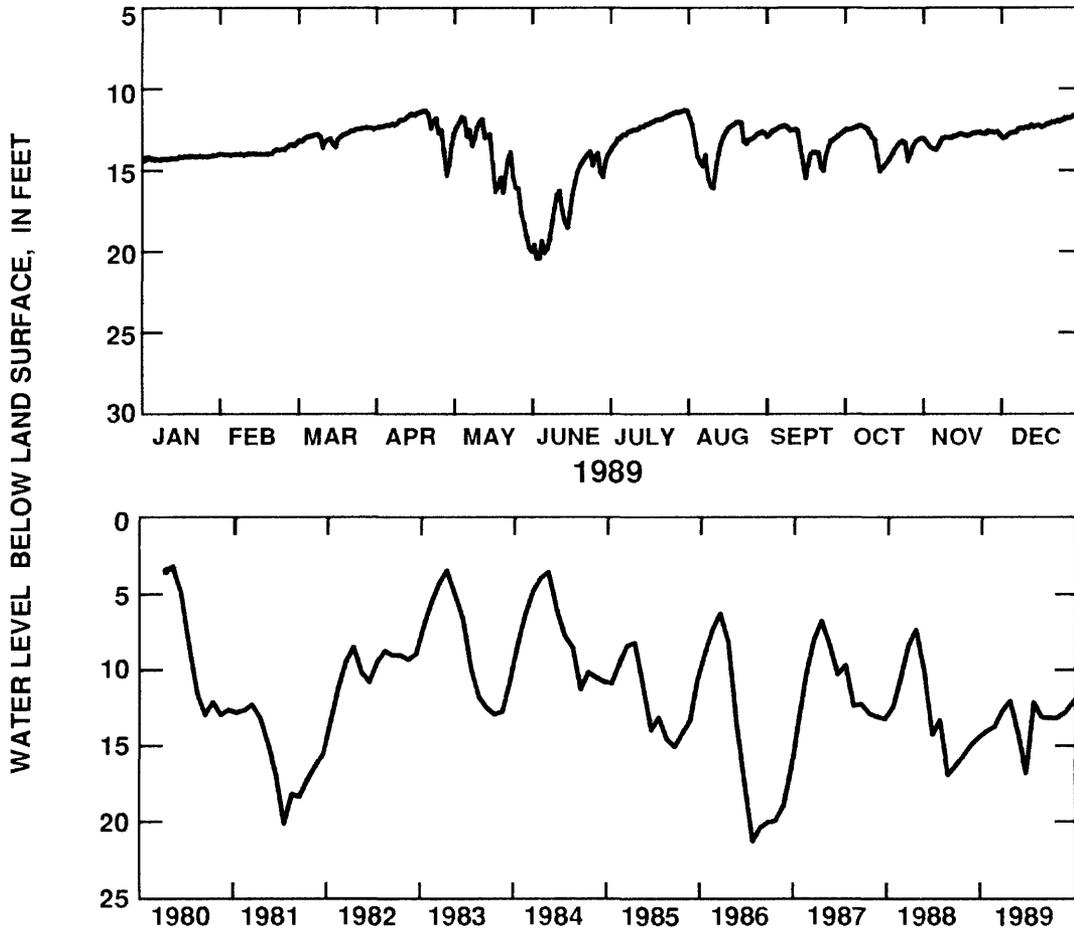
DATUM.--Altitude of land-surface datum is 230 ft.

Measuring point: Top of recorder shelf, 3.13 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 16, 1982.

PERIOD OF RECORD.--April 22, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	14.08	13.78	12.77	12.13	14.29	16.80	12.21	13.20	13.25	13.26	12.93	12.25
MAX	14.21	13.95	13.50	15.24	19.71	20.40	13.97	16.04	15.45	15.04	13.71	13.00
MIN	13.87	13.31	12.25	11.23	11.62	13.77	11.21	11.23	12.20	12.20	12.60	11.47
CAL YR 1989			MEAN	13.41		HIGH	11.21		LOW	20.40		

Figure 74.--Water level in observation well 13M005, Worth County.



Figure 75.--Water levels and locations of observation wells completed in the Clayton aquifer, November 1989.

315731083542301 Local number, 14P014.

LOCATION.--Lat 31°57'31", long 83°54'23", Hydrologic Unit 03130006, in the Georgia Veterans Memorial State Park, 500 ft east of park maintenance facility, about 7.5 mi west of Cordele on U.S. Highway 280.

Owner: Georgia Geologic Survey, Veterans Memorial Park test well 1.

AQUIFER.--Clayton.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 550 ft, cased to 500 ft, open hole.

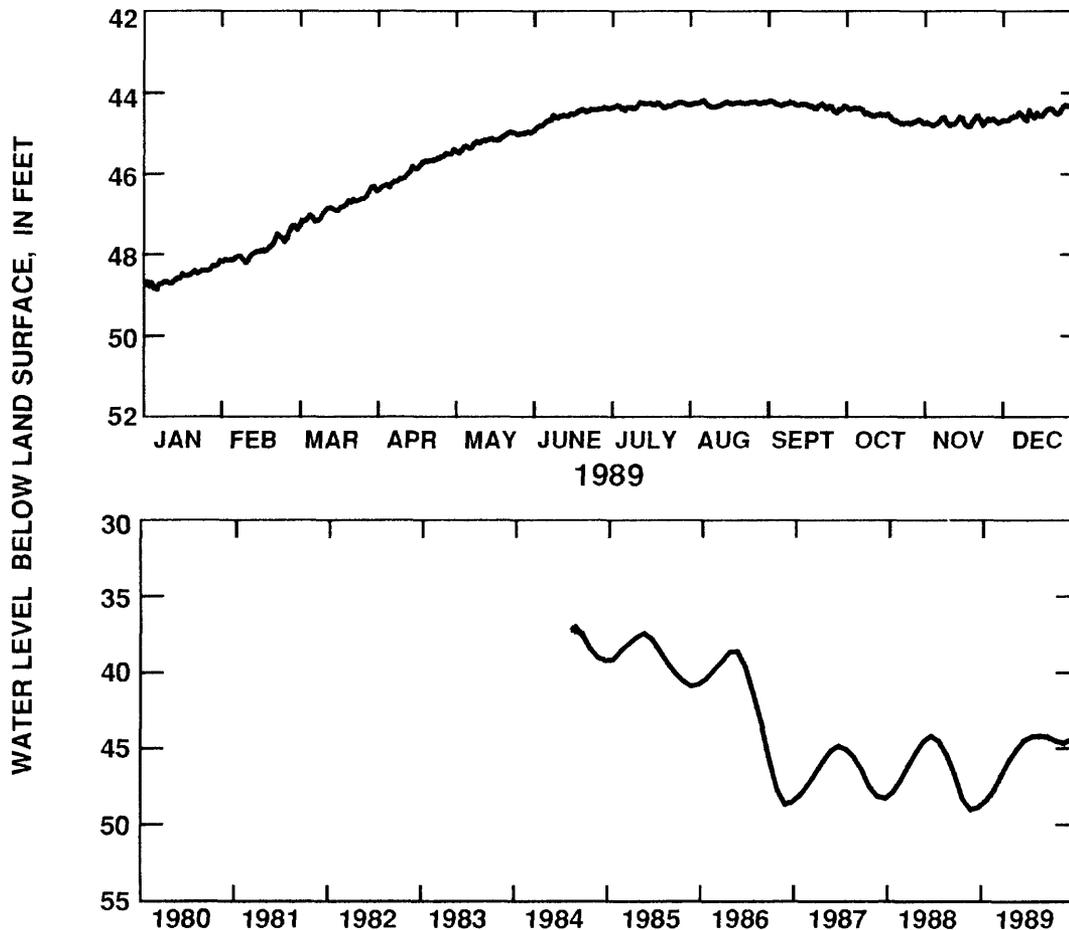
DATUM.--Altitude of land-surface datum is 252 ft.

Measuring point: Top of recorder shelf, 3.1 ft above land-surface datum.

REMARKS.--Well pumped May 20, 1982. Borehole geophysical survey conducted February 22, 1982.

PERIOD OF RECORD.--September 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	48.50	47.82	46.82	45.89	45.13	44.53	44.28	44.24	44.30	44.56	44.72	44.50
MAX	48.83	48.18	47.34	46.40	45.45	44.93	44.40	44.33	44.48	44.76	44.83	44.72
MIN	48.12	47.25	46.28	45.46	44.93	44.33	44.21	44.17	44.17	44.31	44.57	44.16
CAL YR 1989			MEAN	45.43		HIGH	44.16		LOW	48.83		

Figure 76.--Water level in observation well 14P014, Crisp County.

314602084473701 Local number, 07N001.

LOCATION.--Lat 31°46'09", long 84°47'43", Hydrologic Unit 03110204, south of intersection of College and Andrew Streets, 200 ft southwest of Cuthbert city supply well, near electric substation.

Owner: City of Cuthbert.

AQUIFER.--Clayton.

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

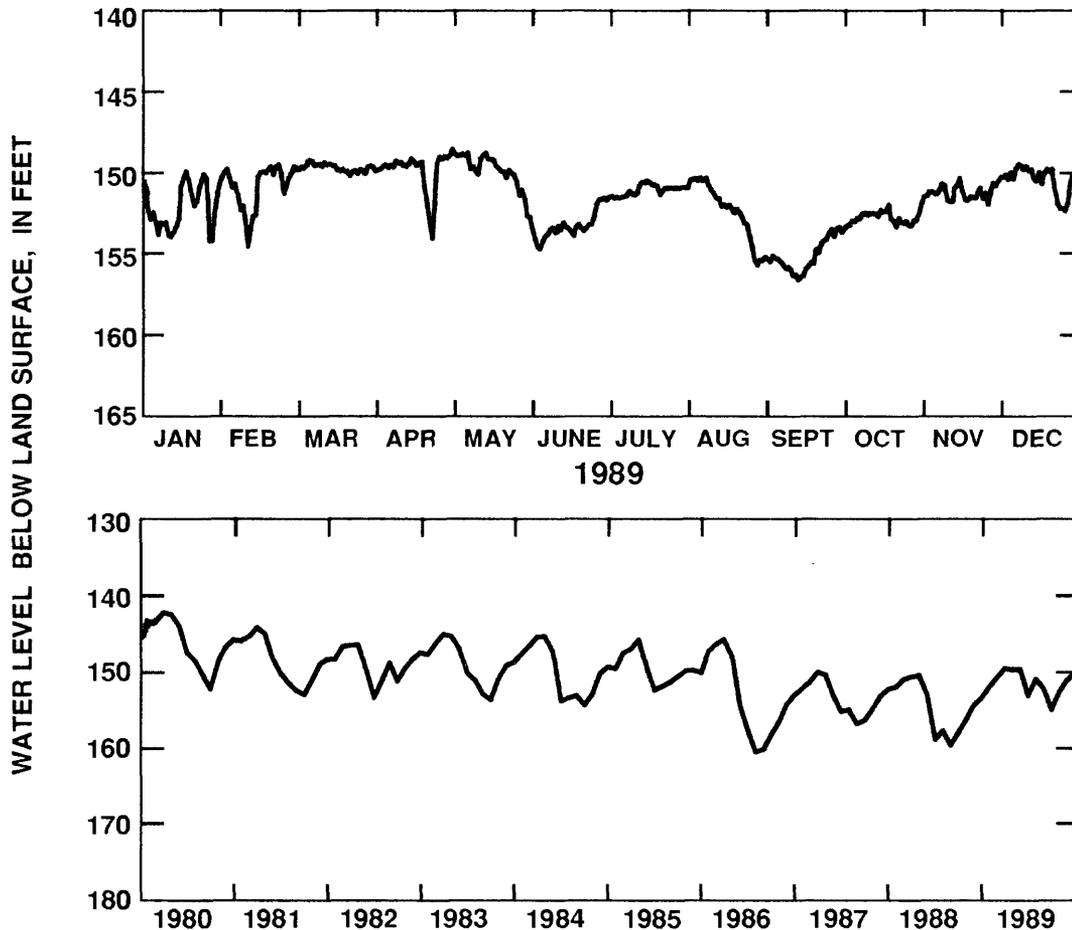
DATUM.--Altitude of land-surface datum is 460 ft.

Measuring point: Top of recorder shelf, 3.30 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 8, 1989. Well near city wells. Water levels for period of missing record, January 16 to February 6, were estimated.

PERIOD OF RECORD.--January 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 132.0 ft below land-surface datum, December 10, 1967; lowest, 162.08 ft below land-surface datum, August 4, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	152.09	150.86	149.67	149.89	149.84	153.28	151.07	152.35	155.18	152.82	151.26	150.44
MAX	154.22	154.57	150.17	154.06	152.76	154.72	151.57	155.73	156.63	153.48	151.99	152.40
MIN	149.89	149.47	149.20	148.92	148.55	151.56	150.49	150.33	153.42	151.91	150.37	149.34
CAL YR 1989			MEAN	151.56		HIGH	148.55		LOW	156.63		

Figure 77.--Water level in observation well 07N001, Randolph County.

313953084361202 Local number, 09M007.

LOCATION.--Lat 31°39'52", long 84°36'12", Hydrologic Unit 03130009, westernmost of two observation wells, 0.2 mi east of Ga. Highway 41, 7.2 mi south of the intersection of U.S. Highway 82 and Ga. Highway 41 in Shellman.

Owner: C.T. Martin test well 2.

AQUIFER.--Clayton.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 430 ft, cased to 356 ft, open hole.

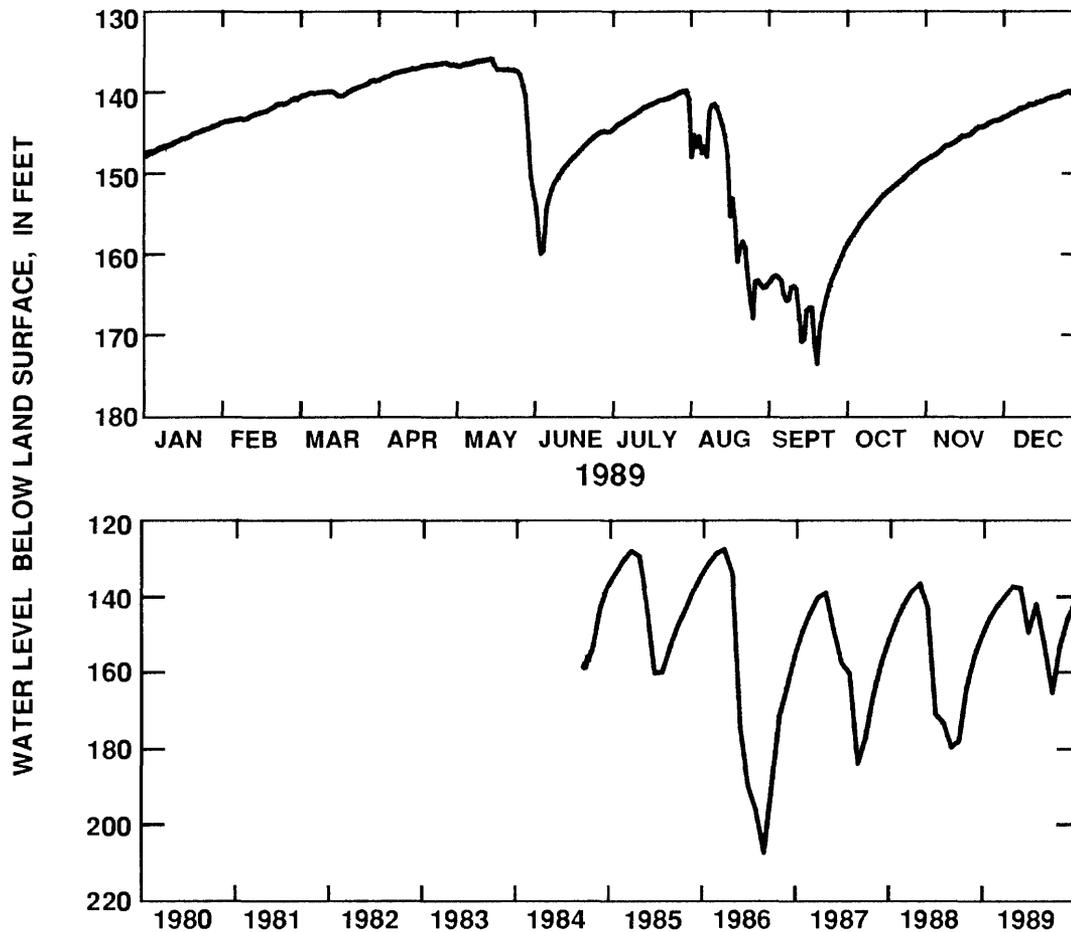
DATUM.--Altitude of land-surface datum is 322 ft.

Measuring point: Top of recorder shelf, 3.25 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted April 15, 1980. Aquifer test conducted April 4, 1982. Well pumped and redeveloped August 8, 1989.

PERIOD OF RECORD.--September 14, 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 126.55 ft below land-surface datum, March 27, 1986; lowest, 212.90 ft below land-surface datum, July 23, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	145.69	142.40	139.85	137.19	137.58	149.47	141.88	152.65	165.36	153.06	145.59	141.13
MAX	147.68	143.58	140.80	138.57	150.32	159.96	144.81	167.97	173.52	159.15	148.37	143.15
MIN	143.70	140.77	138.51	136.32	135.86	144.78	139.73	140.72	159.93	148.51	143.31	139.23
CAL YR 1989			MEAN	145.98		HIGH	135.86		LOW	173.52		

Figure 78.--Water level in observation well 09M007, Randolph County.

314611084310301 Local number, 09N001.

LOCATION.--Lat 31°46'09", long 84°31'07", Hydrologic Unit 03130009, 500 ft south of U.S. Highway 82 behind abandoned school foundations in block house, 1.0 mi west of intersection of U.S. Highway 82 and Ga. Highway 45.

Owner: Terrell County, Graves School.

AQUIFER.--Clayton.

WELL CHARACTERISTICS.--Drilled unused supply well, diameter 6 in., depth 433 ft, cased to 333 ft, open hole.

