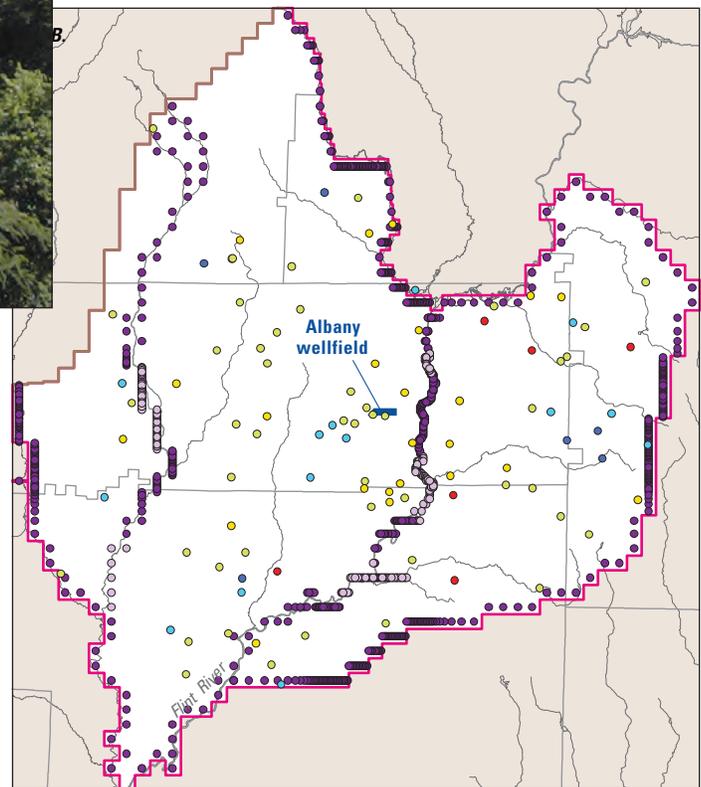


Prepared in cooperation with the  
Albany Water, Gas, and Light Commission

## Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007



Open-File Report 2008–1328

*Cover*

Photo: Flint River at Albany, Georgia.

Map: Albany wellfield area model.

# **Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007**

By Debbie Warner Gordon

Prepared in cooperation with the Albany Water, Gas, and Light Commission

Open-File Report 2008–1328

**U.S. Department of the Interior**  
**U.S. Geological Survey**

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## Conversion Factors

<b>Multiply</b>	<b>By</b>	<b>To obtain</b>
Length		
inch	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Flow Rate		
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m <sup>3</sup> /s)

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88), except where indicated otherwise.

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Altitude, as used in this report, refers to distance above the vertical datum.

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius ( $\mu\text{S}/\text{cm}$  at 25 °C).

Concentrations of chemical constituents in water are given in milligrams per liter (mg/L).

# Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007

By Debbie Warner Gordon

## Abstract

The U.S. Geological Survey (USGS) has been working with the Albany Water, Gas, and Light Commission to monitor ground-water quality and availability since 1977. This report presents an overview of ground-water conditions and studies in the Albany area of Dougherty County, Georgia, during 2007. Historical data are also presented for comparison with 2007 data. Ongoing monitoring activities include continuous water-level recording in 24 wells and monthly water-level measurements in 5 wells. During 2007, water levels in 21 of the continuous-recording wells were below normal, corresponding to lower than average rainfall. Ground-water samples collected from the Upper Floridan aquifer indicate that nitrate levels have decreased or remained about the same since 2006.

Water samples were collected from the Flint River and wells at the Albany wellfield, and data were plotted on a trilinear diagram to show the percent composition of selected major cations and anions. Ground-water constituents (major cations and anions) of the Upper Floridan aquifer at the Albany wellfield are distinctly different from those in the water of the Flint River.

To improve the understanding of the ground-water flow system and nitrate movement in the Upper Floridan aquifer, the USGS is developing a ground-water flow model in the southwestern Albany area of Georgia. The model is being calibrated to simulate periods of dry (October 1999) and relatively wet (March 2001) hydrologic conditions. Preliminary water-level simulations indicate a generally good fit to measured water levels.

## Introduction

Long-term heavy pumping from the Claiborne and Clayton aquifers and the Cretaceous aquifer system (Providence aquifer), which underlie the Upper Floridan aquifer, has resulted in substantial water-level declines in these deep aquifers in the Albany area. To provide additional water supply and reduce the demand on the deep aquifers, the Albany Water, Gas, and Light Commission (WGL) has developed a large wellfield southwest of Albany. The supply wells at this location are open to the Upper Floridan aquifer, a karstic unit that is the uppermost reliable source of water in

the area. Because of local recharge to the aquifer, water quality may be affected by land-use practices. Nitrate levels exceeding the 10-milligrams-per-liter (mg/L) maximum contaminant level (MCL) (U.S. Environmental Protection Agency, 2000) have been detected in some wells upgradient from the wellfield. The complexity of the ground-water flow system and water quality of the Upper Floridan aquifer near the wellfield prompted development of a cooperative water program between the U.S. Geological Survey (USGS) and WGL.

## Albany Water, Gas, and Light Commission Cooperative Water Program

To address concerns about the quality and availability of ground water in the Albany area, the USGS and WGL initiated a cooperative water program during 1977. The Federal-State Cooperative Water Program (CWP) is a partnership between the USGS, State, and local agencies that provides information that forms the foundation for many of the Nation's water-resources management and planning activities. The information also may function as an early warning for emerging water problems. The fundamental characteristic of the CWP is that local and State agencies provide at least one-half the funds, and the USGS performs most of the work. The USGS uses consistent techniques to collect and archive data and the information is stored in a common database available on the Web. The knowledge gained in these studies is published and added to the growing body of information about the hydrology of the area.