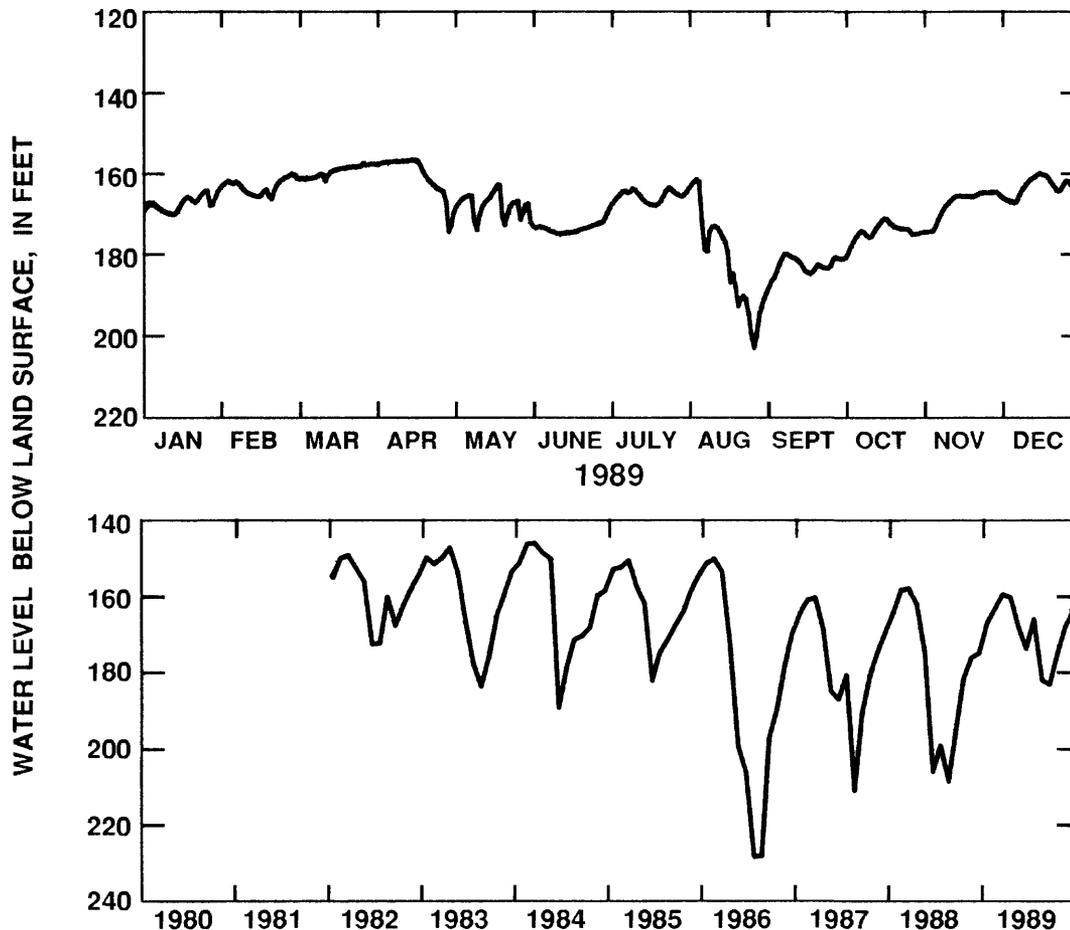
DATUM.--Altitude of land-surface datum is 348 ft.

Measuring point: Top of 6 in. well casing, 0.55 ft below land-surface datum.

REMARKS.--Borehole geophysical survey conducted July 31, 1953. Well pumped and redeveloped August 9, 1989. Water levels for periods of missing record, January 1-3, and August 9-23, were estimated.

PERIOD OF RECORD.--January 10, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	166.86	163.07	159.36	160.09	167.95	173.75	165.91	182.15	183.23	175.01	167.88	163.89
MAX	169.83	166.14	161.74	174.67	174.11	175.17	168.60	203.37	188.53	181.31	175.04	167.69
MIN	162.57	159.85	157.36	156.56	162.84	169.90	163.76	161.74	180.42	171.54	165.01	160.45
CAL YR 1989			MEAN	169.12		HIGH	156.56		LOW	203.37		

Figure 79.--Water level in observation well 09N001, Terrell County.

313532084203501 Local number, 11L002.

LOCATION.--Lat 31°35'32", long 84°20'35", Hydrologic Unit 03130008, Tallahassee Plantation, 1.3 mi north of Ga. Highway 234, 10.4 mi west of Albany.

Owner: Georgia Geologic Survey, Albany Nursery.

AQUIFER.--Clayton.

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

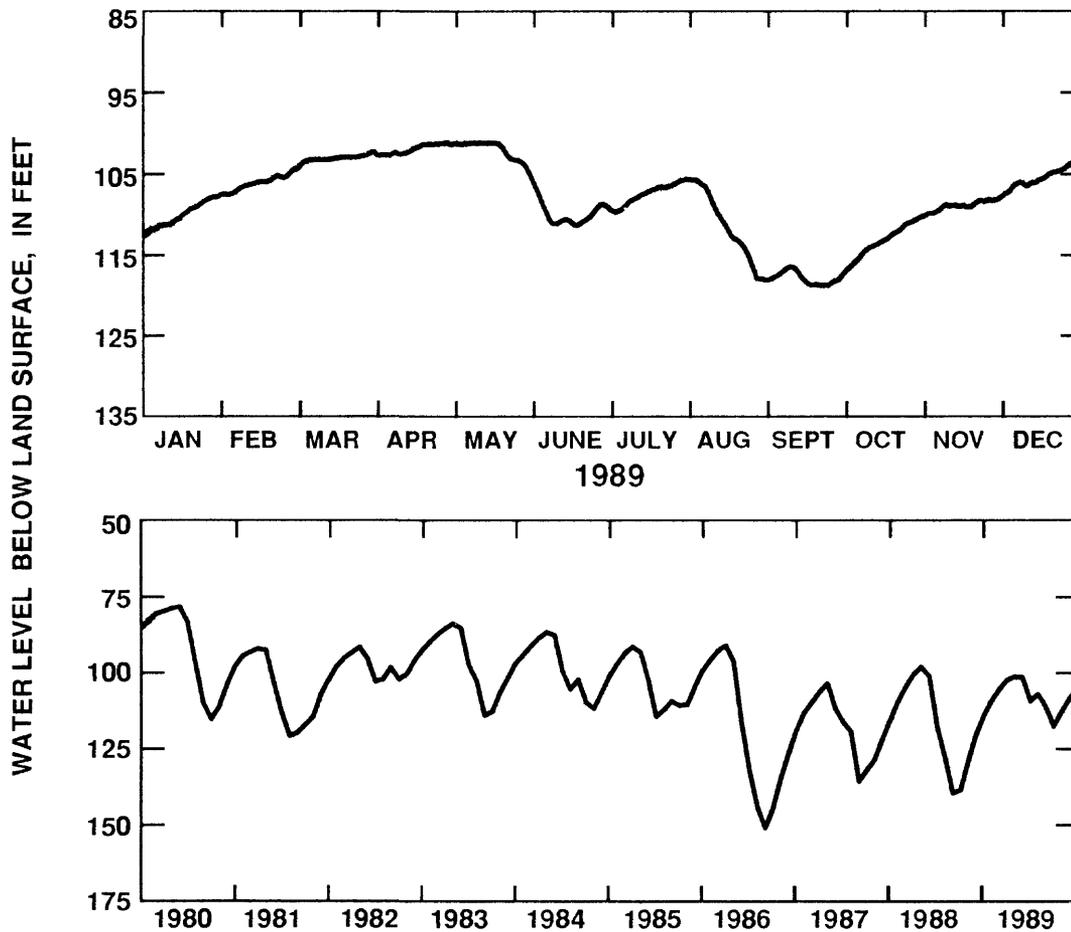
DATUM.--Altitude of land-surface datum is 222 ft.

Measuring point: Top of recorder shelf, 3.02 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 14, 1988. Borehole geophysical survey conducted June 3, 1975.

PERIOD OF RECORD.--September 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 58.90 ft below land-surface datum, April 29, 1975; lowest, 152.61 ft below land-surface datum, August 23, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	109.57	105.76	102.79	101.67	101.86	109.78	107.35	111.67	117.99	113.24	108.94	105.51
MAX	112.02	107.23	104.03	102.46	105.21	111.24	109.57	118.21	118.96	116.97	110.11	107.77
MIN	107.23	104.09	102.02	100.90	100.94	105.96	105.53	105.55	116.54	110.23	108.02	103.51
CAL YR 1989			MEAN	108.01		HIGH	100.90		LOW	118.96		

Figure 80.--Water level in observation well 11L002, Dougherty County.

313554084062501 Local number, 13L002.

LOCATION.--Lat 31°35'51", long 84°06'24", Hydrologic Unit 03130008, 50 ft west of Albany city supply well house, 75 ft east of church located at the corner of Malone and Gardner Avenue.

Owner: Albany Water, Gas, and Light Commission, Turner City 2.

AQUIFER.--Clayton.

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

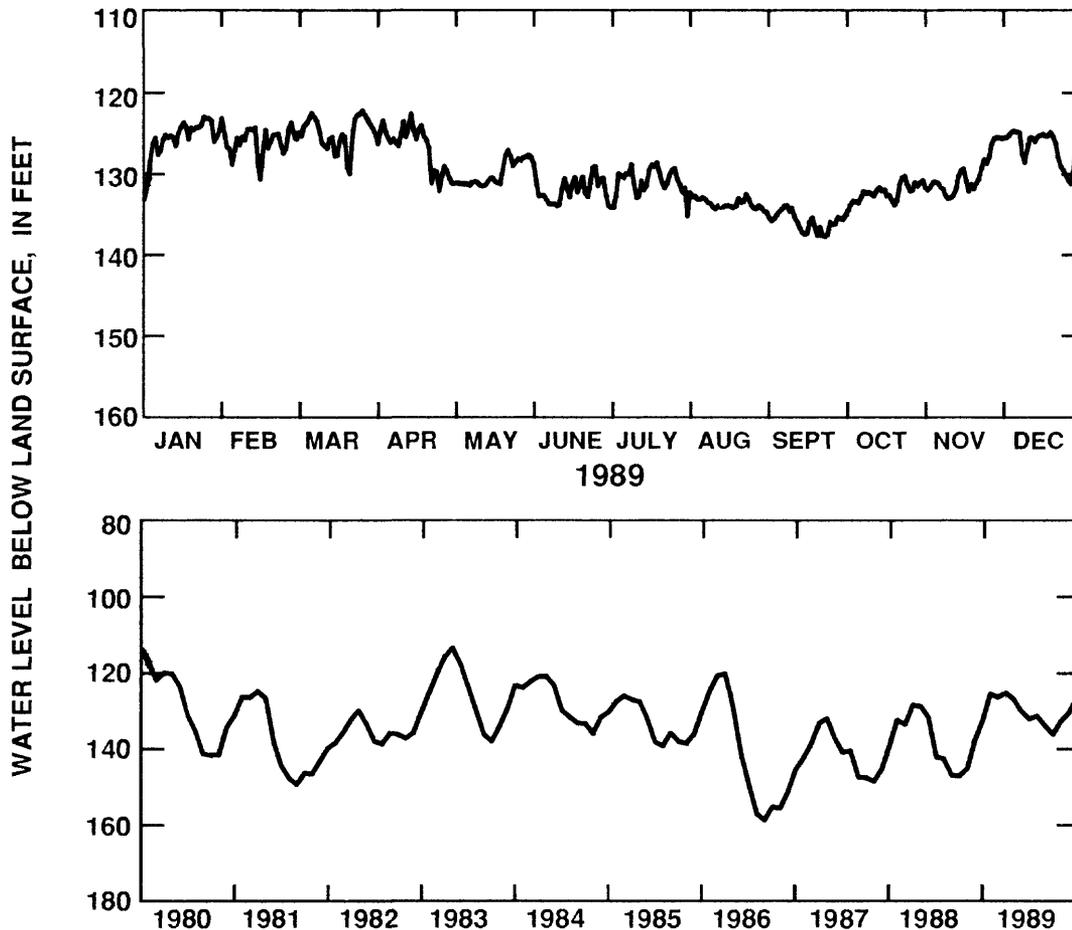
DATUM.--Altitude of land-surface datum is 212.84 ft.

Measuring point: Top of recorder shelf, 3.2 ft above land-surface datum.

REMARKS.--Well pumped and sounded to a depth of 760 ft, June 21, 1978; water-quality sample collected at conclusion of pumping. Borehole geophysical survey conducted March 17, 1977. Water levels for periods of missing record, January 31 to February 20, March 13-21 and 28-30, April 21-27, May 3-5 and 22, and May 30 to June 1, were estimated.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 38.19 ft below land-surface datum, April 1, 1959; lowest, 160.88 ft below land-surface datum, July 26, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	125.29	126.15	125.02	126.77	130.06	131.95	130.91	133.73	135.98	132.45	130.38	126.67
MAX	130.76	130.77	130.07	132.16	131.59	134.03	134.24	134.84	137.81	135.14	133.11	131.27
MIN	123.05	123.77	122.31	122.69	127.18	128.79	128.73	132.36	134.01	130.36	125.59	124.80
CAL YR 1989	MEAN		129.62		HIGH		122.31		LOW		137.81	

Figure 81.--Water level in observation well 13L002, Dougherty County.

312827084551501 Local number, 06K009.

LOCATION.--Lat 31°28'24", long 84°55'12", Hydrologic Unit 03130004, westernmost of two recorder wells, 300 yds north of the pool at Kolomoki Mounds State Park, 4.2 mi north of the city limits of Blakely, on Kolomoki Road.

Owner: Georgia Geologic Survey, Kolomoki Mounds State Park test well 1.

AQUIFER.--Clayton.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 612 ft, cased to 491 ft, open hole.

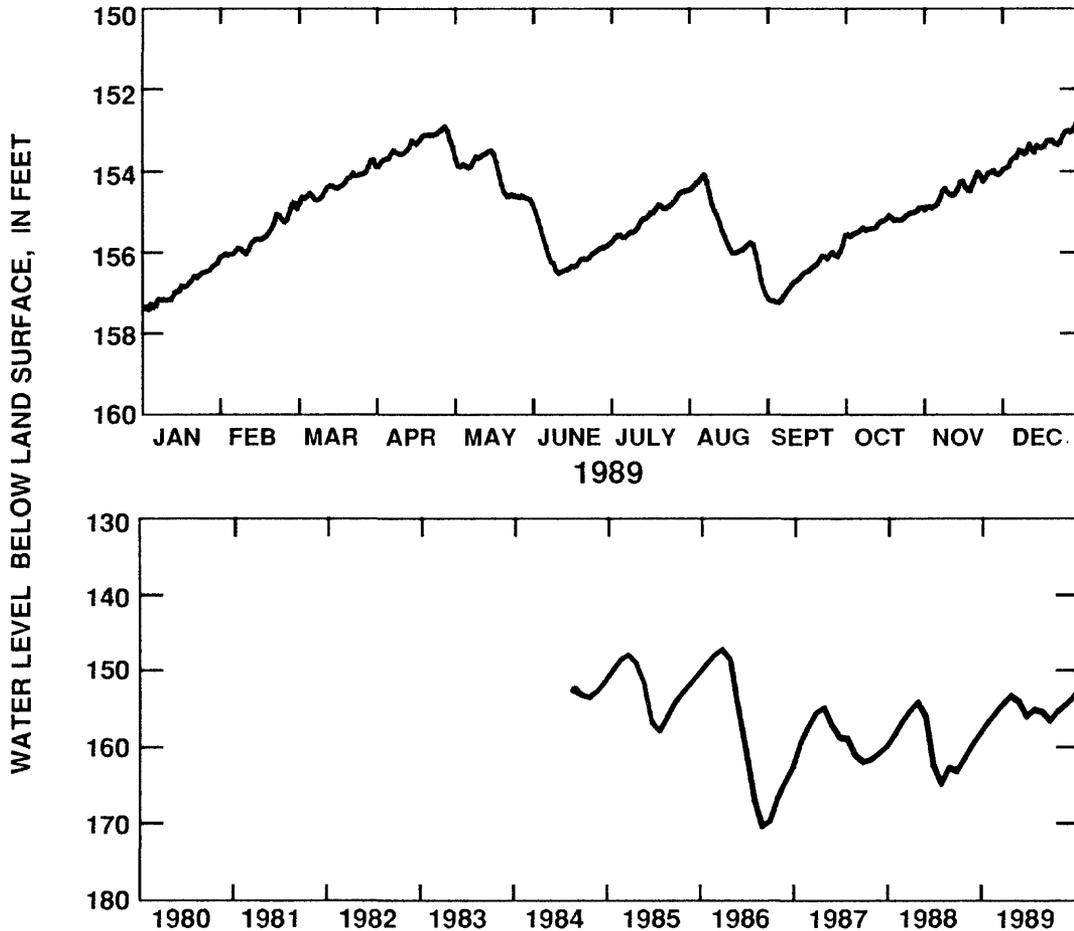
DATUM.--Altitude of land-surface datum is 310 ft.

Measuring point: Top of recorder shelf, 3.27 ft above land-surface datum.

REMARK.--Borehole geophysical survey conducted November 20, 1979. Aquifer test conducted May 19, 1982. Well pumped and redeveloped August 8, 1989.

PERIOD OF RECORD.--August 31, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	156.79	155.54	154.31	153.32	154.02	156.00	155.13	155.41	156.57	155.28	154.43	153.41
MAX	157.37	156.03	154.88	153.85	154.67	156.51	155.77	157.07	157.26	155.61	154.95	154.04
MIN	156.05	154.75	153.68	152.86	153.36	154.78	154.47	154.08	155.84	154.90	153.99	152.72
CAL YR 1989			MEAN	155.01		HIGH	152.72		LOW	157.37		

Figure 82.--Water level in observation well 06K009, Early County.

312654084210103 Local number, 11K005.

LOCATION.--Lat 31°26'54", long 84°21'01", Hydrologic Unit 03130008, easternmost of two recorder wells, 50 ft east of logging road, 0.65 mi west and 0.65 south of main gate into the St. Joe Paper Company woodland on Tarva Road, 3.6 mi south of Ga. Highway 62.

Owner: U.S. Geological Survey test well 12.

AQUIFER.--Clayton.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 690 ft, cased to 630 ft, open hole.