## Purpose and Scope

Hydrologic, geologic, and water-quality data are needed to manage water resources effectively in the city of Albany and Dougherty County area. The objectives of the Albany CWP are to (1) augment the current level of understanding of the hydrogeologic framework of the Upper Floridan aquifer and the occurrence of nitrate contamination near the WGL wellfield, (2) monitor water-level fluctuations in the four aquifers used in the area and relate water-level trends to changes in climatic conditions and pumping patterns, and (3) evaluate and monitor water quality in the Upper Floridan aquifer as pumping patterns and land-use activities change.

## 2 Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007

This report provides an overview of ground-water conditions through 2007 and studies conducted as part of the Albany CWP during 2007. This includes a summary of ground-water conditions based on continuous monitoring of water levels in a 24-well network (fig. 1), construction of a potentiometric surface map for the Upper Floridan aquifer based on 58 water-level measurements collected during October 2007, collection and analysis of water samples from 13 wells and one Flint River site during October 2007 for analysis of dissolved nitrate and major ions, continuous monitoring of streamflow at one gage on the Flint River (gage 02352500, fig. 1) and one gage on Chickasawhatchee Creek (gage 02354410, fig. 1), and continuous monitoring of precipitation at the Flint River at Albany streamgage (gage 02352500, fig. 1) and at Albany State University (Flint River Water, Planning, and Policy Center ((FRWPPC)) Albany State University, fig. 1). Water-level data for each well for the period of record, nitrate concentrations from 1998 to 2007, precipitation data from 2004 to 2007, and water-use data every 5 years from 1980 to 2007 are presented for comparison with the 2007

data. In addition to monitoring, the USGS is developing a ground-water flow model to simulate ground-water flow and nitrate flow paths near the wellfield. As part of the CWP, water levels are monitored in all of Dougherty County, two wells in Lee County, and one well in Baker County, Georgia (fig. 1).

### Acknowledgments

The author appreciates the technical feedback, guidance, and data provided by staff of WGL, including Keith Goodin, Lee Daniel, Gary Morfield, and Jim Stolze. Several USGS employees played an important role in the collection, processing, and quality assurance of ground-water data, including John M. McCranie, Mark S. Reynolds, O. Gary Holloway, Stephen J. Lawrence, and Michael F. Peck. Appreciation is extended to Dorothy F. Payne for consultation and advice during ground-water model development, and to Jaime A. Painter for geographic information system applications. Cartographic design and layout were provided by Caryl J. Wipperfurth and Bonnie J. Turcott.

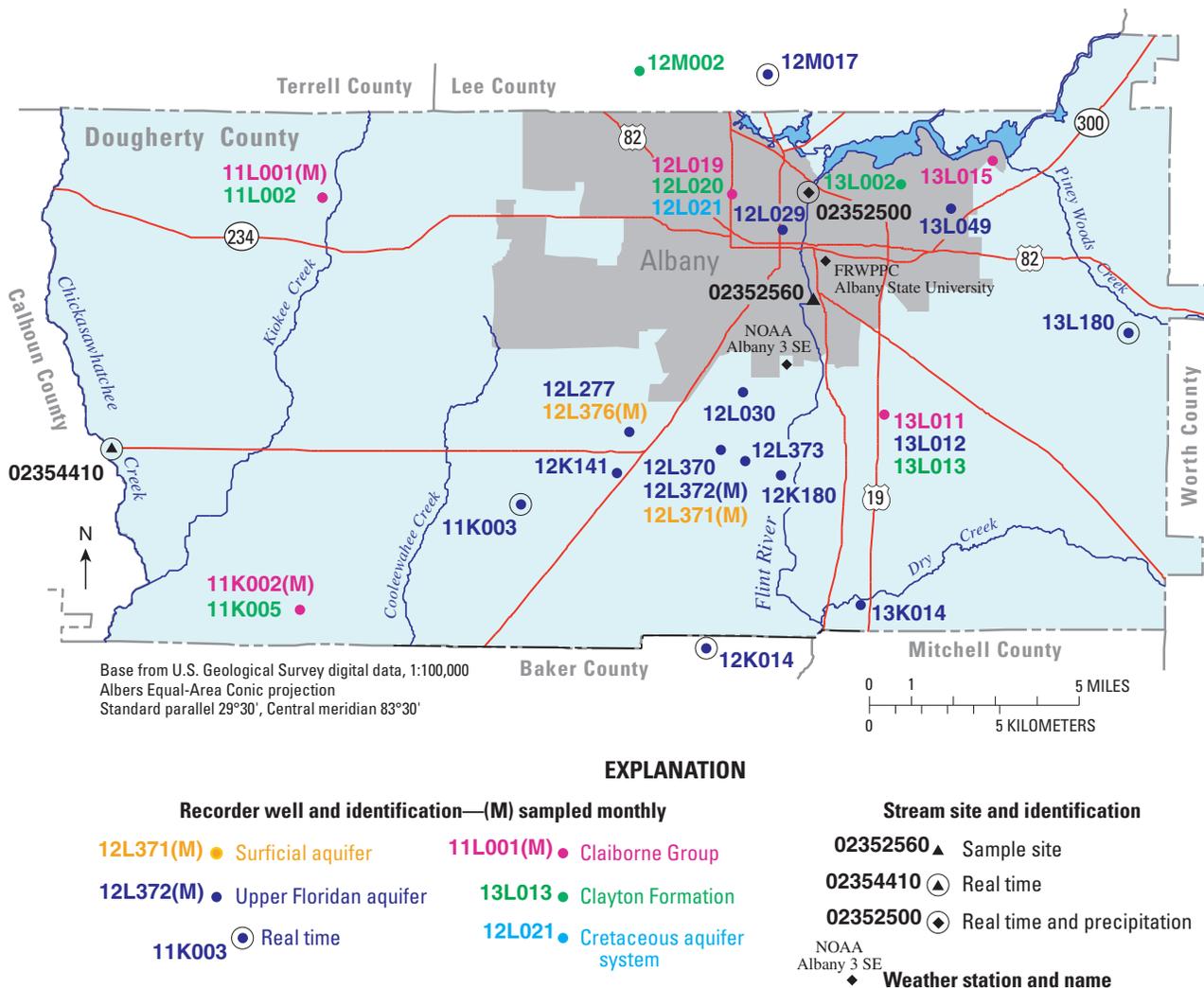


Figure 1. Monitoring wells and streamgages in the Albany area of Dougherty County, Georgia.