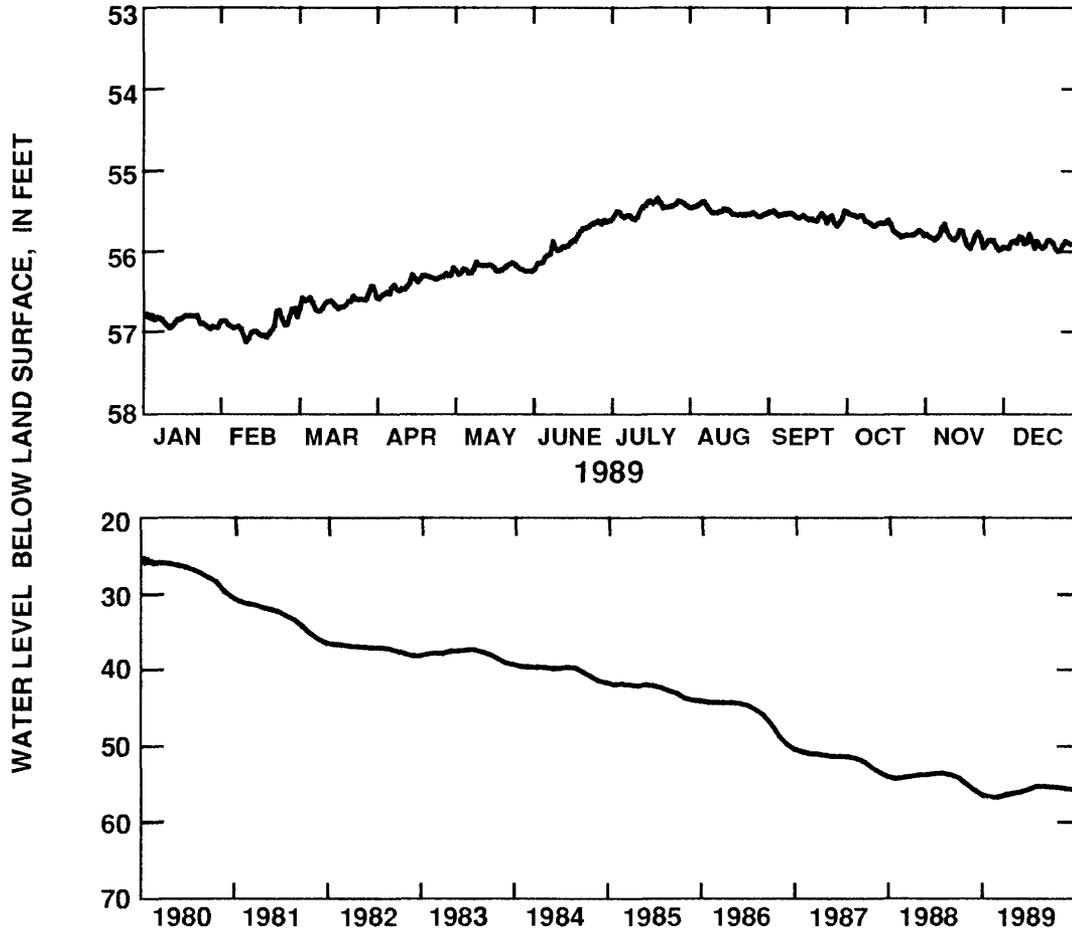
DATUM.--Altitude of land-surface datum is 183 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 14, 1979.

PERIOD OF RECORD.--May 16, 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.03 ft below land-surface datum, May 24, 1979; lowest, 57.12 ft below land-surface datum, February 9, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	56.86	56.93	56.63	56.40	56.21	55.88	55.47	55.50	55.58	55.68	55.85	55.92
MAX	56.96	57.12	56.81	56.59	56.29	56.25	55.62	55.57	55.69	55.83	56.00	56.02
MIN	56.79	56.71	56.44	56.28	56.13	55.61	55.34	55.38	55.50	55.50	55.67	55.76
CAL YR 1989			MEAN	56.07		HIGH	55.34		LOW	57.12		

Figure 83.--Water level in observation well 11K005, Dougherty County.

Cretaceous Aquifer System

Water levels in the Cretaceous aquifer system are monitored in nine wells, all of which are included in this report (figs. 84-94). Water levels in the aquifer system are influenced by changes in precipitation, pumping, and natural discharge. During 1985, the aquifer system supplied more than 147 Mgal/d, primarily for municipal and industrial use (Pierce and Kundell, 1990, p. 219).

In Chattahoochee County near Columbus, the water level in wells tapping the Cretaceous aquifer system has shown a long-term water-level decline since 1965. The mean water level in well 06S001 (fig. 85) near Columbus was 1.2 ft lower in 1989 than in 1988 and a record low was measured in December. The water level continued to decline in this area.

Providence aquifer

The water level in the Providence aquifer in the Albany area is monitored in one well (12L021, fig. 86) and is affected primarily by changes in local pumping. The aquifer supplied about 9 Mgal/d for municipal, industrial, and agricultural use in southwestern Georgia during 1980 (Clarke and others, 1983). Pumping from the aquifer has resulted in the development of cones of depression at Albany and Americus and water-level declines near Albany of more than 100 ft during the period 1950-80 (Clarke and others, 1983).

The water-level response to pumping is shown on the hydrograph for well 12L021 at Albany (fig. 86). The mean water level in this well was 4.4 ft higher in 1989 than in 1988. Above-normal precipitation (fig. 8) during 1989 probably resulted in decreased pumping, which allowed the continued recovery of the water level from the 1986 drought.

Dublin, Midville, and Dublin-Midville aquifer systems

The water levels in the Dublin aquifer system is monitored in one well (18U001, fig. 87) in southern Twiggs County. 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, 1985), where pumpage exceeded 37 Mgal/d in 1985. The mean water level in well 18U001 (fig. 87) remained about the same in 1989 as in 1988, leveling-off the general downward trend since 1983. Rainfall at Macon (fig. 12) was above normal from April through December 1989, which probably resulted in increased recharge and decreased pumpage, producing a rise in the water level.

The water level in the Midville aquifer system is affected primarily by regional pumping (Clarke and others, 1985) and is monitored in four wells in east-central Georgia. The mean water levels in four wells 18T001, 21U004, 24V001, and 28X001, (figs.88-91) were about the same in 1989 as in 1988, diminishing the downward trend in that area.

During November 1989, water-level measurements were made in 99 wells tapping the Dublin-Midville aquifer system. These measurements were used to prepare a water-level map (fig. 92). Since the last map was constructed in October 1984 (Clarke and others, 1986, p. 33), the configuration of the water-level map changed at Sandersville and Deepstep, Washington County. In these areas, the size of existing cones of depression increased slightly, possibly indicating that pumping had increased during 1984-89.

The water level in the Dublin-Midville aquifer system is monitored continuously in two wells, one in Richmond County (30AA04, fig. 93) and one at Sandersville, Washington County (23X027, fig. 94). The water level in wells tapping the Dublin-Midville aquifer system in Richmond County is influenced primarily by precipitation and by local pumping (Gorday, 1985, p. 28). (See hydrograph for well 30AA04 (fig. 93) near McBean.) The mean water level in well 30AA04 was 0.6 ft higher in 1989 than in 1988 as a result of above-normal precipitation and possibly decreased pumping during the year. (See precipitation graph for Augusta, fig. 10.) This rise reversed the downward trend in water-levels that began in 1985.

EXPLANATION

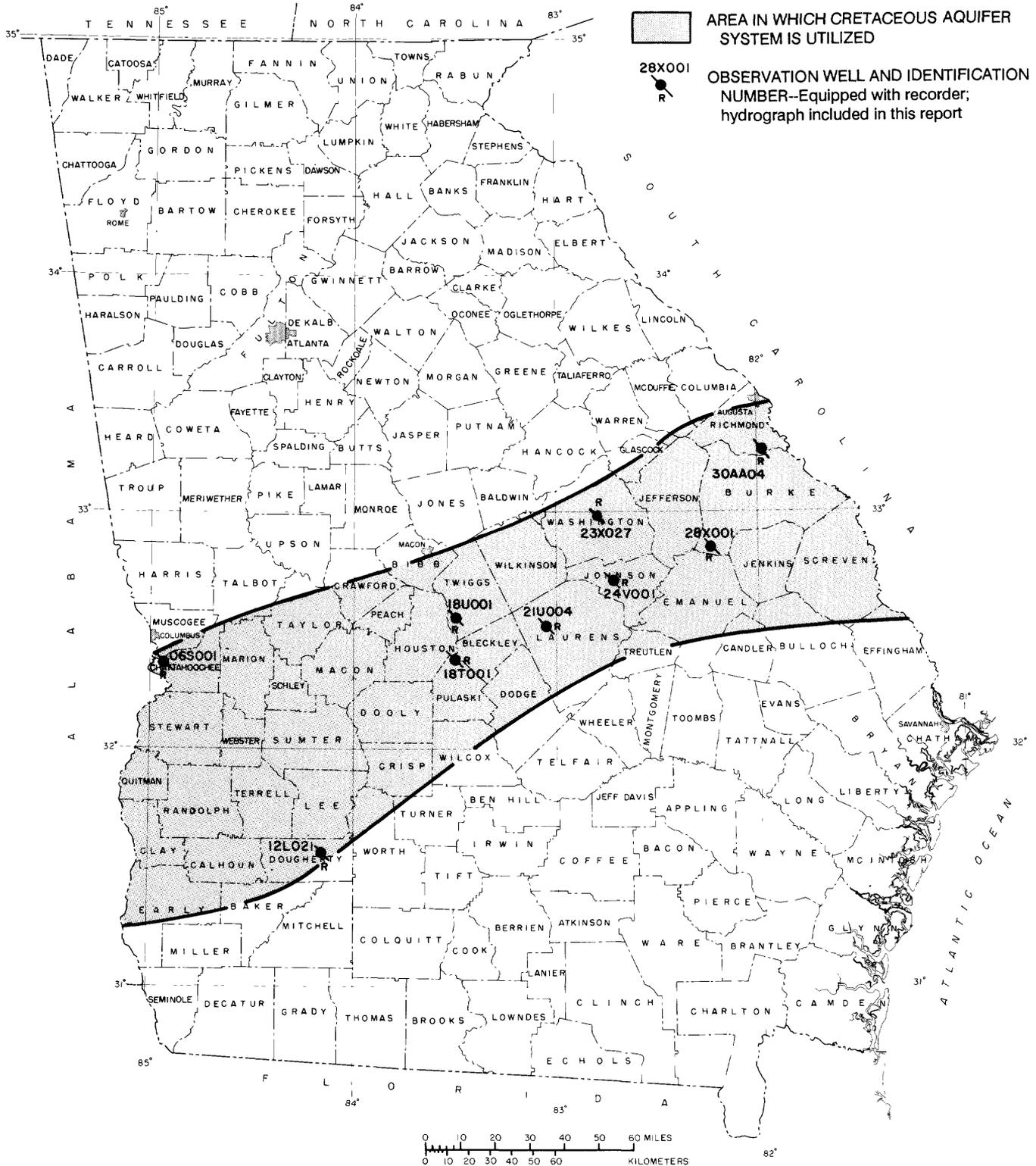


Figure 84.--Locations of observation wells completed in the Cretaceous aquifer system.

322036084590301 Local number, 06S001

LOCATION.--Lat 32°20'31", long 84°59'10", Hydrologic Unit 03130003, in "Motor Pool" across road from Lawson Airfield main building.

Owner: U.S. Army, Fort Benning.

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.

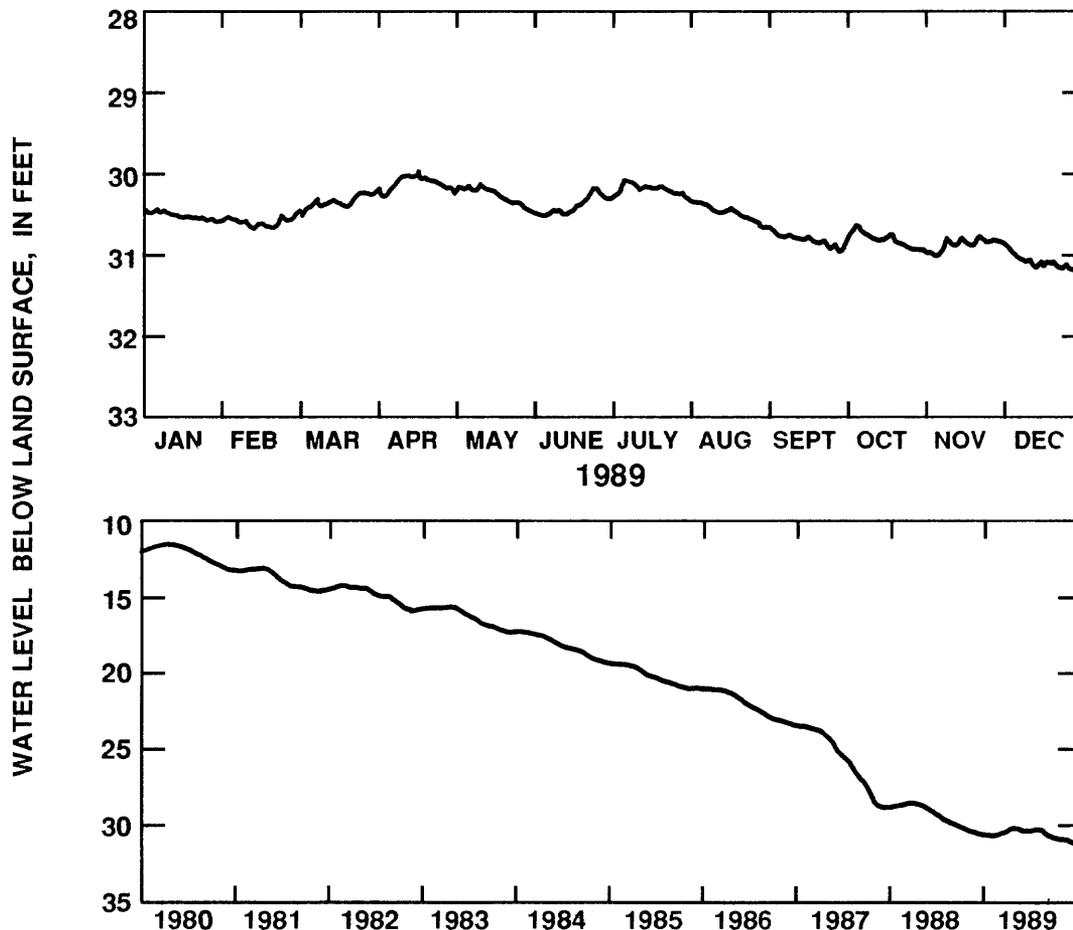
DATUM.--Altitude of land-surface datum is 255 ft.

Measuring point: Top of recorder shelf, 2.80 ft above land-surface datum.

REMARKS.--Well pumped and redeveloped August 7, 1989. Well pumped and sampled by Georgia Geologic Survey November 29-30, 1989. Water levels for period of missing record, November 29 to December 8, were estimated.

PERIOD OF RECORD.--May 1950 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.37 ft below land-surface datum, April 10, 1964; lowest, 31.18 ft below land-surface datum, December 30, 1989.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	30.52	30.58	30.33	30.11	30.27	30.38	30.19	30.49	30.82	30.81	30.87	31.08
MAX	30.58	30.67	30.51	30.28	30.48	30.52	30.31	30.67	30.95	30.94	31.02	31.18
MIN	30.43	30.45	30.18	29.98	30.14	30.16	30.07	30.34	30.68	30.62	30.77	30.88
CAL YR 1989			MEAN	30.54		HIGH	29.98		LOW	31.18		

Figure 85.--Water level in observation well 06S001, Chattahoochee County.

313534084103003 Local number, 12L021.

LOCATION.--Lat 31°35'37", long 84°10'29", Hydrologic Unit 03130008, located in park at intersection of Slaphey Drive and Fifth Avenue.

Owner: U.S. Geological Survey test well 10.

AQUIFER.--Providence

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 834 ft, cased to 810 ft, screen to 830 ft.

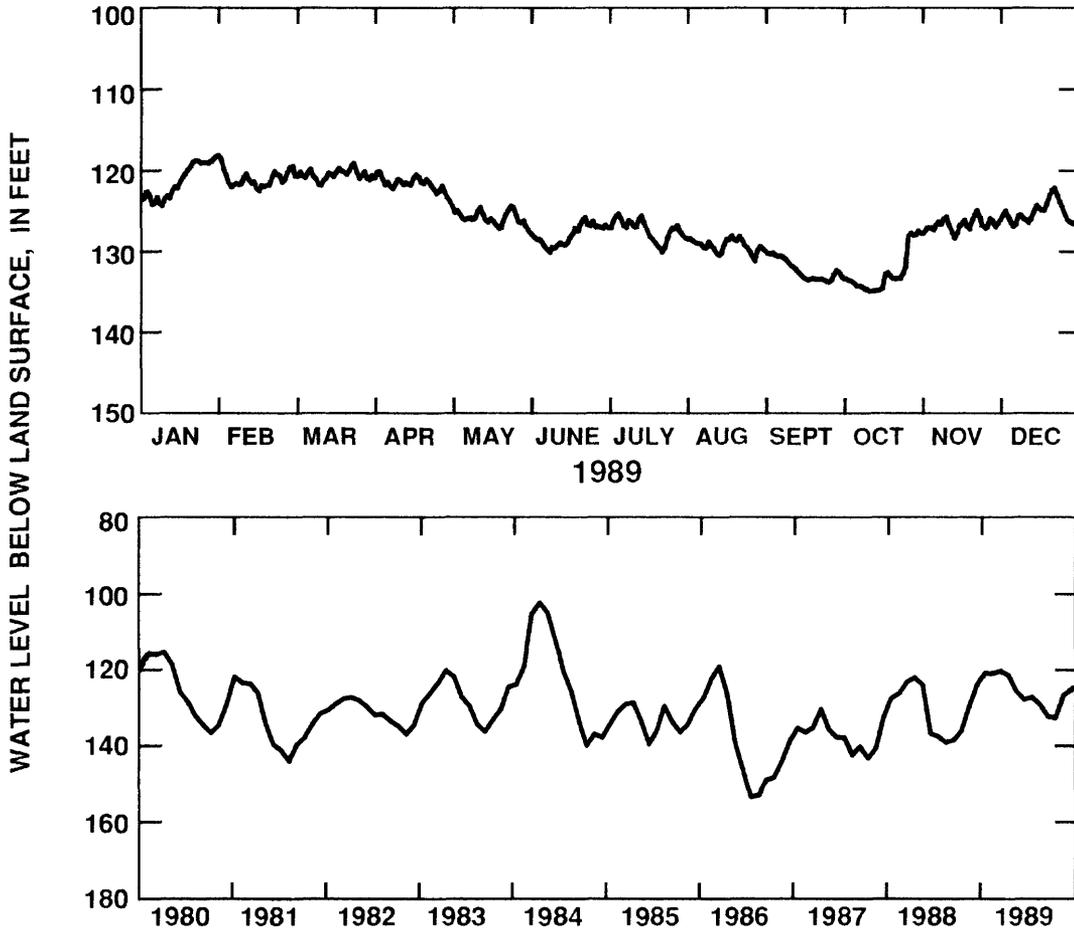
DATUM.--Altitude of land-surface datum is 198 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted October 26, 1978. Well pumped and sampled October 24, 1989.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	121.00	121.09	120.48	121.64	125.86	128.04	127.42	129.38	132.47	132.84	126.82	125.38
MAX	124.28	122.48	121.78	123.78	127.65	130.17	130.18	131.34	133.97	135.11	128.49	127.03
MIN	118.07	119.44	119.09	120.16	124.35	125.83	125.39	128.16	130.33	127.59	125.01	122.30
CAL YR 1989			MEAN	126.06		HIGH	118.07		LOW	135.11		

Figure 86.--Water level in observation well 12L021, Dougherty County.

323302083263401 Local number, 18U001.

LOCATION.--Lat 32°33'02", long 83°26'34", Hydrologic Unit 03070104, 0.6 mi north of intersection of U.S. Highways 23 and 12 and Ga. Highway 96, 100 feet west of highway near Woods Road West.