## Ground-Water Conditions

Ground-water levels in the Albany area of Dougherty County have been monitored for several decades as part of the CWP. Precipitation and ground-water pumpage also are monitored to assess their influence on ground-water conditions. Nitrate concentrations in wells near the Albany wellfield have been analyzed since the late 1990s. These data are used to guide water-management decisions by State and local authorities.

### Factors Influencing Ground-Water Levels

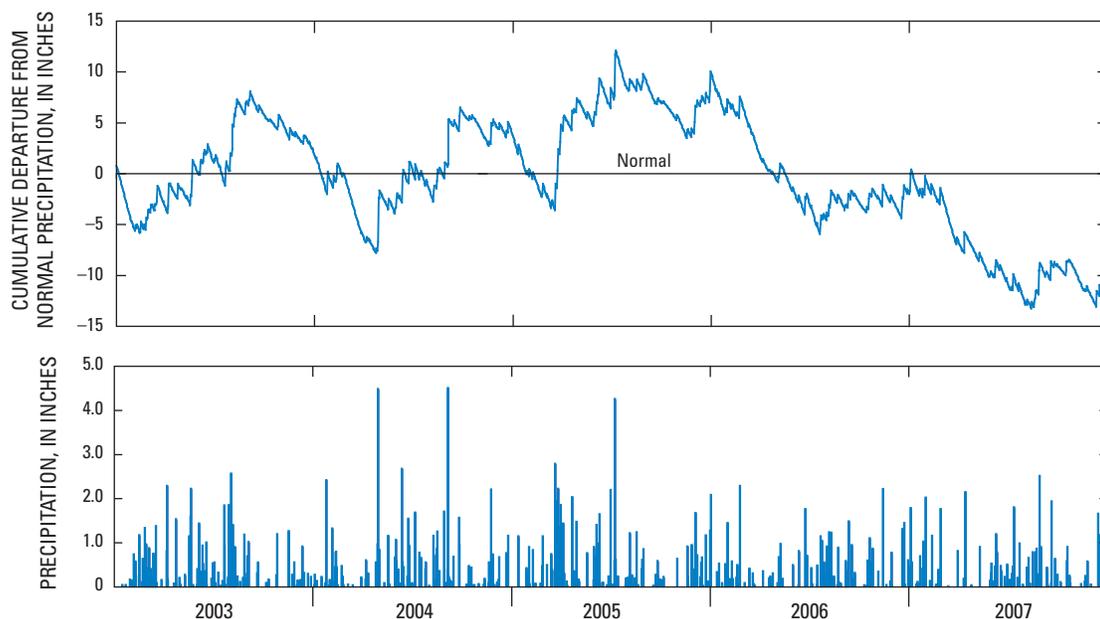
Fluctuations and long-term trends in ground-water levels occur as a result of changes in recharge to and discharge from an aquifer. Recharge rates vary in response to precipitation, evapotranspiration, and surface-water infiltration into an aquifer. Discharge occurs as natural flow from an aquifer to streams or springs, as evapotranspiration from shallow water-table aquifers, as leakage to vertically adjacent aquifers, and as withdrawal (pumpage) from wells.

### Precipitation

Precipitation in the Albany area of Dougherty County influences ground-water levels in the shallow surficial aquifer system and to a lesser degree in the Upper Floridan aquifer. Changes in precipitation also affect quantities of ground water withdrawn from deeper aquifers and, thus, have an indirect effect on ground-water levels in the Claiborne, Clayton, and Providence aquifers. To monitor precipitation in the Albany area of Dougherty County a real-time climatic site at Albany State University (fig. 1) is operated by the College of Agriculture and Environmental Sciences, University of Georgia, and a real-time streamgauge and

precipitation site at the Flint River at Albany is operated by the USGS (gage 02352500, fig. 1). Real-time monitoring data for these sites are accessible at <http://www.griffin.uga.edu/aemn/cgi-bin/AEMN.pl?site=GAAB>, and [http://waterdata.usgs.gov/ga/nwis/uw/?site\\_no=02352500&PARAMeter\\_cd=00045](http://waterdata.usgs.gov/ga/nwis/uw/?site_no=02352500&PARAMeter_cd=00045), respectively (accessed on July 22, 2008). Precipitation data are also available for the Albany, Georgia area, from the National Oceanic and Atmospheric Administration (Albany 3 SE, NOAA, fig. 1) at <http://cdo.ncdc.noaa.gov/climatenormals/clim84/GA/GA090140.txt> (accessed on June 26, 2008).

Precipitation and cumulative departure from normal data for January 1, 2003, through December 31, 2007 (NOAA's Albany 3 SE climatic station, fig. 1), are shown in figure 2. The cumulative departure from normal precipitation data can be used to evaluate trends in precipitation, which typically relate to recharge of shallow aquifers. Cumulative departure from normal precipitation data describe the long-term surplus or deficit of precipitation during a designated period and are derived by adding successive daily values of departures from normal precipitation data. In this report, daily precipitation data in inches and 30-year (dynamic) normals from NOAA's Albany 3 SE climatic station were used to calculate the cumulative departure from normal (data obtained from <http://cdo.ncdc.noaa.gov/climatenormals/clim84/GA/GA090140.txt>, accessed on June 26, 2008). Thirty-year (dynamic) normals are the daily 1971 through 2000 normal mean precipitation for the NOAA station Albany 3 SE ([http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl?directive=prod\\_select2&prodtype=CLIM84&subnum=](http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl?directive=prod_select2&prodtype=CLIM84&subnum=), accessed June 27, 2008). Negative values indicate below-normal precipitation, and positive values indicate above-normal precipitation. Cumulative departure data indicate below-normal rainfall since early 2006 (fig. 2).



**Figure 2.** Total daily precipitation data and cumulative departure from normal for January 1, 2003, through December 31, 2007 (NOAA site Albany 3 SE).