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

AQUIFER.--Dublin aquifer system.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 616 ft, cased to 586 ft, screen to 616 ft.

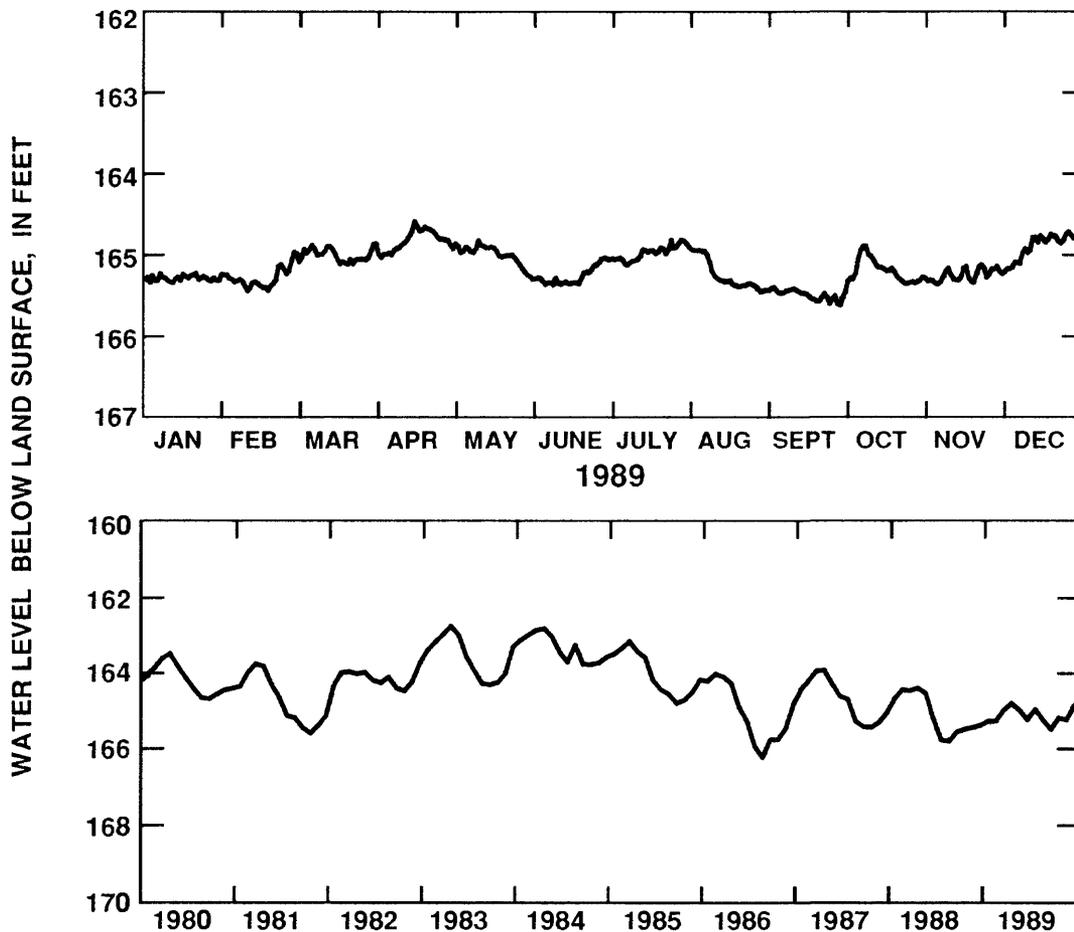
DATUM.--Altitude of land-surface datum is 442 ft.

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

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, 166.39 ft below land-surface datum, August 10-11, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	165.29	165.29	165.01	164.83	165.01	165.27	164.99	165.28	165.52	165.22	165.28	164.91
MAX	165.35	165.45	165.12	165.04	165.31	165.38	165.14	165.48	165.65	165.38	165.39	165.24
MIN	165.23	164.97	164.87	164.59	164.83	165.05	164.83	164.95	165.42	164.91	165.15	164.71
CAL YR 1989			MEAN	165.16		HIGH	164.59		LOW	165.65		

Figure 87.--Water level in observation well 18U001, Twiggs County.

322245083290101 Local number, 18T001.

LOCATION.--Lat 32°22'45", long 83°29'01", Hydrologic Unit 03070104, about 8.5 mi west of Cochran off Ga. Highway 126, at Georgia Forestry Commission Tree Nursery.

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

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.

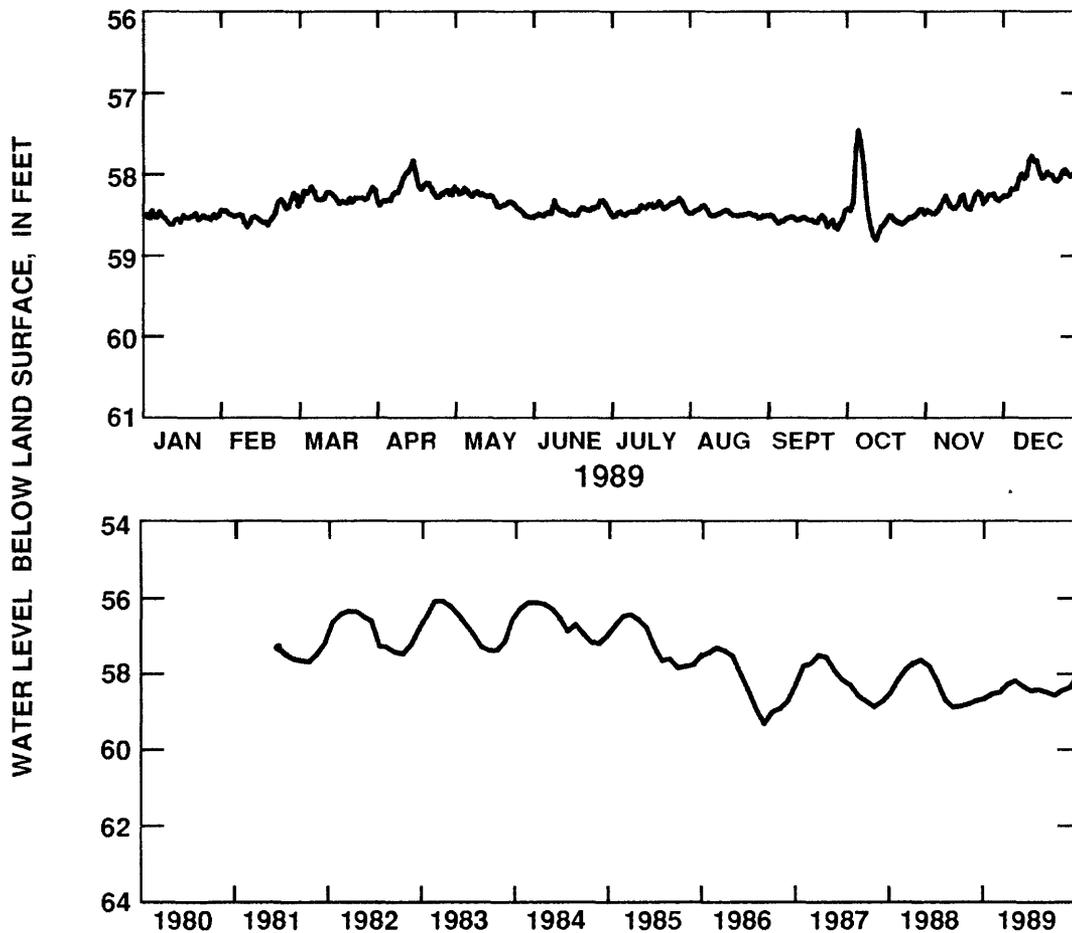
DATUM.--Altitude of land-surface datum is 334 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

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, 59.41 ft below land-surface datum, August 22, 1986.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	58.54	58.49	58.29	58.19	58.33	58.45	58.42	58.49	58.57	58.44	58.36	58.04
MAX	58.63	58.66	58.40	58.39	58.54	58.54	58.53	58.54	58.68	58.82	58.49	58.30
MIN	58.45	58.24	58.16	57.84	58.17	58.33	58.30	58.39	58.51	57.46	58.23	57.78
CAL YR 1989			MEAN	58.38		HIGH	57.46		LOW	58.82		

Figure 88.--Water level in observation well 18T001, Pulaski County.

323030083030003 Local number, 21U004.

LOCATION.--Lat 32°30'27", long 83°02'44", Hydrologic Unit 03070102, at rest area No. 87 on Interstate 16 east between mile posts 43 and 44.

Owner: U.S. Geological Survey, Laurens 3.

AQUIFER.--Midville aquifer system.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 1,685 ft, cased to 1,060 ft, screened intervals, 1,060-1,080 ft, and 1,220-1,240 ft.

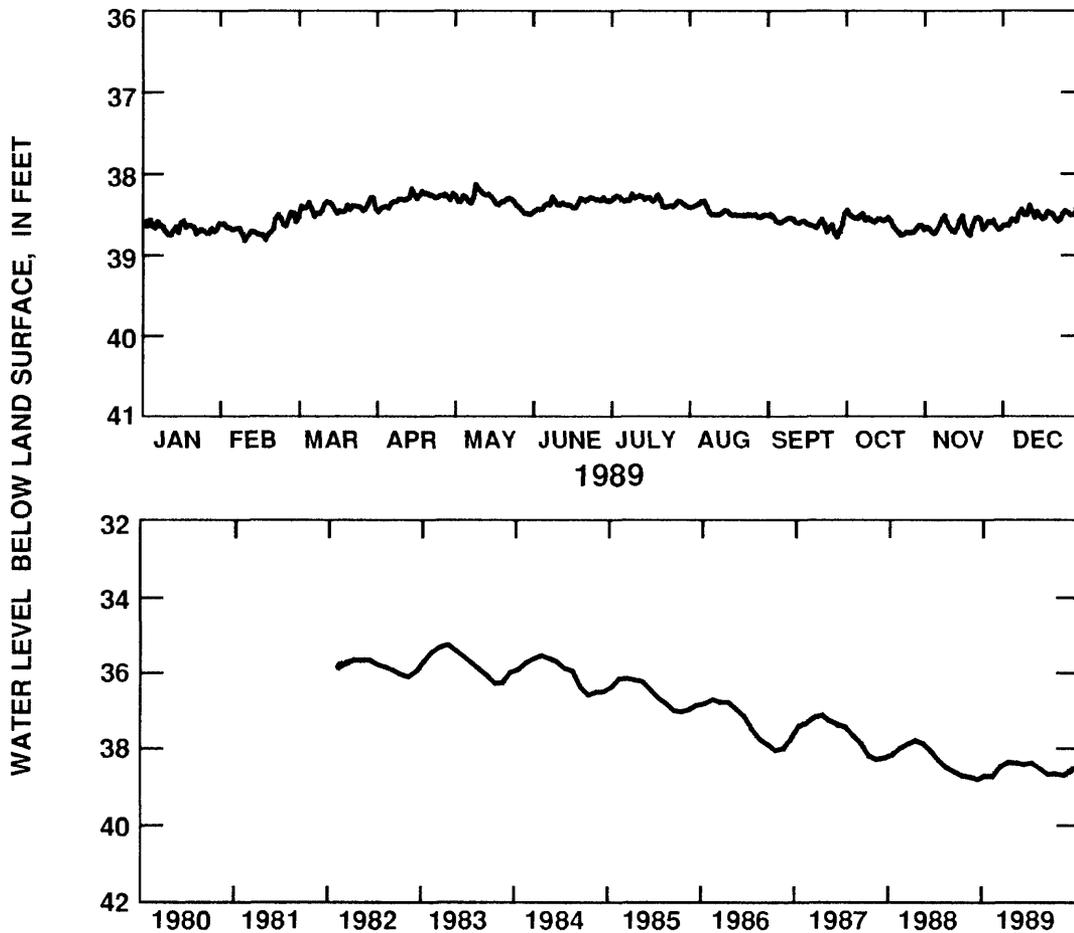
DATUM.--Altitude of land-surface datum is 282 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted December 4, 1981. Water-quality analysis January 28, 1982. Water levels for periods of missing record, January 1-19, and February 9 to March 7, were estimated.

PERIOD OF RECORD.--February 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 35.17 ft below land-surface datum, April 3, 1983; lowest, 38.85 ft below land-surface datum, December 2, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	38.67	38.68	38.43	38.32	38.33	38.38	38.34	38.49	38.63	38.63	38.66	38.54
MAX	38.76	38.83	38.60	38.48	38.51	38.50	38.43	38.55	38.80	38.78	38.78	38.70
MIN	38.58	38.48	38.30	38.19	38.14	38.29	38.26	38.35	38.52	38.47	38.54	38.38
CAL YR 1989			MEAN	38.51		HIGH	38.14		LOW	38.83		

Figure 89.--Water level in observation well 21U004, Laurens County.

324209082430201 Local number, 24V001.

LOCATION.--lat 32°42'09", long 82°43'02", Hydrologic Unit 03070107, about 500 ft west of Ga. Highway 15, 1.8 mi south of intersection of Ga. Highways 15 and 57, at Georgia Forestry Commission Firetower.

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

AQUIFER.--Midville aquifer system.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 1,780 ft, cased to 1,120 ft, screened intervals, 1,120-1,140 ft, 1,260-1,280 ft, and 1,320-1,340 ft.

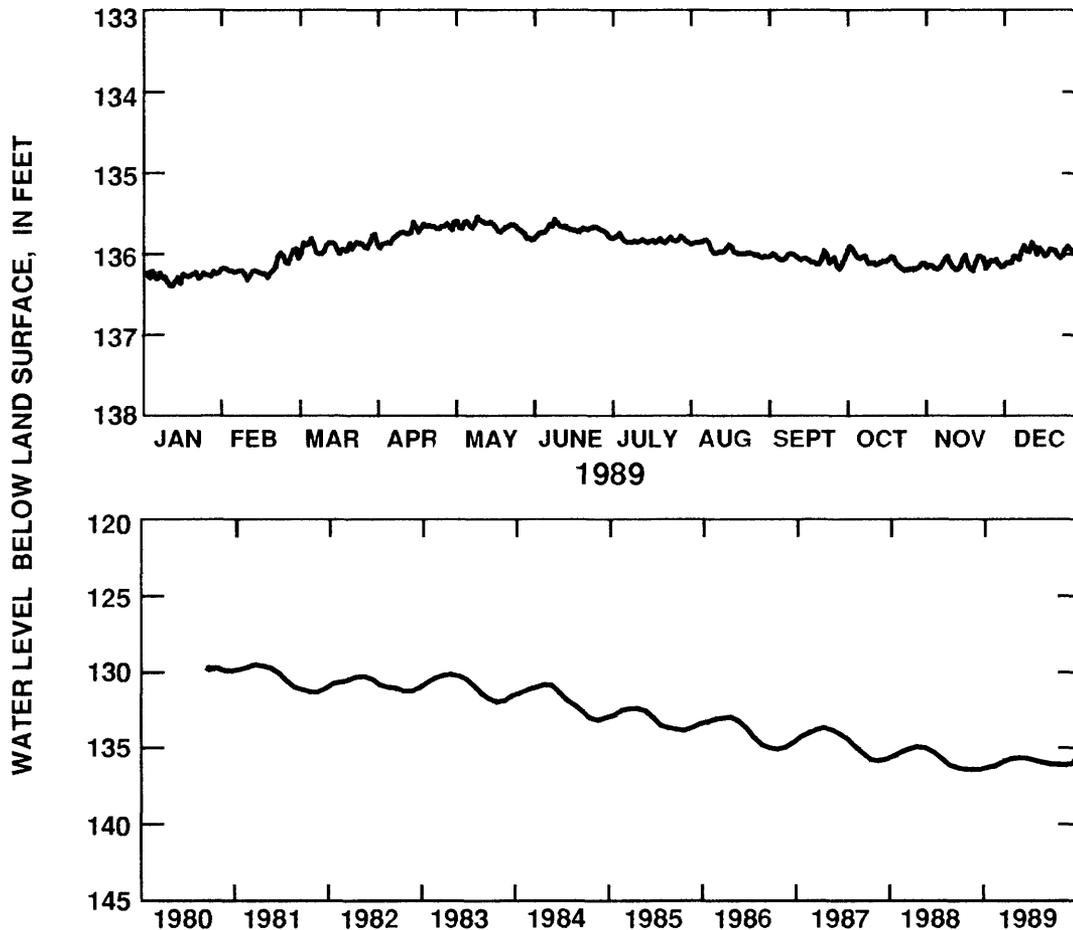
DATUM.--Altitude of land-surface datum is 355 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted July 15 and August 18, 1980. Water-quality analysis August 29, 1980.

PERIOD OF RECORD.--September 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 129.30 ft below land-surface datum, March 5, 1981; lowest, 136.52 ft below land-surface datum, December 2, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	136.29	136.18	135.92	135.74	135.68	135.71	135.85	135.97	136.09	136.12	136.15	136.02
MAX	136.41	136.34	136.07	135.94	135.84	135.83	135.88	136.07	136.21	136.23	136.24	136.18
MIN	136.19	135.96	135.77	135.62	135.55	135.59	135.76	135.85	135.99	135.93	136.04	135.86
CAL YR 1989			MEAN	135.98		HIGH	135.55		LOW	136.41		

Figure 90.--Water level in observation well 24V001, Johnson County.

325232082131501 Local number, 28X001.

LOCATION.--Lat 32°52'32", long 82°13'15", Hydrologic Unit 03060201, 4.2 mi north of Midville off Ga. Highway 56 at Southeastern Experiment Station.

Owner: U.S. Geological Survey, Midville Experiment Station 1.

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.

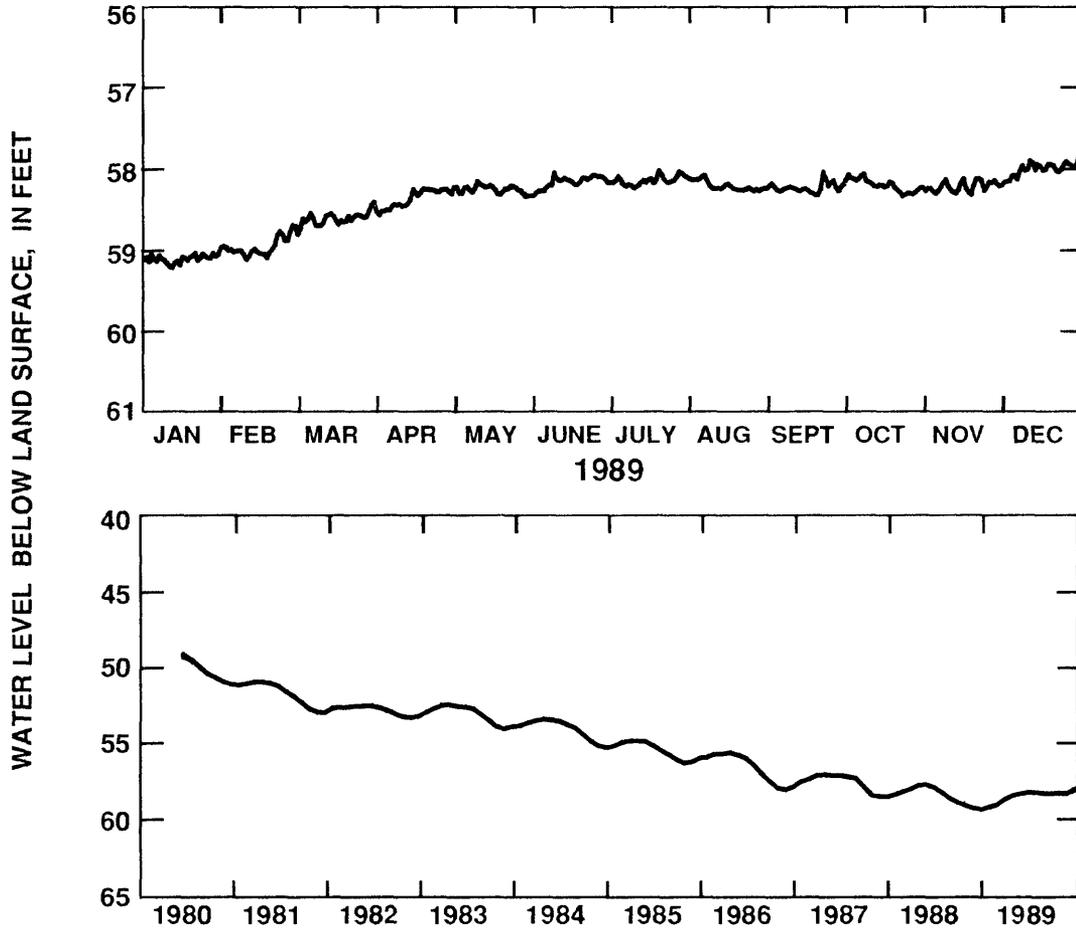
Measuring point: Top of recorder shelf, 3.04 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 8 and April 22, 1980. Water-quality analyses May 23, 1980.

Water levels for period of missing record, May 6-23, were estimated.

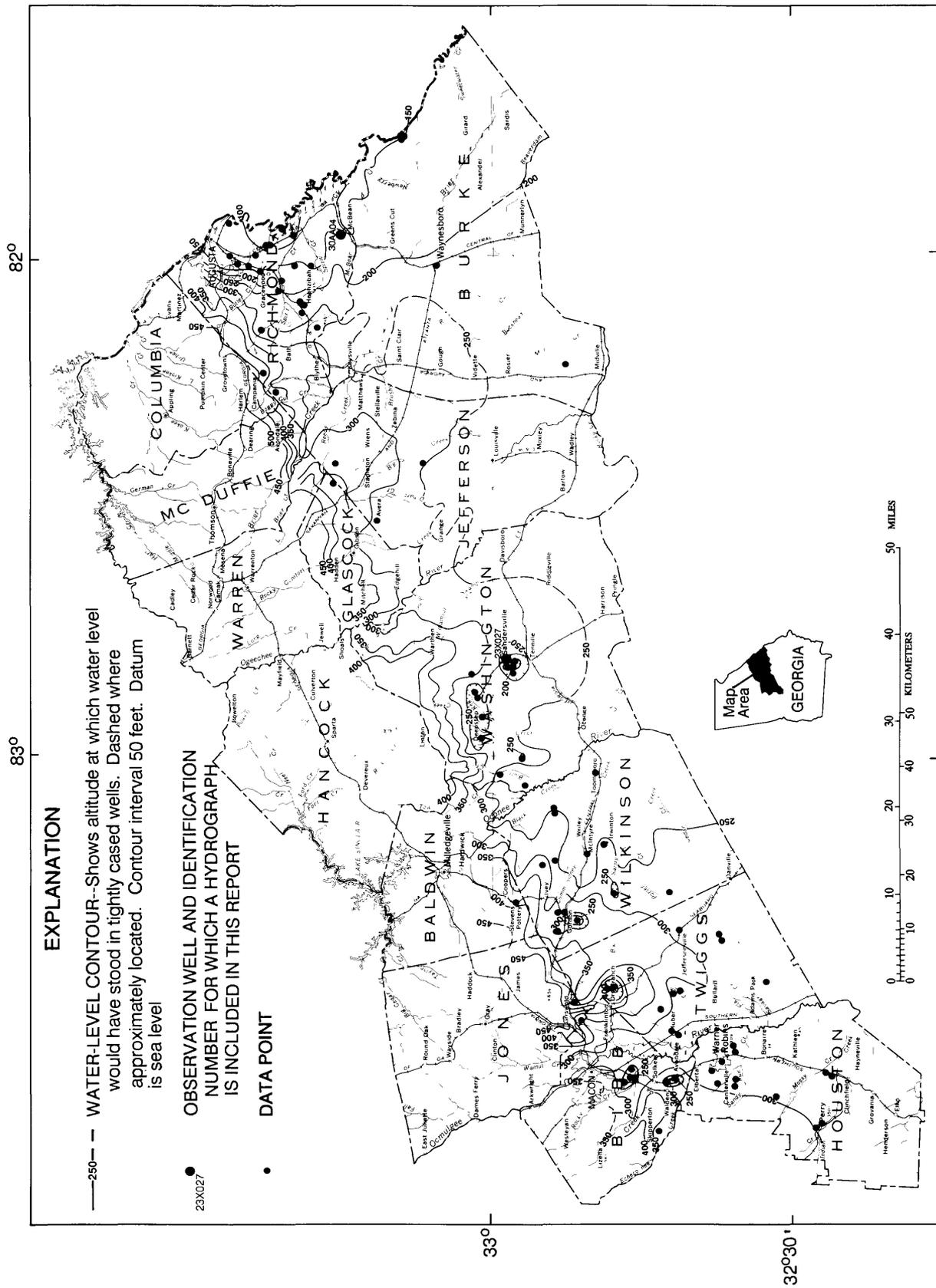
PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 49.07 ft below land-surface datum, June 4, 1980; lowest, 59.34 ft below land-surface datum, December 2, 1988.



	1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN		59.10	58.96	58.61	58.37	58.25	58.16	58.14	58.21	58.23	58.20	58.22	58.01
MAX		59.22	59.12	58.81	58.57	58.34	58.33	58.23	58.27	58.32	58.33	58.32	58.20
MIN		58.96	58.70	58.41	58.24	58.15	58.05	58.02	58.08	58.04	58.06	58.12	57.85
CAL YR 1989				MEAN	58.37		HIGH	57.85		LOW	59.22		

Figure 91.--Water level in observation well 28X001, Burke County.



EXPLANATION

- 250— WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval 50 feet. Datum is sea level
- OBSERVATION WELL AND IDENTIFICATION NUMBER FOR WHICH A HYDROGRAPH IS INCLUDED IN THIS REPORT
- DATA POINT

Figure 92.--Water levels and locations of observation wells completed in the Dublin-Midville aquifer system, November 1989.

Base from U.S. Geological Survey State base map, 1970

331711081573701 Local number, 30AA04.

LOCATION.--lat 33°15'25", long 81°57'47", Hydrologic Unit 03060106, 1.5 mi north of McBean, 0.65 mi south of Little McBean Creek, 0.5 mi west of Ga. Highway 56.

Owner: Richmond County water system, U.S. Geological Survey McBean 2.

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.

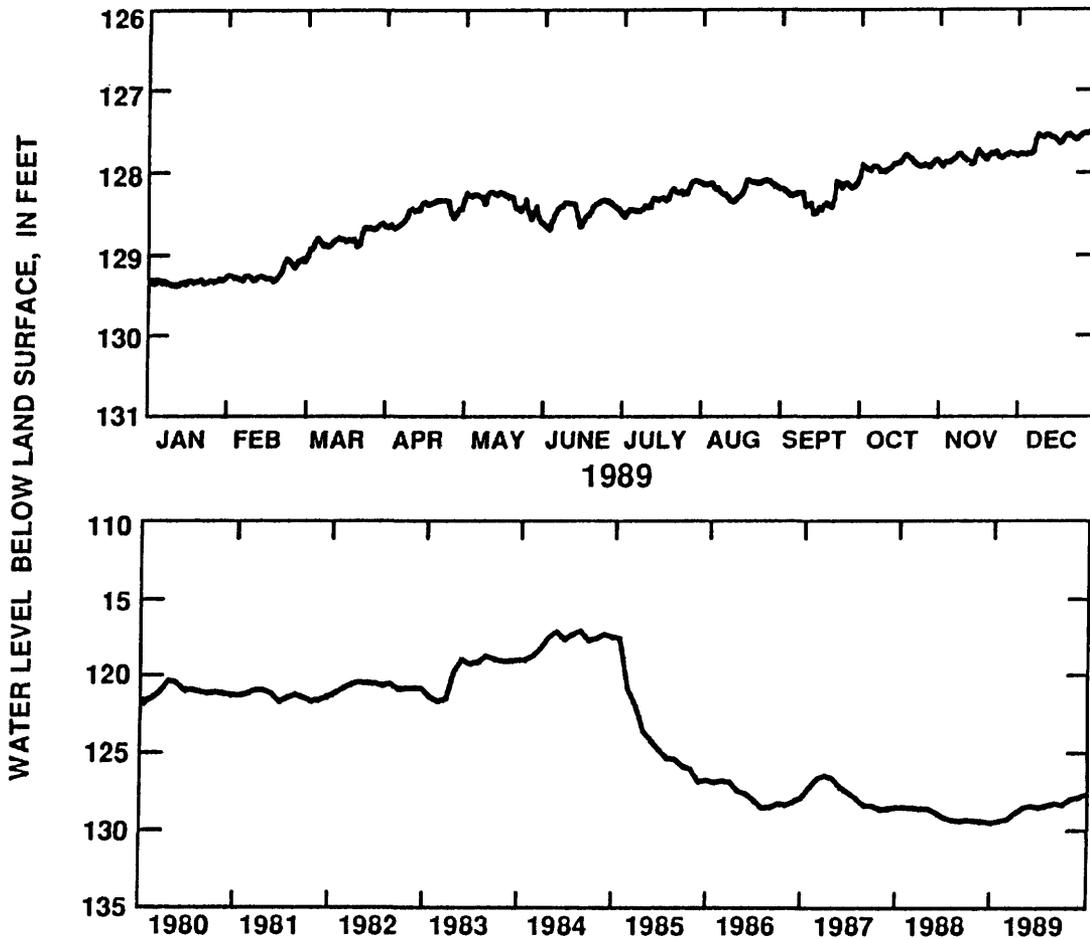
DATUM.--Altitude of land-surface datum is 293 ft.

Measuring point: Top of 6 in. casing, 1.5 ft above land-surface datum.

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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	129.33	129.22	128.80	128.47	128.34	128.45	128.32	128.18	128.28	127.91	127.81	127.60
MAX	129.37	129.32	129.07	128.67	128.60	128.68	128.53	128.35	128.50	128.05	127.92	127.79
MIN	129.25	129.04	128.61	128.33	128.23	128.33	128.10	128.09	128.10	127.78	127.72	127.45
CAL YR 1989			MEAN	128.39		HIGH	127.45		LOW	129.37		

Figure 93.--Water level in observation well 30AA04, Richmond County.

325848082480901 Local number, 23X027.

LOCATION.--Lat 32°58'48", long 82°48'08", Hydrologic Unit 03070102, 3,000 ft south of the intersection of Ga. Highway 24 and Jordon Mill Road, and 3,100 ft south of the courthouse in Sandersville, east side of railroad.

Owner: City of Sandersville 8.

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.

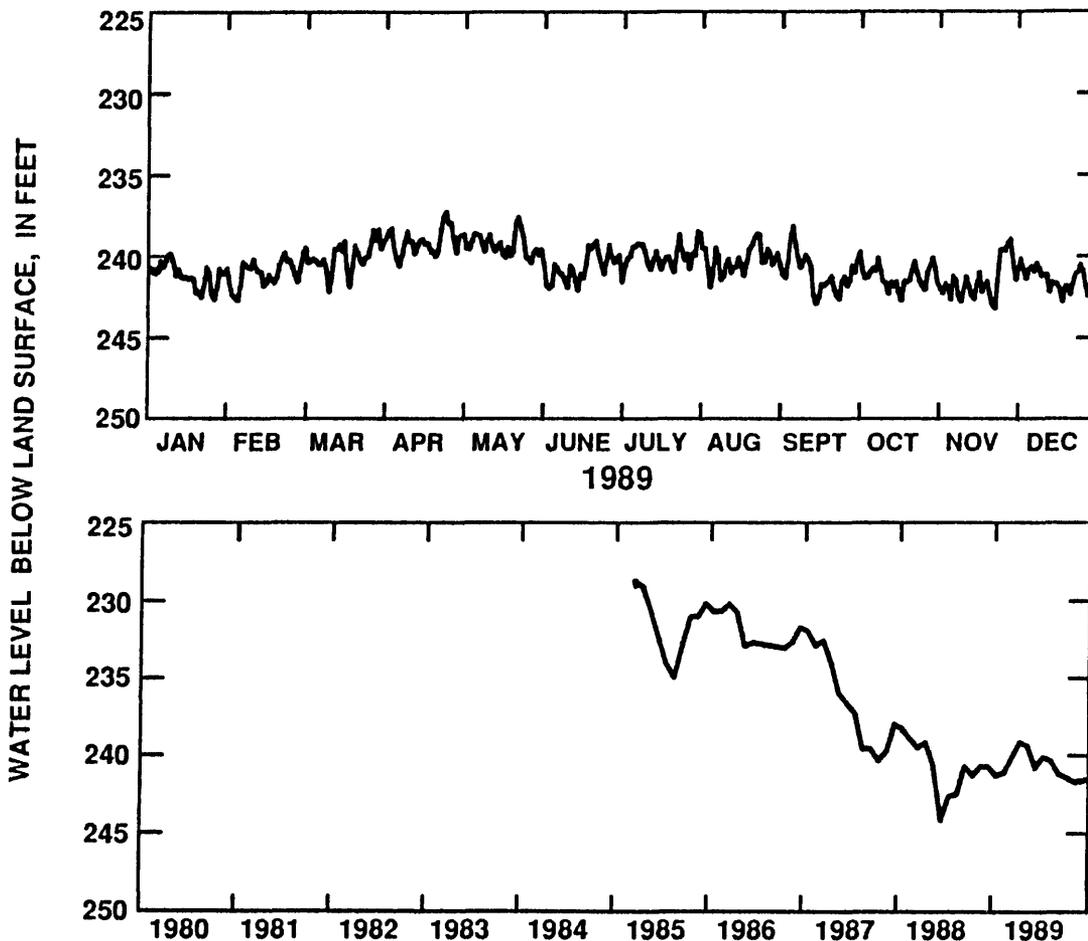
DATUM.--Altitude of land-surface datum is 450 ft.

Measuring point: Top of recorder shelf, 3.2 ft above land-surface datum.

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 14, 1985 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 227.68 ft below land-surface datum, April 9, 1985; lowest, 245.93 ft below land-surface datum, June 15, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
MEAN	241.24	241.07	240.05	239.09	239.33	240.72	240.04	240.30	241.17	241.38	241.66	241.59		
MAX	242.71	242.76	242.24	240.63	240.44	242.14	241.64	241.98	243.03	242.85	243.35	243.05		
MIN	239.88	239.84	238.36	237.28	237.62	239.13	238.54	238.69	238.23	239.88	239.10	240.33		
CAL YR 1989	MEAN		240.63			HIGH		237.28		LOW			243.35	

Figure 94.--Water level in observation well 23X027, Washington County.

At Sandersville, Washington County, the water level in the Dublin-Midville aquifer system is influenced primarily by local pumping. The mean water level in well 23X027 (fig. 94), at Sandersville, was about the same in 1989 as in 1988, leveling off the downward trend that began in 1985.

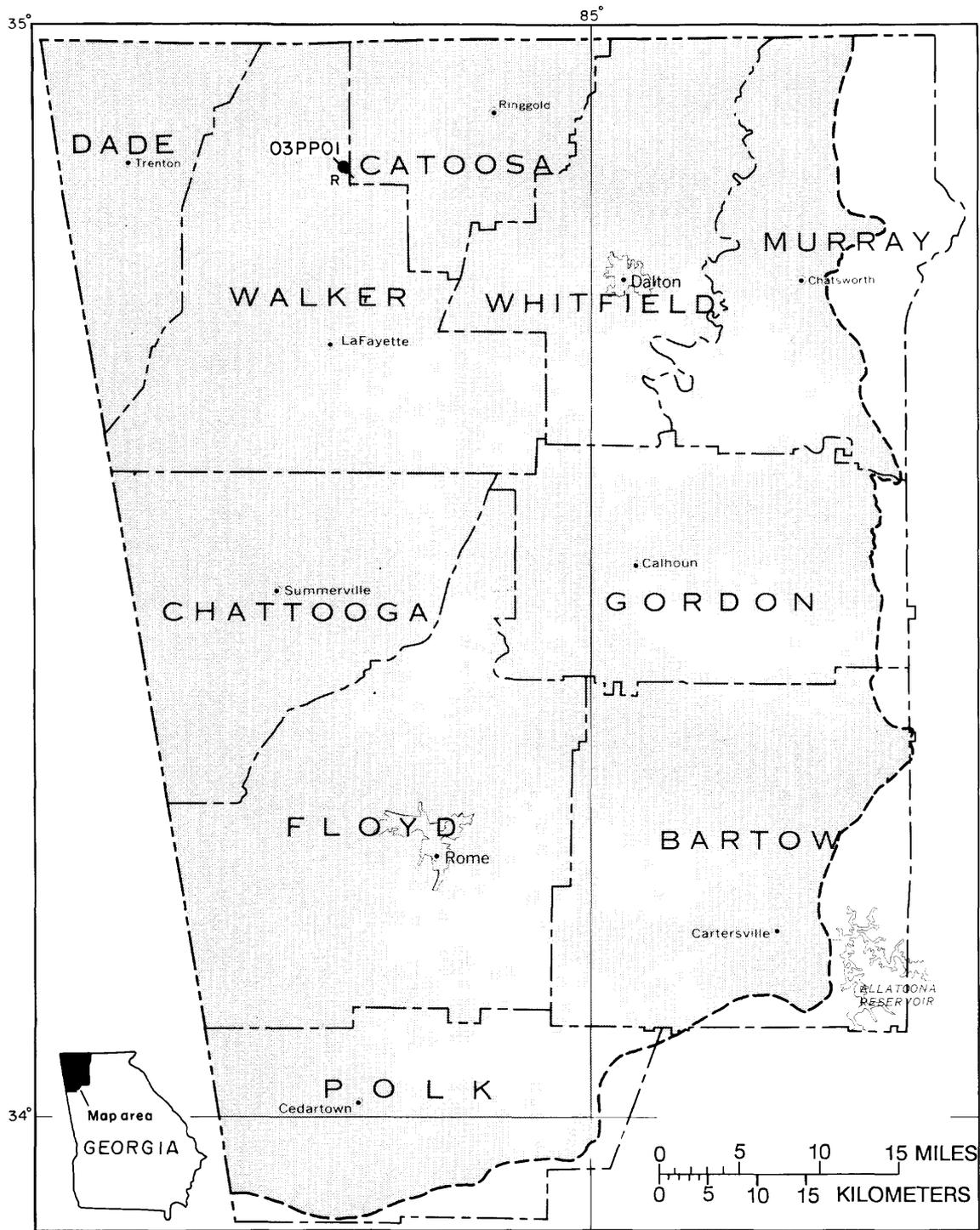
Paleozoic Rock Aquifers

The water level in the Paleozoic rock aquifer in Walker County is monitored in well 03PP01 (figs. 95, 96). In this area, the water level in wells tapping the Paleozoic rock aquifers are affected primarily by precipitation and locally by pumping.