### Ground-Water Pumpage

The locations of ground-water pumping centers and amounts of water withdrawn from these centers may greatly affect ground-water levels in the Albany area of Dougherty County. Changes in pumping rates and the addition of new pumping centers may alter the configuration of potentiometric surfaces, reverse ground-water flow directions, and increase seasonal and long-term fluctuations in the aquifers.

During 2007, water was withdrawn in Dougherty County, at a rate of about 27.3 million gallons per day (Mgal/d), excluding irrigation pumping, of which 12.7 Mgal/d was for public supply and 14.7 Mgal/d was for industry (J.L. Fanning, U.S. Geological Survey, written commun., 2007). Irrigation pumping rose from about 10.9 Mgal/d during 1995 to

20.3 Mgal/d during 2000, then decreased to about 10 Mgal/d during 2005 (fig. 3). Irrigation-pumping data are not yet available for 2007; however, irrigation pumping during 2007 probably was greater than during 2005 because of the decrease in precipitation during 2007. The increase in irrigation pumping during 2000 reflects the drought that lasted from 1998 until late 2002.

Pumping for public supply decreased from about 16.5 Mgal/d during 1980 to about 12.7 Mgal/d during 2007. Industrial water use for paper and products increased by 4 Mgal/d from 1980 to 2007; for brewing increased by about 1 Mgal/d from 1980 to 2000, then decreased slightly during 2005 and 2007; and for pharmaceutical decreased by 4.3 from 1980 to 2007 (fig. 3; J.L. Fanning, U.S. Geological Survey, written commun., 2006).

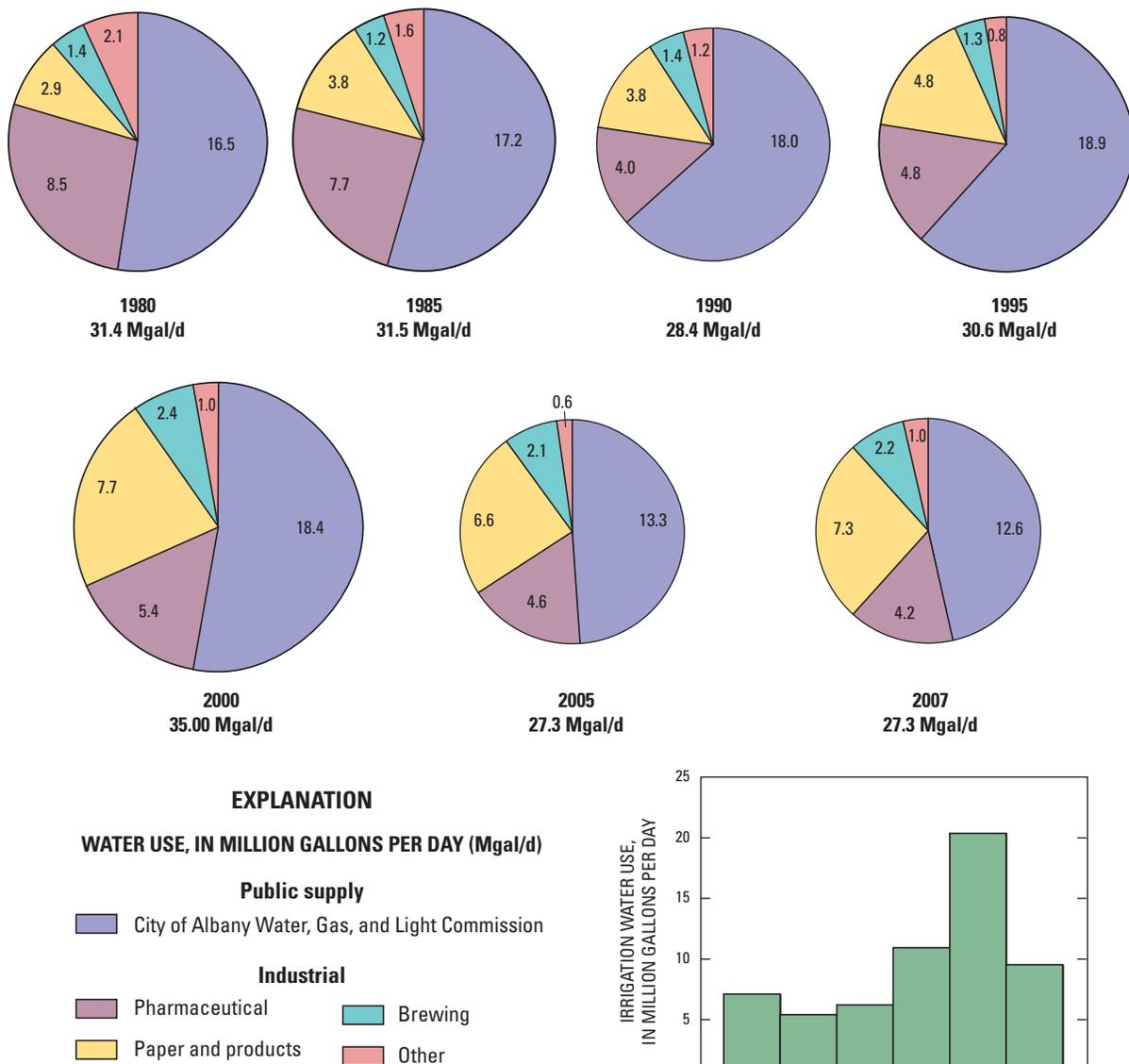


Figure 3. Water-use data from 1980 through 2007. Irrigation data for 2007 are not available.

### Streamflow

Streamflow is monitored in real time on the Flint River at Albany (gage 02352500) and Chickasawhatchee Creek near Leary (gage 02354410; fig. 1). The Flint River gage at Albany was installed during 1901, and the gage at Chickasawhatchee near Leary was installed during May 2001. Data for each site are available at <http://waterdata.usgs.gov/ga/nwis/rt>, (accessed July 21, 2008). Gage height at the Flint River at Albany was

below historic median for most of 2007 (fig. 4). The stream stage exceeded the historic median for brief periods during storms during the spring of 2007. Daily mean gage height data for the Chickasawhatchee Creek near Leary were close to the historic median from January to about May when stream levels dropped below the historic median through December (fig. 5). The low gage height at both sites corresponds to a period of below-normal precipitation (figs. 2, 4, and 5).