The mean water level in well 03PP01 was 2.9 ft higher in 1989 than in 1988. Precipitation was above normal during much of the year, which resulted in increased recharge to the aquifer and higher water levels. (See precipitation graph for the Rome station, figure 4.) As a result of this increased recharge, a record high water level was measured in June 1989. The rapid response to precipitation shown on the hydrograph for well 03PP01 illustrates the effect of precipitation on water levels in areas having thin soil cover (figs. 4, 96).

Crystalline Rock Aquifers

Water-level fluctuations and trends in the crystalline rock aquifers are monitored in nine wells, records from four are included in this report (figs. 97-101). Ground-water levels in wells tapping the crystalline rock aquifers are affected mainly by precipitation and evapotranspiration, and locally by pumping. Generally, precipitation is heavy in winter and mid-summer and relatively light in spring and fall. During 1989, however, precipitation was above normal during most of the year (see precipitation graphs for the Cleveland, Athens, Clayton, and Atlanta stations, figs. 6, 7, 9, and 11). As a result of this above-normal precipitation, mean water levels generally were higher in 1989 than in 1988. The mean water levels in wells 10DD02 (fig. 98) in Fulton County, 11FF04 (fig. 99) in DeKalb County, 19HH12 (fig. 100) in Madison County, and 21BB04 (fig. 101) in Greene County were from 0.7 to 2.1 ft higher in 1989 than in 1988. These rises reversed the downward water-level trend in wells 10DD02 and 19HH12. A record-high water level was measured in well 21BB04 in May 1989.



EXPLANATION

- AREA OF PALEOZOIC ROCK AQUIFERS
- OBSERVATION WELL AND IDENTIFICATION NUMBER — equipped with recorder; hydrograph included in this report

Figure 95.--Location of observation well completed in the Paleozoic rock aquifers.

345403085160001 Local number, 03PP01.

LOCATION.--Lat 34°54'08", long 85°16'00", Hydrologic Unit 06020001, Chickamauga and Chattanooga National Military Park.

Owner: National Park Service, Fort Oglethorpe.

AQUIFER.--Paleozoic Rock (Chickamauga Limestone).

WELL CHARACTERISTICS.--Cable-tooled, observation well, diameter 8 in., depth 72 ft, cased to 11 ft, open hole.

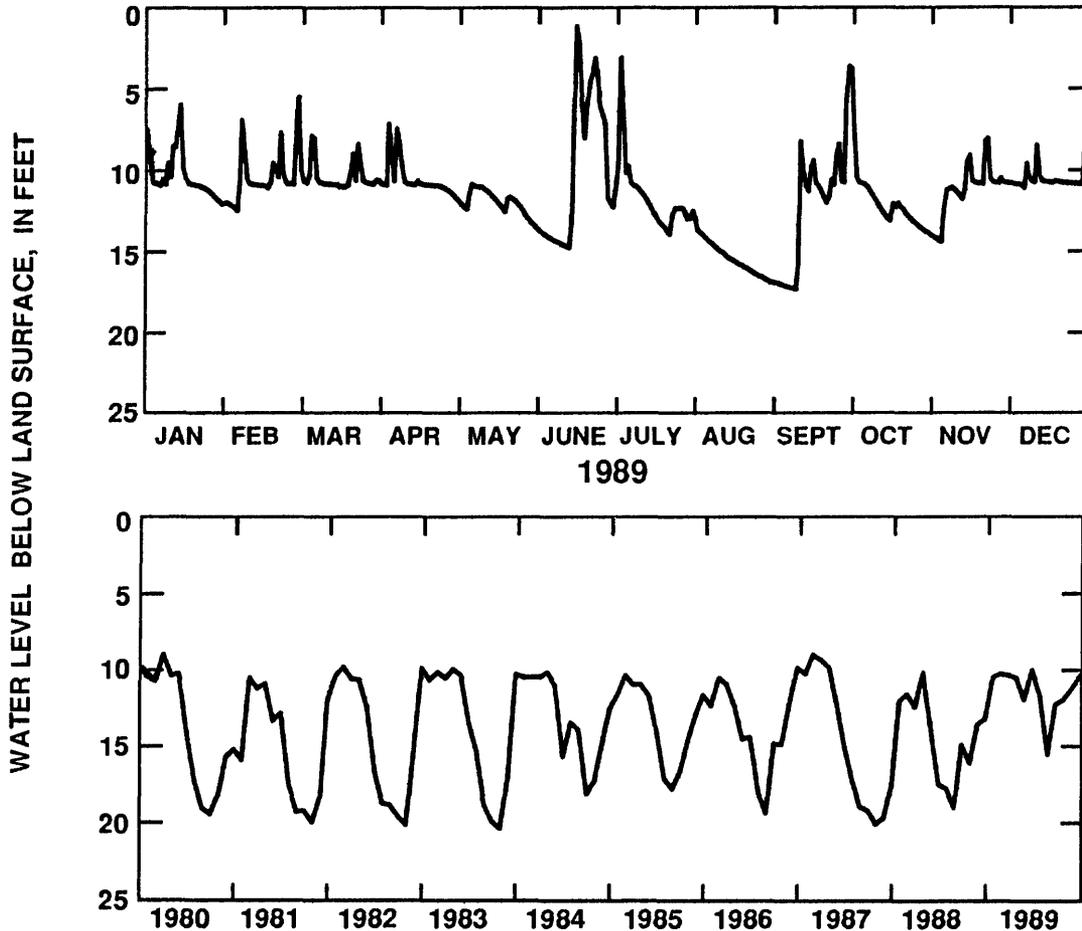
DATUM.--Altitude of land-surface datum is 730 ft.

Measuring point: Pointer on recorder shelf, 2.09 ft above land surface.

REMARKS.--Well sounded October 18, 1977. Water levels for period of missing record, June 15-26, were estimated.

PERIOD OF RECORD.--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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	10.42	10.22	10.32	10.49	11.92	10.95	11.60	15.47	12.25	11.95	11.28	10.56
MAX	11.98	12.39	10.96	11.71	13.47	14.76	13.94	16.97	17.37	13.92	14.45	11.13
MIN	5.85	5.43	7.78	7.07	10.80	4.52	2.96	12.96	3.54	3.69	8.08	6.72
CAL YR 1989			MEAN	11.46		HIGH	2.96		LOW	17.37		

Figure 96.--Water level in observation well 03PP01, Walker County.

EXPLANATION



AREA OF CRYSTALLINE ROCK
AQUIFERS



OBSERVATION WELL AND IDENTIFI-
CATION NUMBER--Equipped with
recorder; hydrograph included in
this report

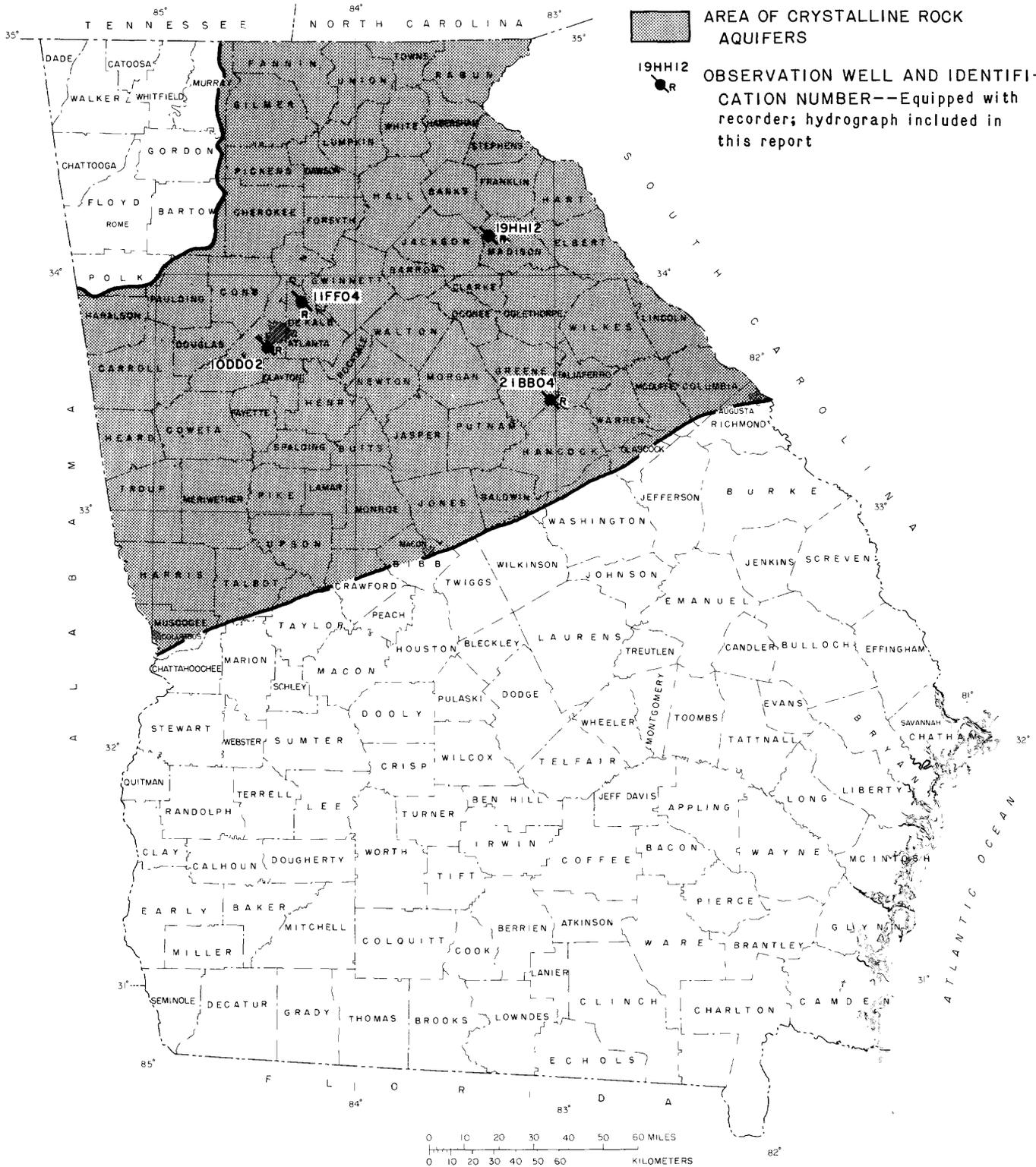


Figure 97.--Locations of observation wells completed in the crystalline rock aquifers.

334207084254801 Local number, 10DD02.

LOCATION.--Lat 33°42'07", long 84°25'48", Hydrologic Unit 03130002, 100 ft east of parking lot at main entrance.

Owner: U.S. Army, Fort McPherson.

AQUIFER.--Crystalline rock (Biotite gneiss).

WELL CHARACTERISTICS.--Drilled unused supply well, diameter 12 in., depth 338 ft, cased to 41 ft, open hole.

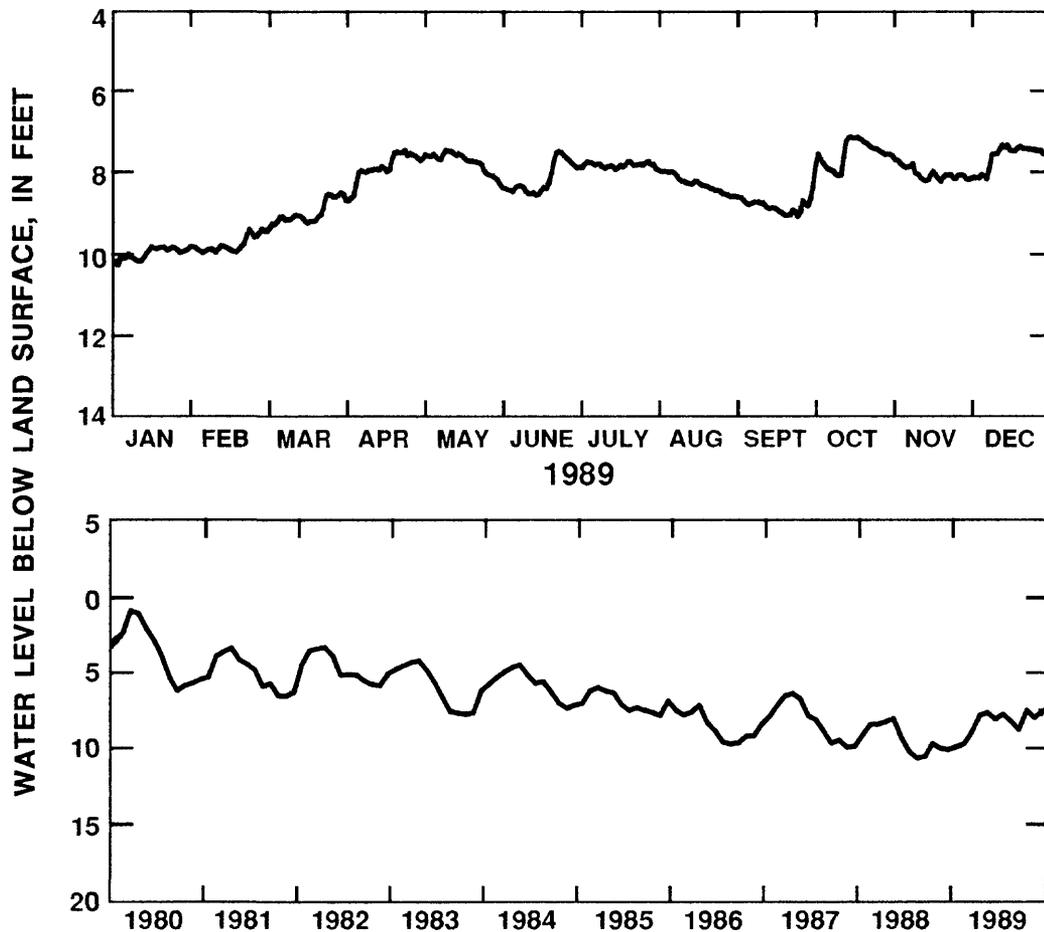
DATUM.--Altitude of land-surface datum is 1,013 ft.

Measuring point: Top of recorder shelf, 3.45 ft above land-surface datum..

REMARKS.--Well pumped and sounded February 14, 1976, to a depth of 338 ft. Well pumped and water sample collected November 26, 1985. Borehole geophysical survey conducted November 19, 1974. Water levels for period of missing record, December 22-26, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	9.94	9.74	8.96	7.86	7.70	8.13	7.79	8.26	8.82	7.54	8.03	7.62
MAX	10.21	9.94	9.40	8.66	8.27	8.53	7.90	8.58	9.08	8.07	8.23	8.17
MIN	9.79	9.35	8.46	7.41	7.41	7.45	7.71	7.92	8.35	7.12	7.69	7.33
CAL YR 1989			MEAN	8.36		HIGH	7.12		LOW	10.21		

Figure 98.--Water level in observation well 10DD02, Fulton County.

335517084164001 Local number, 11FF04.

LOCATION.--Lat 33°55'17", long 84°16'40", Hydrologic Unit 03130001, 6481 Peachtree Industrial Boulevard, 55 ft south of southeastern corner of building.

Owner: U.S. Geological Survey

AQUIFER.--Crystalline rock.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 620 ft, cased to 36 ft, open hole.

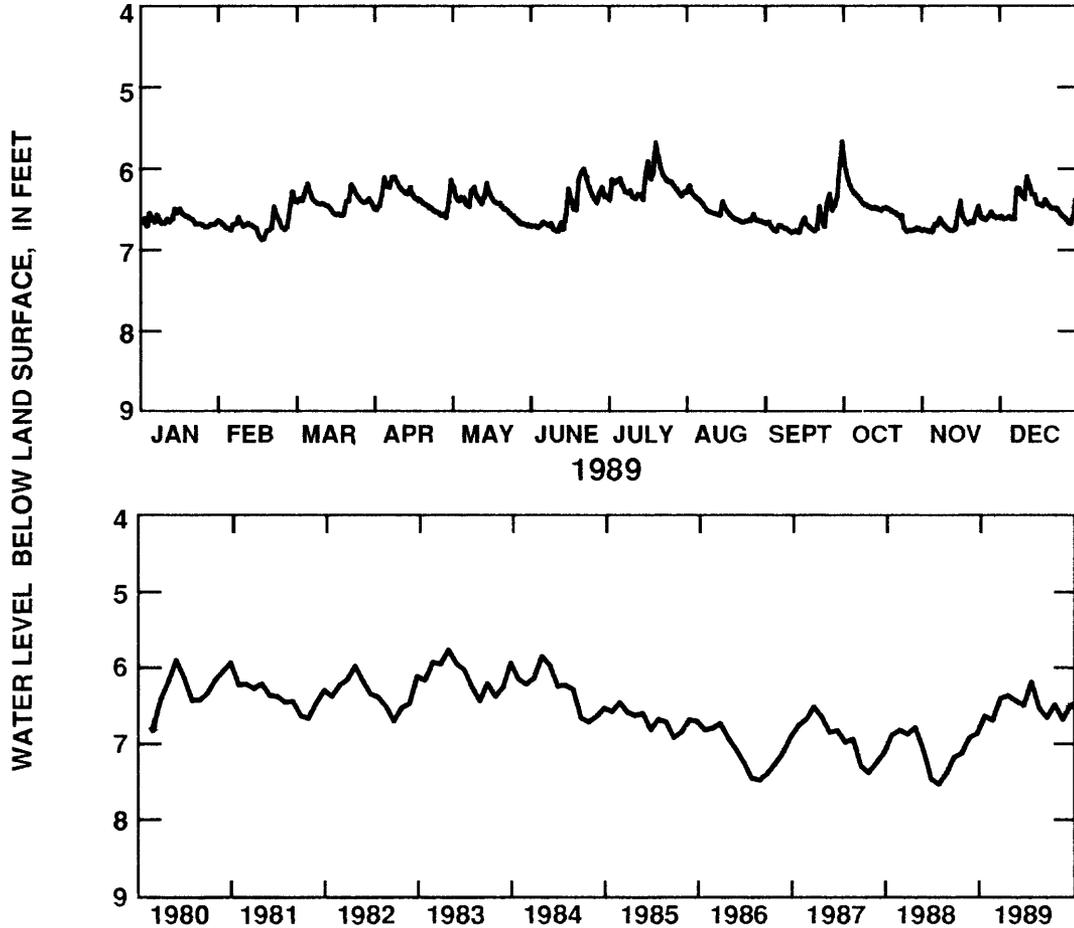
DATUM.--Altitude of land-surface datum is 950 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted April 18, 1980.

PERIOD OF RECORD.--February 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.46 ft below land-surface datum, February 2, 1983; lowest, 7.66 ft below land-surface datum, July 20, 1988.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	6.62	6.68	6.40	6.36	6.43	6.49	6.18	6.53	6.65	6.48	6.67	6.49
MAX	6.71	6.87	6.57	6.60	6.70	6.77	6.38	6.67	6.80	6.79	6.79	6.70
MIN	6.48	6.28	6.17	6.09	6.13	6.00	5.67	6.21	5.99	5.67	6.41	6.11
CAL YR 1989			MEAN	6.50		HIGH	5.67		LOW	6.87		

Figure 99.--Water level in observation well 11FF04, DeKalb County.

341020083201701 Local number, 19HH12.

LOCATION.--Lat 34°10'20", long 83°20'17", Hydrologic Unit 03060104, 2.5 mi west of the intersection of Ga. Highways 98 and 106 in Ila, approximately 0.8 mi south of Ga. Highway 98.

Owner: Meadowlake Estates.

AQUIFER.--Crystalline rock.

WELL CHARACTERISTICS.--Drilled unused supply well, diameter 6 in., depth 185 ft, cased to 50 ft, open hole.

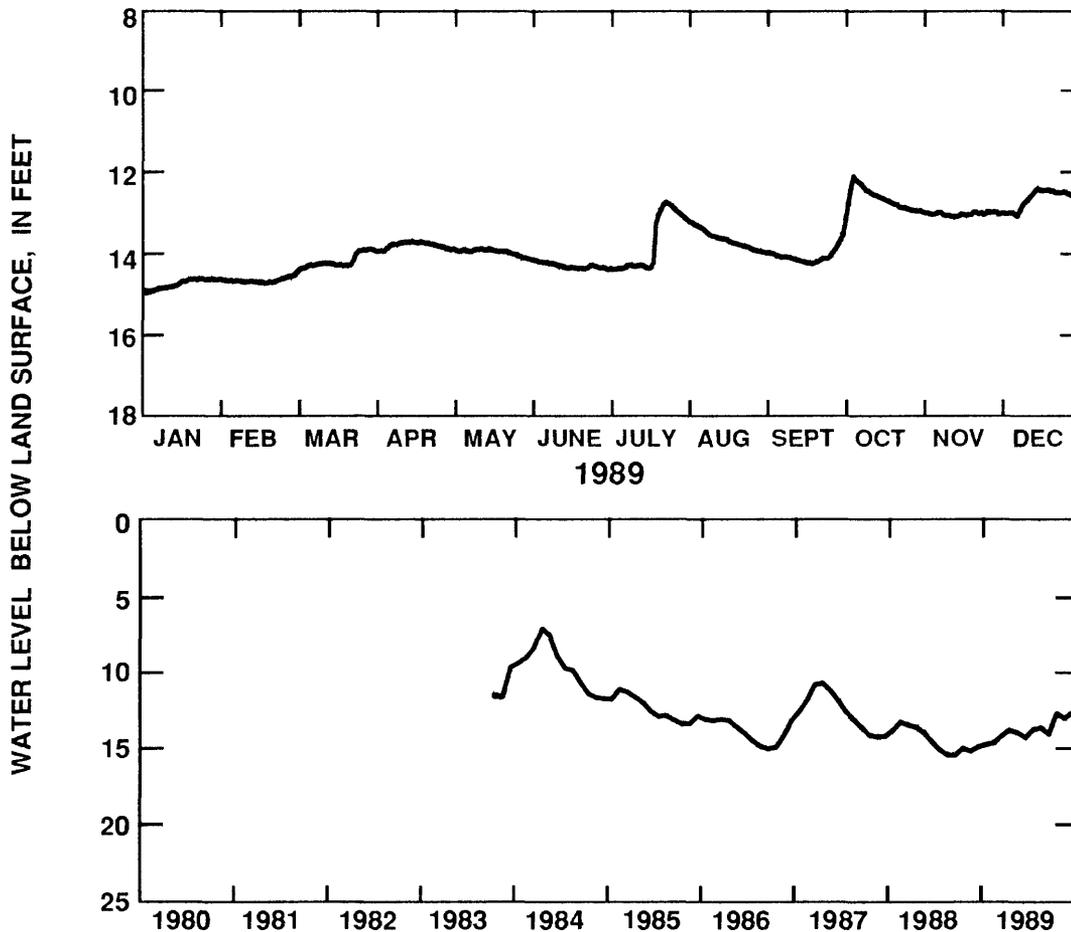
DATUM.--Altitude of land-surface datum is 800 ft.

Measuring point: Top of recorder shelf, 3.0 ft above land-surface datum.

REMARKS.--Water levels for periods of missing record, June 28 to July 12, and September 19 to October 3, 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.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	14.72	14.64	14.17	13.78	13.95	14.27	13.73	13.63	14.04	12.66	13.01	12.64
MAX	14.93	14.71	14.43	13.92	14.12	14.36	14.36	13.96	14.23	13.16	13.07	13.06
MIN	14.61	14.50	13.87	13.68	13.87	14.13	12.72	13.19	13.51	12.10	12.95	12.39
CAL YR 1989			MEAN	13.76		HIGH	12.10		LOW	14.93		

Figure 100.--Water level in observation well 19HH12, Madison County.

332808083010201 Local number, 21BB04.

LOCATION.--Lat 33°28'08", long 83°01'02", Hydrologic Unit 03070101, 1.1 mi east of Ga. Highway 17 at White Plains, and 50 ft north of the centerline of Veazey Road.

Owner: Charles Veazey.

AQUIFER.--Crystalline rock.

WELL CHARACTERISTICS.--Drilled unused supply well, diameter 6 in., depth 497 ft, cased to 15 ft, open hole.

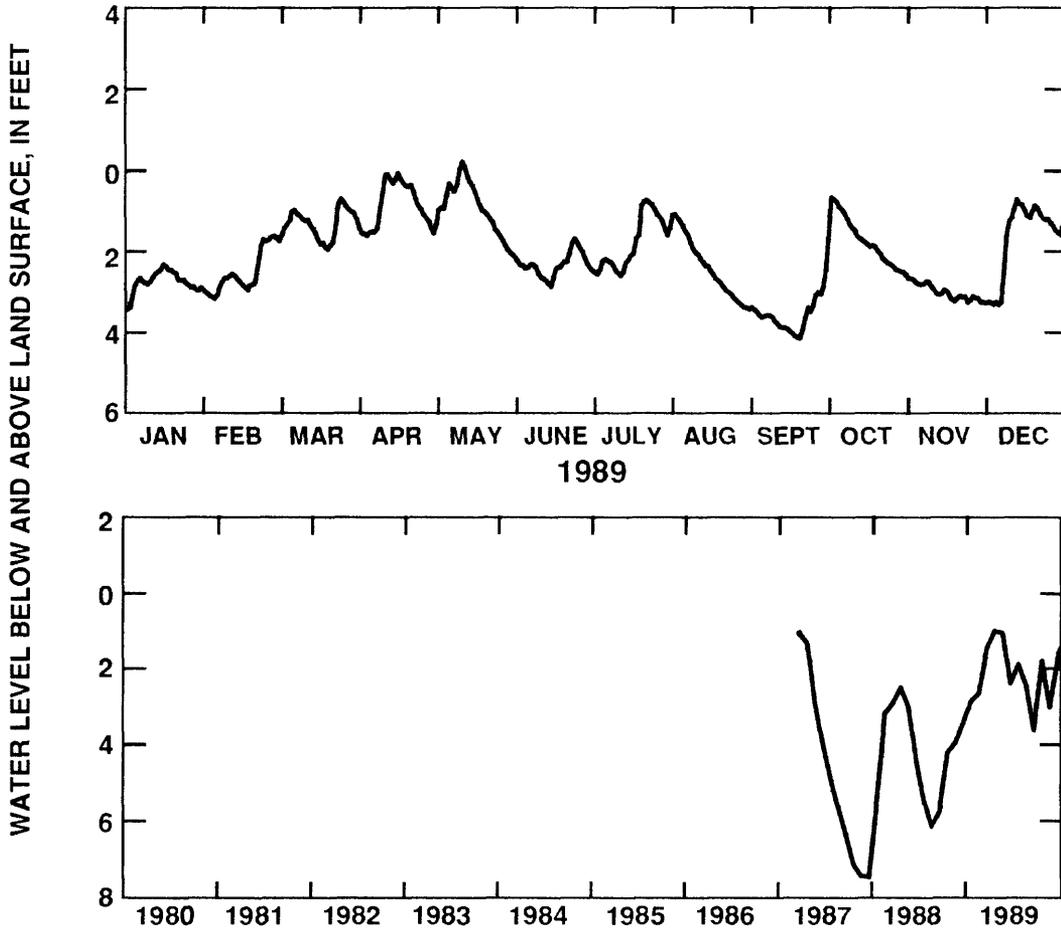
DATUM.--Altitude of land-surface datum is 675 ft.

Measuring point: Top of recorder shelf, 2.5 ft above land-surface datum.

REMARKS.--Borehole geophysical survey conducted March 13, 1987. Water levels for period of missing record, June 9-10, were estimated.

PERIOD OF RECORD.--March 13, 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.18 ft above land-surface datum, May 11, 1989; lowest, 7.58 ft below land-surface datum, December 7, 1987.



1989	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MEAN	2.78	2.56	1.35	.89	.94	2.30	1.79	2.36	3.53	1.69	2.93	1.61
MAX	3.44	3.19	1.96	1.63	2.07	2.84	2.57	3.37	4.08	2.50	3.18	3.23
MIN	2.36	1.65	.73	.10	-.18	1.67	.72	1.06	2.41	.62	2.60	.65
CAL YR 1989	MEAN		2.05		HIGH		-.18		LOW		4.08	
[Negative value indicates water level above land surface]												

Figure 101.--Water level in observation well 21BB04, Greene County.

CHLORIDE CONCENTRATIONS IN THE FLORIDAN AQUIFER SYSTEM

Chloride concentrations in water from the Floridan aquifer system have been monitored periodically in coastal Georgia since the 1950's. Chloride concentrations in the Upper Floridan aquifer over most of the coastal Georgia area are less than 40 mg/L (Clarke and others, 1990, p. 48), which is within the 250 mg/L drinking-water standard established by the Georgia Department of Natural Resources (1977) and the U.S. Environmental Protection Agency (1986b). Chloride concentrations in the Upper Floridan aquifer that exceed drinking-water standards have been detected only in the Brunswick area.

Savannah Area

Saltwater has the potential to enter the Floridan aquifer system in the Savannah area by encroachment from the sea or to a lesser extent, by upconing (upward leakage) from deeper zones (Clarke and others, 1990, p. 48). Chloride concentrations in the Upper Floridan aquifer in the Savannah area generally increase toward the eastern part of Chatham County (Joiner and others, 1989, p. 162).

At Savannah, 12 wells are sampled on a monthly basis, records from five are included in this report (figs. 102-103). Data from these wells indicate that chloride concentrations generally increase with depth below land surface in the Savannah area (fig. 103). This increase is illustrated by chloride graphs for one well tapping the Upper Floridan aquifer and four wells tapping the Lower Floridan aquifer. During 1989, water samples from well 37Q185 (interval tapped 274-360 ft) tapping the Upper Floridan aquifer had concentrations of less than 10 mg/L. In the Lower Floridan aquifer, water samples from well 38Q004 (interval tapped 606-657) had concentrations of less than 200 mg/L. However, water samples from wells 39Q018 (interval tapped, 630-670 ft) and 39Q017 (interval tapped, 710-745 ft) had concentrations of less than 900 mg/L, and water samples from well 38Q196 (interval tapped, 870-925 ft) had chloride concentrations of 5,300 to 5,500 mg/L in 1989.

Chloride concentrations in the Floridan aquifer system at Savannah showed little change during 1980-89 (fig. 103). In the Upper Floridan aquifer, chloride concentrations in water from well 37Q185 ranged from 2 to 7 mg/L during 1986-89. During the same period, the chloride concentrations in water from the Lower Floridan aquifer ranged from 160 to 170 mg/L in well 38Q004, from 600 to 620 mg/L in well 39Q018, and from 820 to 840 mg/L in well 37Q017. The concentration in water from well 38Q196, tapping the Lower Floridan aquifer increased from 5,300 mg/L in January 1980 to 5,400 mg/L in December 1989.

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. This water-level decline has allowed saltwater to migrate upward into the Upper Floridan aquifer in Brunswick where chloride concentrations in the upper water-bearing zone are greater than 2,000 mg/L at three known locations.

About 80 wells in Glynn County, mostly in the Brunswick area, are pumped and sampled semi-annually for chloride analysis (fig. 104). Chloride graphs from eight of these wells are included in this report (figs. 105, 106). Observed changes in chloride concentrations in these wells may be attributed to areal variations in pumping that have altered water-level gradients; and thus, the direction of chloride migration.

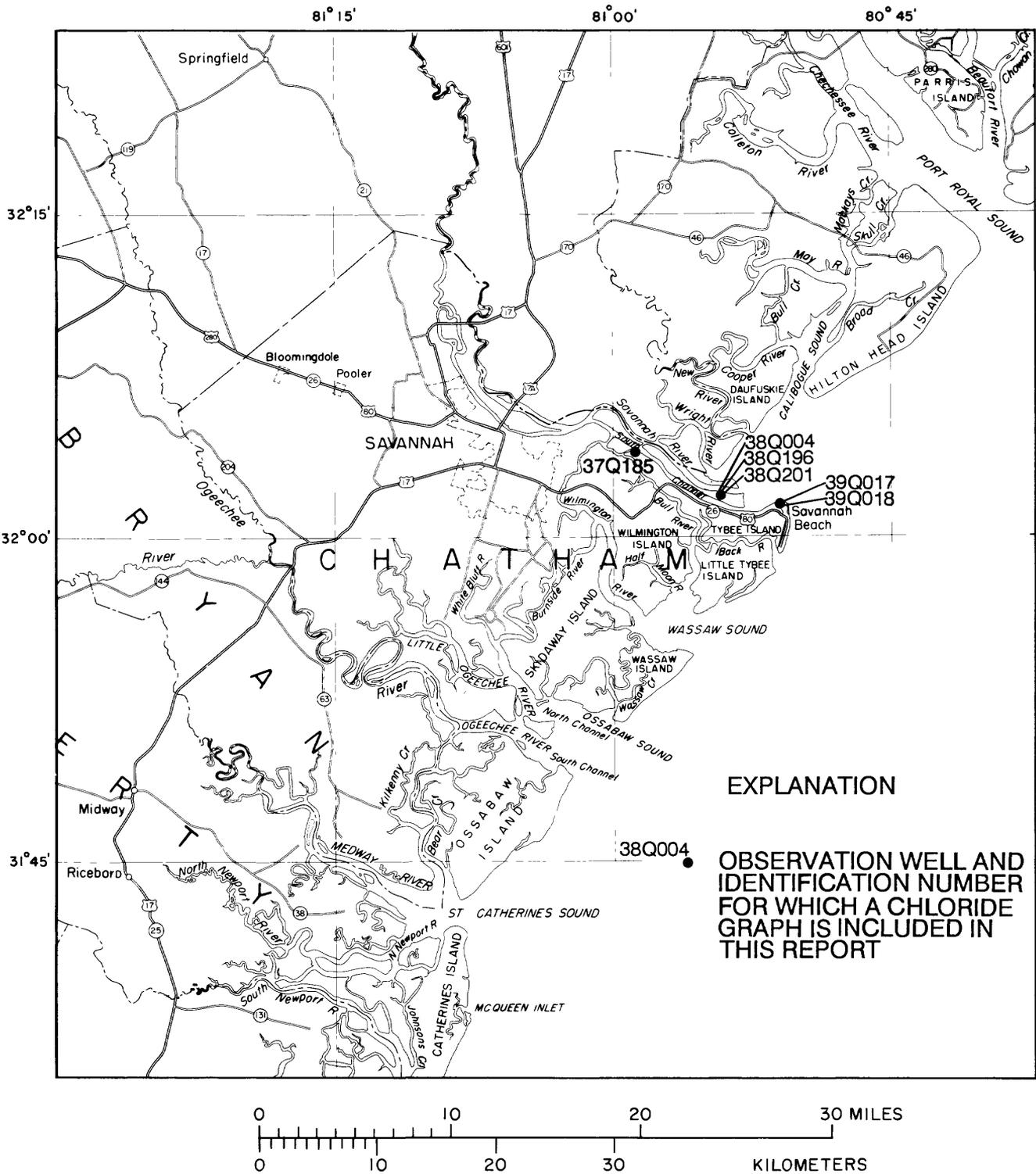


Figure 102.--Locations of chloride-monitoring wells completed in the Floridan aquifer system in the Savannah area.