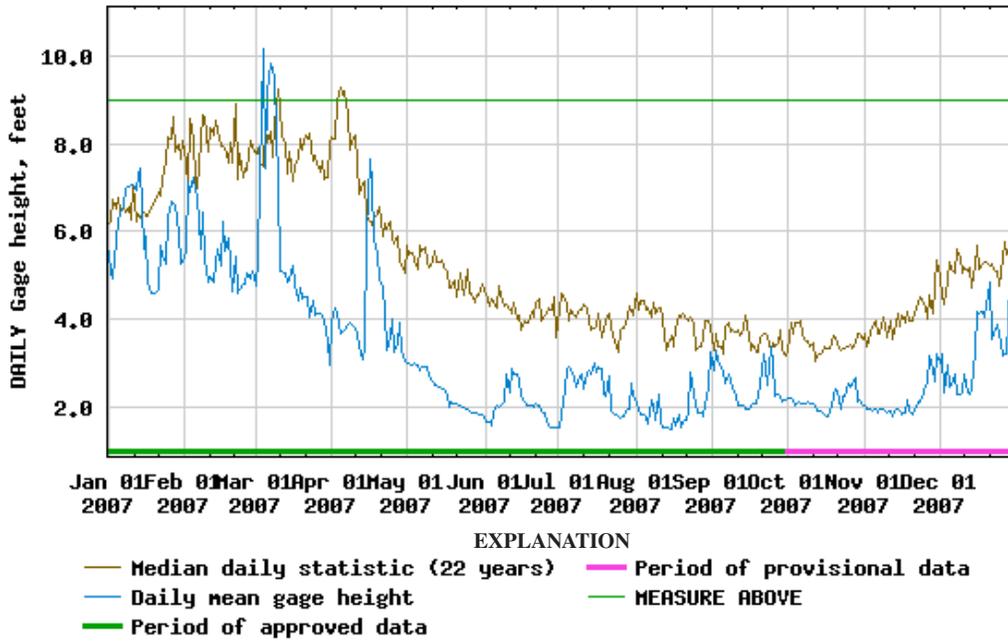


Figure 4. Daily mean gage height for the Flint River gage at Albany, Georgia (02352500), 2007.

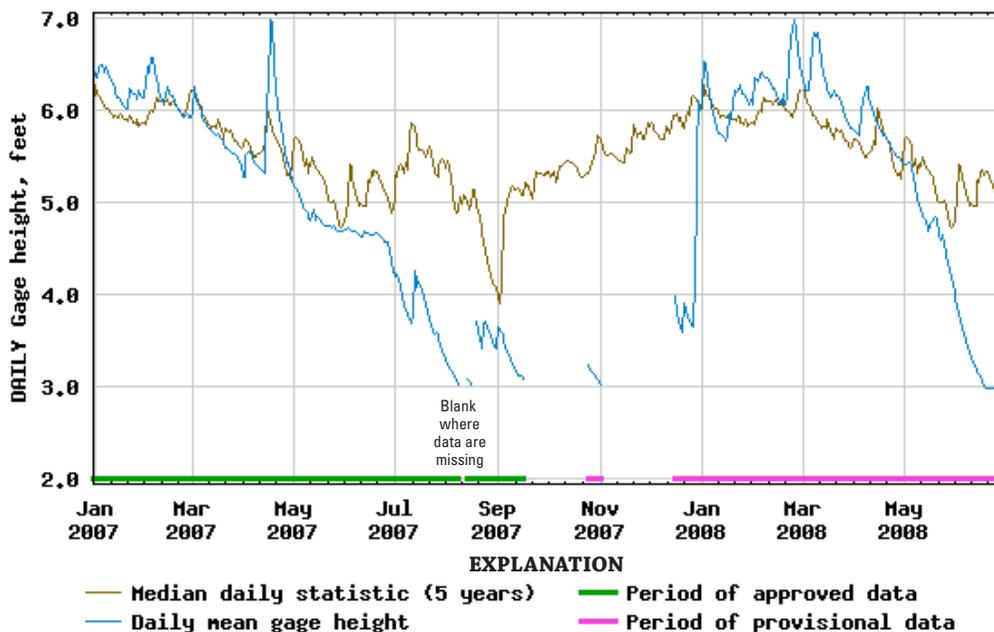


Figure 5. Daily mean gage height for the Chickasawhatchee Creek gage near Leary, Georgia (02354410), 2007.

## Ground-Water Levels

Ground-water levels in the Albany area of Dougherty County are continuously monitored in 14 wells as part of the CWP and in 10 additional wells in conjunction with other projects (fig. 1; table 1). Water levels are measured in another five wells on a monthly basis. All data are available on the Web at [http://waterdata.usgs.gov/ga/nwis/dv?referred\\_module=gw](http://waterdata.usgs.gov/ga/nwis/dv?referred_module=gw) (accessed July 18, 2008). Of the 29 wells, 15 monitor the Upper Floridan aquifer, 5 monitor the Claiborne aquifer, 6 monitor the Clayton aquifer,

1 monitors the Providence aquifer, and 2 monitor the surficial aquifer (fig. 1, table 1). Hydrographs showing annual daily mean (2007) water levels, monthly water-level statistics, and monthly mean water levels for the period of record for all continuous-monitored wells are presented in Appendix A. Hydrographs of water levels measured monthly are also shown in Appendix A. Hydrographs presented in Appendix A and wells listed in table 1 are ordered by aquifer, then sequentially by their site name (well identifier); thus, well 12K141 precedes well 12K180, which precedes well 12L029, and so forth.

**Table 1.** Recorder wells in the Albany area of Dougherty County, Georgia.

[\*, wells measured monthly; project/cooperator: WGL, Albany Water, Gas, and Light Commission; GaEPD, Georgia Environmental Protection Division; FRWPPC, Flint River Water, Planning, and Policy Center]

Well number	Well name	Aquifer	Project/cooperator	County
12L371*	Albany WGL	Surficial	Albany WGL	Dougherty
12L376*	Albany WGL	Surficial	Albany WGL	Dougherty
11K003	Nilo TW North	Upper Floridan	GaEPD	Dougherty
12K014	Blue Springs OW	Upper Floridan	GaEPD	Baker
12K141	Albany WGL A750 Lower	Upper Floridan	Albany WGL	Dougherty
12K180	EPD MW-2	Upper Floridan	Albany WGL	Dougherty
12L029	USGS TW 13	Upper Floridan	Albany WGL	Dougherty
12L030	USGS TW 16	Upper Floridan	Albany WGL	Dougherty
12L277	Albany WGL	Upper Floridan	Albany WGL	Dougherty
12L370	Albany WGL	Upper Floridan	Albany WGL	Dougherty
12L372*	Albany WGL	Upper Floridan	Albany WGL	Dougherty
12L373	EPD MW-1	Upper Floridan	Albany WGL	Dougherty
12M017	USGS TW 19	Upper Floridan	GaEPD	Lee
13K014	USGS TW 15	Upper Floridan	FRWPPC (Merck & Company)	Dougherty
13L012	USGS TW 3	Upper Floridan	Albany WGL	Dougherty
13L049	Turner 1	Upper Floridan	FRWPPC (Miller Brewing Company)	Dougherty
13L180	MCLB Corehole 3 Lower Ocala	Upper Floridan	GaEPD	Dougherty
12L019	USGS TW 5	Claiborne	Albany WGL	Dougherty
13L011	USGS TW 2	Claiborne	Albany WGL	Dougherty
13L015	Turner 2	Claiborne	FRWPPC (Miller Brewing Company)	Dougherty
11K002*	USGS TW 11	Claiborne	Albany WGL	Dougherty
11L001*	USGS TW 4	Claiborne	Albany WGL	Dougherty
11K005	USGS TW 12	Clayton	Albany WGL	Dougherty
11L002	DNR Albany Nursery	Clayton	GaEPD	Dougherty
12L020	USGS TW 6	Clayton	Albany WGL	Dougherty
12M002	USGS TW 9	Clayton	Lee County	Lee
13L002	Albany WGL, Turner City 2	Clayton	GaEPD	Dougherty
13L013	USGS TW 7	Clayton	Albany WGL	Dougherty
12L021	USGS TW 10	Providence	Albany WGL	Dougherty

### Surficial Aquifer

During 2007, water levels were measured monthly in two wells completed in the surficial aquifer in the Albany area of Dougherty County (table 1; fig. 1). Hydrographs for these wells are presented in Appendix A. Well 12L371 (fig. A1) was dry from June 2007 through December 2007 because of the below-normal precipitation during the second half of 2007.

### Upper Floridan Aquifer

Water levels in the Upper Floridan aquifer are monitored in 15 wells. Hydrographs for these wells are presented in Appendix A.

Water levels in the Upper Floridan aquifer generally were below the historical median daily values during 2007, corresponding to below-normal rainfall and increased

pumping. Water levels in well 13L180 were above the historical median daily values until October 2007 then fell below the historical median daily values through the rest of the year. Water levels in five of the wells were at or just above the historical median daily values until spring 2007 and below the historical median daily values through the rest of the year (wells 12K180, 12L029, 12L277, 12L370, and 12L373). Water levels in the other nine wells were below the historical median daily values throughout 2007.

A potentiometric-surface map for the Upper Floridan aquifer was constructed using data from 58 wells in the southwestern Albany area during October 23–25, 2007 (fig. 6). The potentiometric contours indicate that water generally flows from northwest to southeast in the Albany area of Dougherty County, with no evidence of a cone of depression at the wellfield. Water levels generally were lower during 2007 than during 2006.