CHLORIDE CONCENTRATION, IN MILLIGRAMS PER LITER

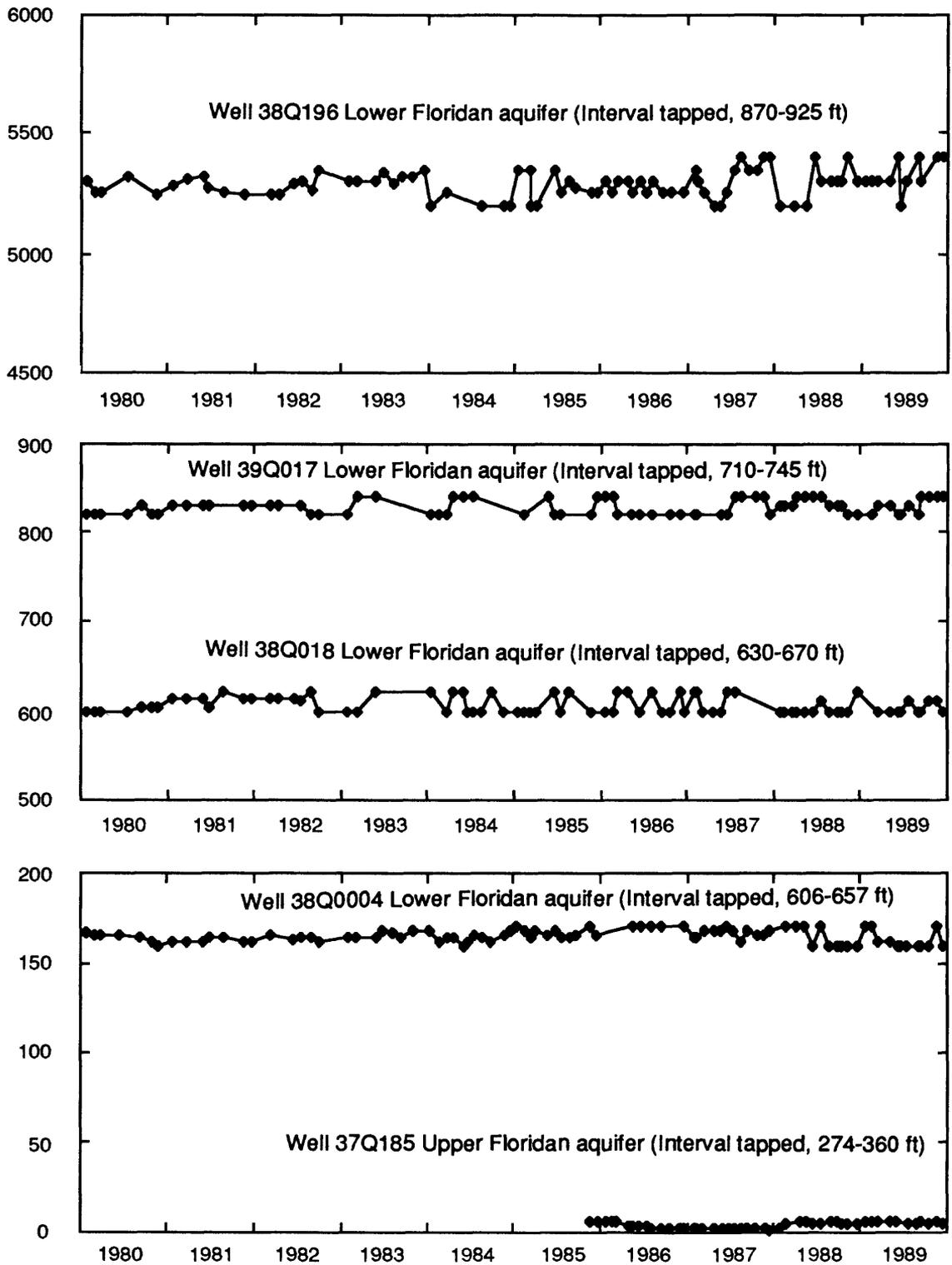
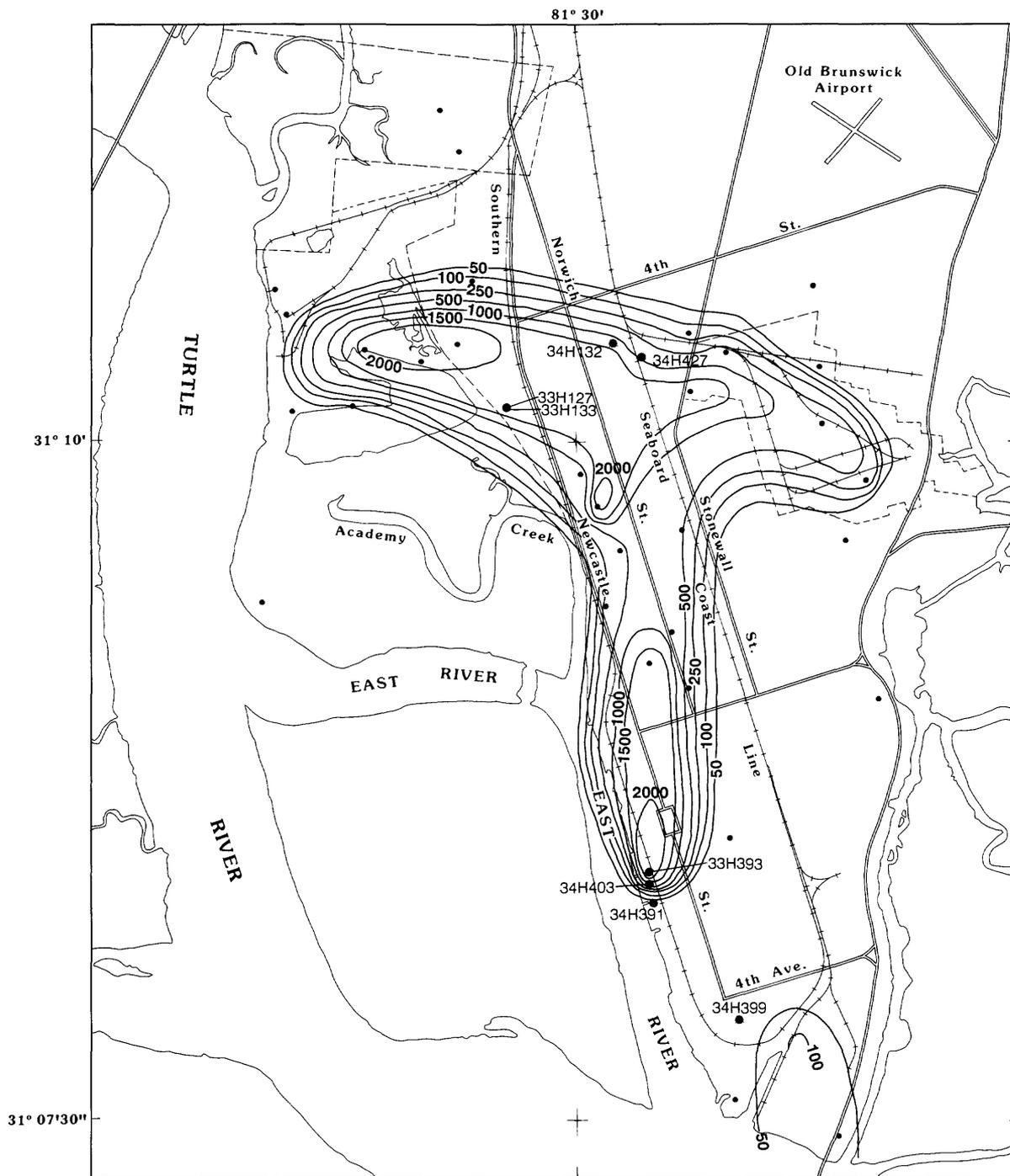
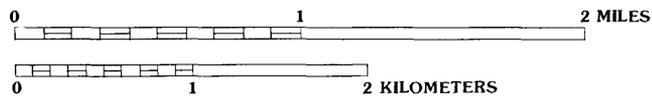


Figure 103.-- Chloride concentrations in the Upper and Lower Floridan aquifers in the Savannah area.



Base from U.S. Geological Survey
 Brunswick East 1:24,000, 1979
 Brunswick West 1:24,000, 1979



EXPLANATION

- 500 — LINE OF EQUAL CHLORIDE CONCENTRATION--
Interval varies, in milligrams per liter
- 33H133 OBSERVATION WELL FOR WHICH A CHLORIDE GRAPH IS
INCLUDED IN THIS REPORT
- DATA POINT

Figure 104.--Chloride concentrations and locations of chloride-monitoring wells in the upper water-bearing zone of the Upper Floridan aquifer in the Brunswick area, October 1989.

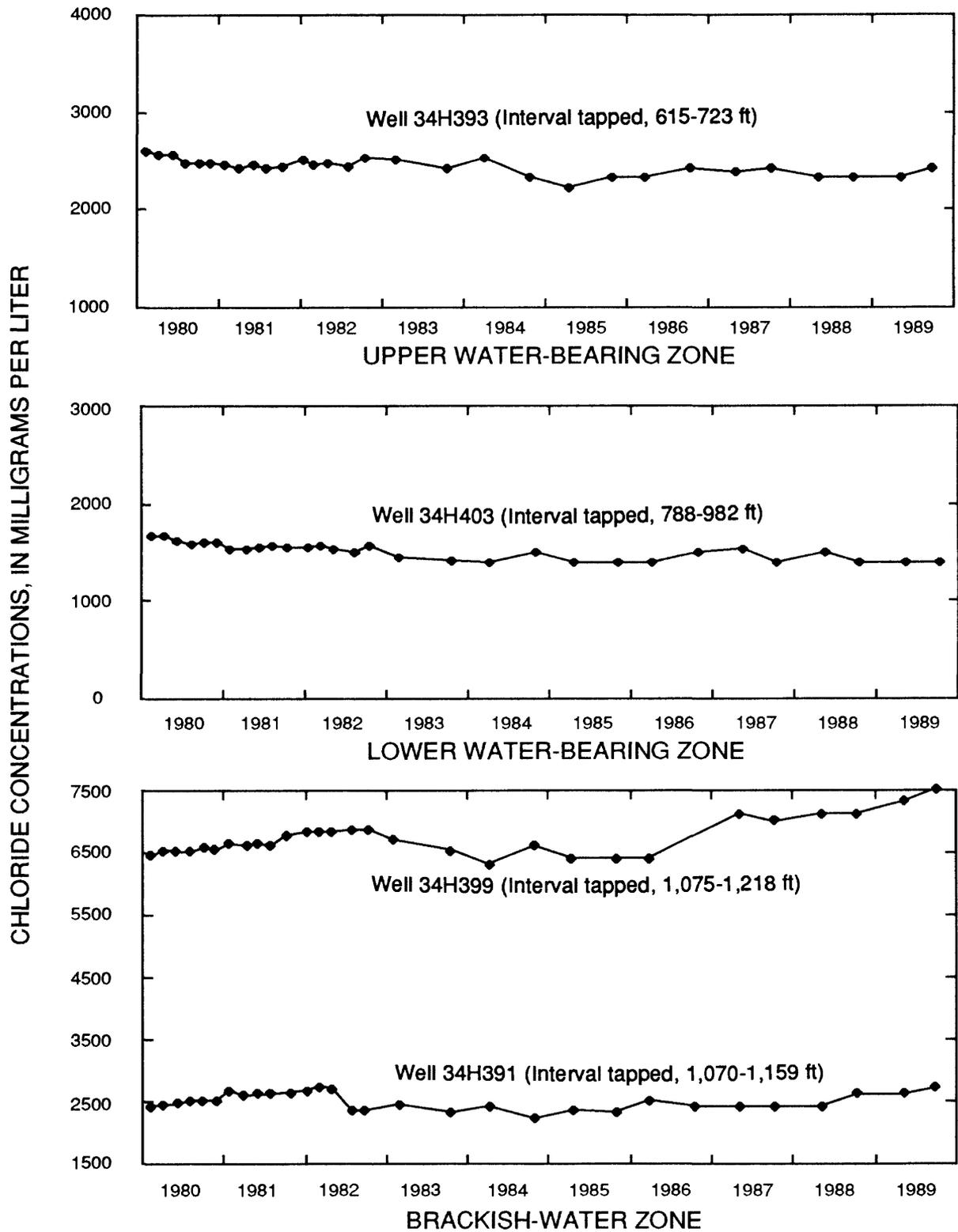


Figure 105.--Chloride concentrations in the Floridan aquifer system in the Bay Street area of Brunswick

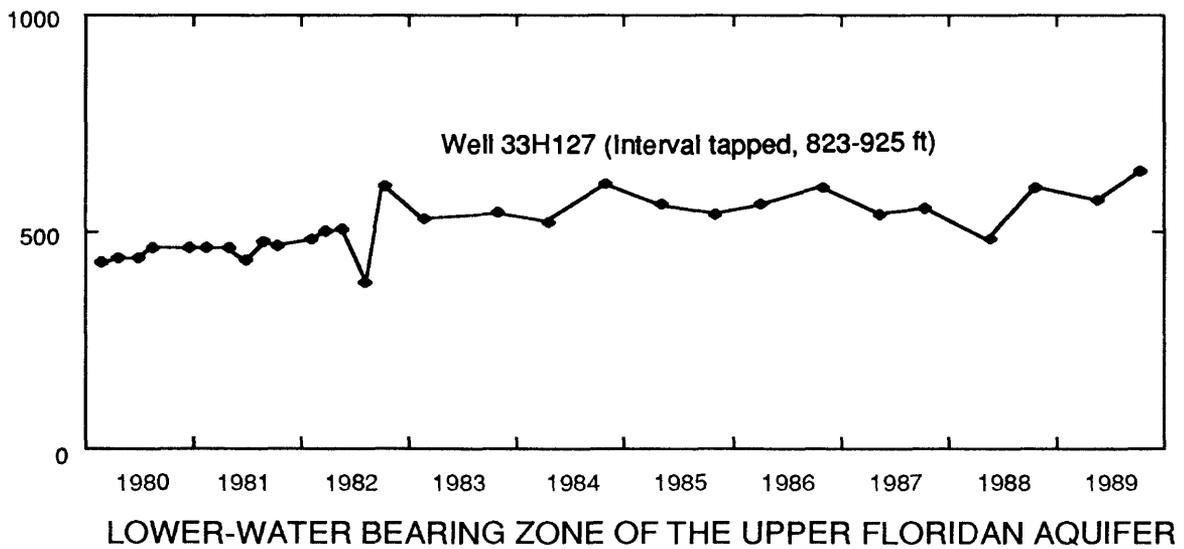
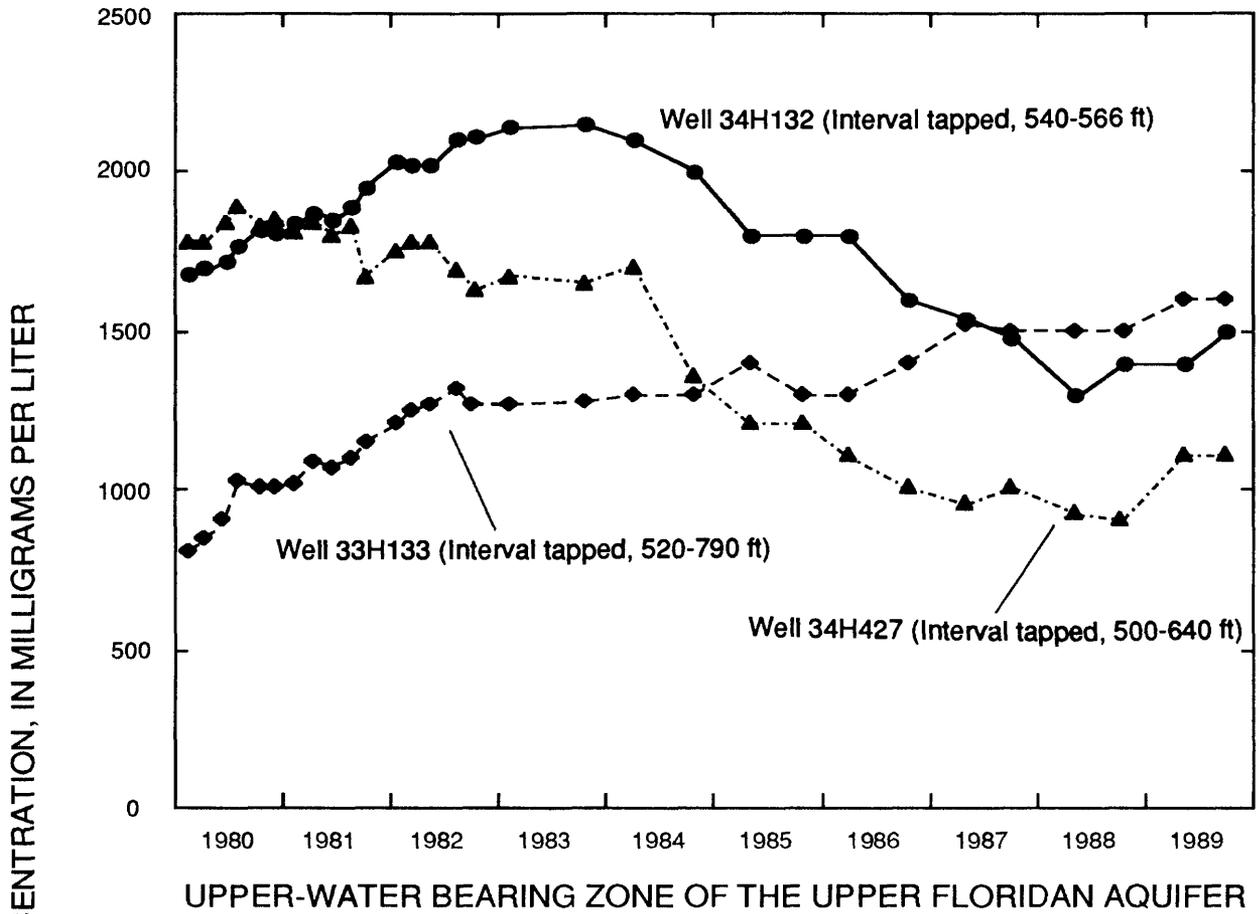


Figure 106.--Chloride concentrations in the Floridan aquifer system in the north Brunswick area.

In the Bay Street area of Brunswick, the chloride concentrations in water from the upper and lower water-bearing zones of the Upper Floridan aquifer decreased slightly during 1980-89 (fig. 105). The chloride concentration in water from well 34H393, which taps the upper water-bearing zone were between 2,200 and 2,570 mg/L during 1980-89. From February 1980 to October 1989, the chloride concentration in water from the well had decreased 170 mg/L. Well 34H403, which taps the lower water-bearing zone, yielded water that had chloride concentrations between 1,400 and 1,675 mg/L during 1980-89. From February 1980 to October 1989, the chloride concentration in water from this well decreased 265 mg/L.

In the Bay Street area, chloride concentrations in water from the brackish-water zone in the upper part of the Lower Floridan aquifer increased during 1980-89 (fig. 105). Water from well 34H391, which taps the brackish-water zone, had a chloride concentration of 2,700 mg/L in October 1989, which was 100 mg/L greater than that measured in 1988 and 200 mg/L greater than that measured in 1980. Well 34H399, in the south Brunswick area also taps the brackish-water zone. Water in this well had a chloride concentration of 7,500 mg/L at the end of 1989, which was 400 mg/L greater than that measured in 1988, and 925 mg/L greater than that measured in 1980.

The chloride concentration in the upper water-bearing zone in the north Brunswick area decreased in two of the three wells included in this report during 1980-89 (wells 34H132 and 34H427, fig. 106). In well 34H132, the concentration decreased from 1,680 mg/L in February 1980 to 1,500 mg/L in October 1989. The concentration in water from well 34H427 decreased from 1,780 mg/L in February 1980 to 1,100 mg/L in October 1989. In water from well 33H133, also tapping the upper water-bearing zone in the north Brunswick area, the chloride concentration generally increased during 1980-89. In February 1980, the concentration in water from this well was 804 mg/L and in October 1989 the concentration was 1,600 mg/L, an increase of 796 mg/L.

In the lower water-bearing zone in the north Brunswick area, the chloride concentration in water from well 33H127 increased during 1980-89 (fig. 106). The concentration was 428 mg/L in February 1980, and 640 mg/L in October 1989, an increase of 212 mg/L. Chloride concentrations in the well increased 40 mg/L during 1988-89.

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