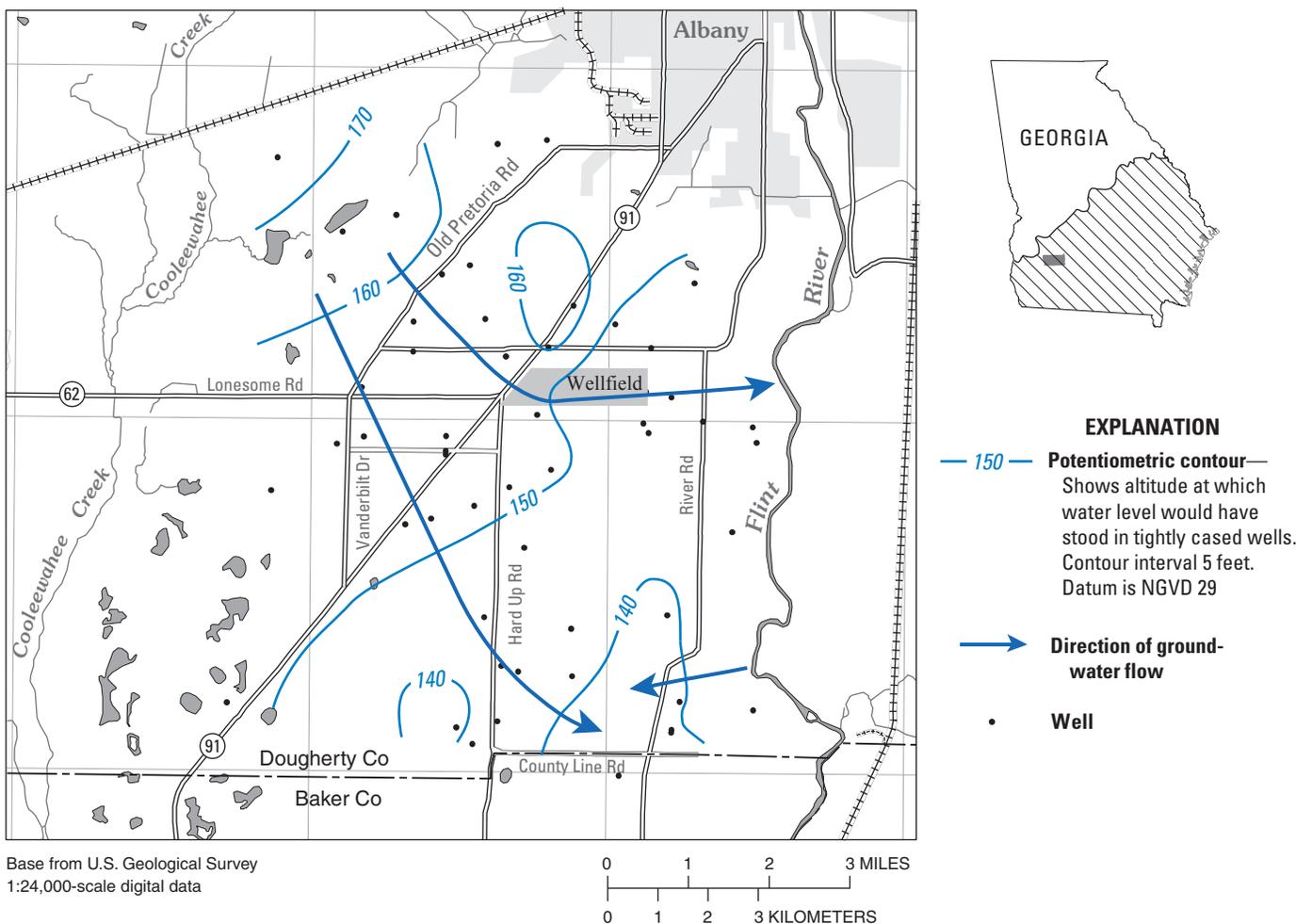


Figure 6. Potentiometric surface of the Upper Floridan aquifer, October 2007.

### Claiborne Aquifer

Water levels in the Albany area of Dougherty County are monitored in five wells completed in the Claiborne aquifer (table 1; fig. 1). Hydrographs for these wells are presented in Appendix A.

Water levels in the Claiborne aquifer indicate delayed response to precipitation and a more rapid response to pumping changes. Water levels in wells 12L019 and 13L011 were above the historical median daily values and in well 13L015 remained close to the historical median daily values throughout 2007. The variability probably is due to the localized effects of pumping.

### Clayton and Providence Aquifers

Water levels in the Albany area of Dougherty County are monitored in six wells completed in the Clayton aquifer and in one well completed in the Providence aquifer (table 1, fig. 1). Hydrographs for these wells are presented in Appendix A.

Like the Claiborne aquifer, the Clayton and Providence aquifers do not respond quickly to precipitation but are affected mostly by pumping. Water levels in the Clayton aquifer during 2007 were below the historical median daily values in three wells (wells 11K005, 11L002, and 12M002)

and above the historical median daily values in well 3L013. Water levels in well 13L002 were near the historical median daily values from January to April 2007, dropped below the historical median daily values in April until November 2007, and remained close to the historical median daily values through the end of 2007. Water levels for well 12L020 were available only from January through April and for parts of September, October, and December 2007. Water levels in well 12L021, completed in the Providence aquifer, were above the historical median daily values throughout 2007.

### Sinkhole Development

Locations of 12 new sinkholes that developed at the wellfield during 2007 were provided by WGL (Gary Morfield and Jim Stolze, WGL, written commun., April 2, 2007; July 2, 2007; and January 8, 2008). These sinkholes primarily formed in the pond on the wellfield property and adjacent to a production well located on the southwest part of the property. Sinkhole locations were added to the sinkhole map from 2006 (fig. 7). The large number of sinkholes that developed during 2007 may be a result of low water levels (fig. 8). No sinkholes developed in 2006 when water levels were at or above median levels (fig. 8).

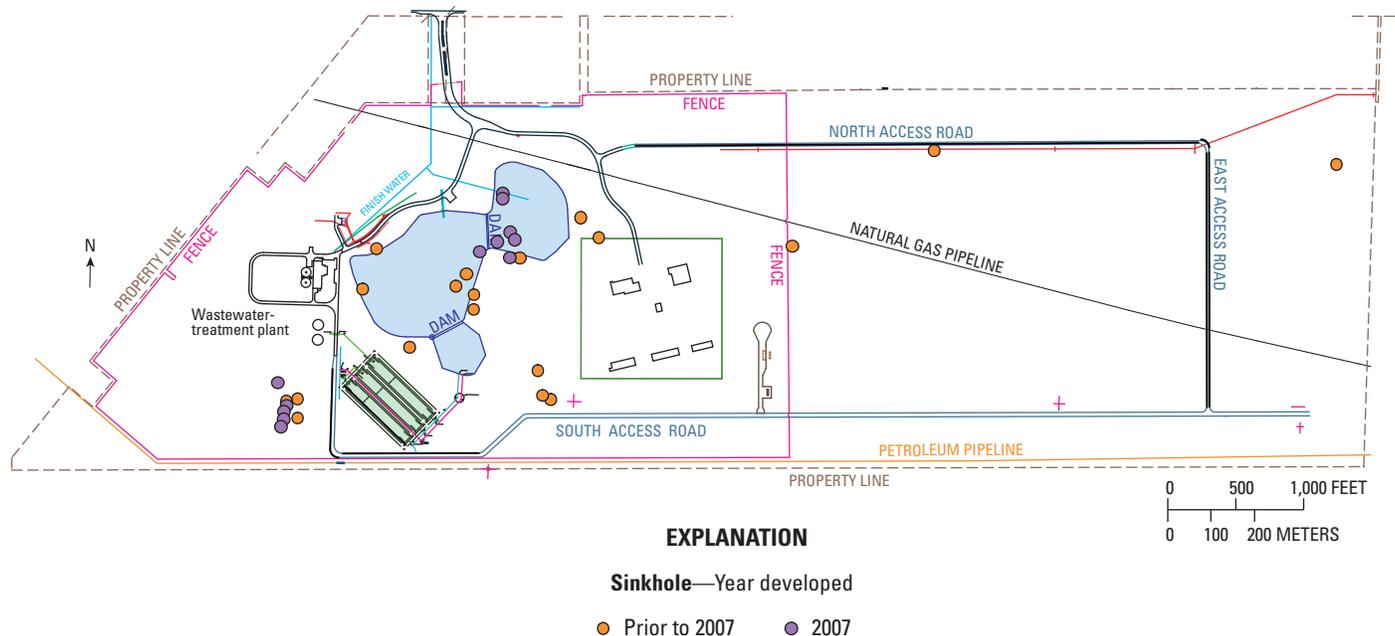


Figure 7. Albany wellfield showing sinkhole locations. Base map and locations provided by Albany Water, Gas, and Light Commission.

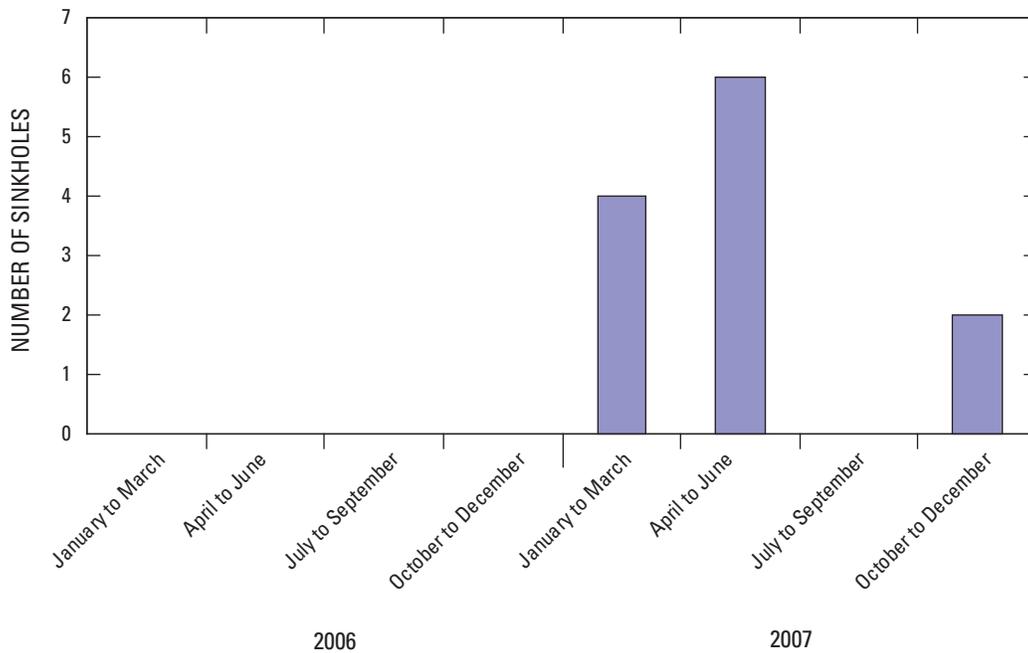
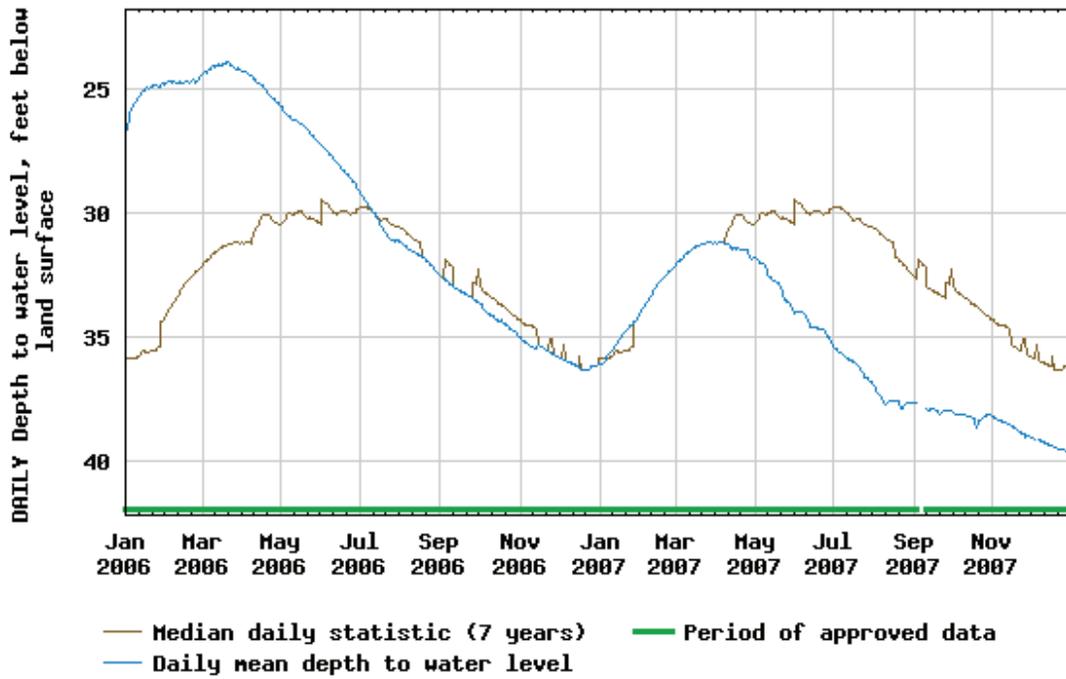


Figure 8. Water levels in well 12L277 and number of sinkholes that developed in the Albany wellfield during 2006 and 2007.

## Nitrate Concentration in the Upper Floridan Aquifer

Water samples were collected from 12 wells in the southwest area of Albany, October 15–18, 2007, and were analyzed for cations, anions, and nutrients. Water-quality data are presented in Appendix B, and nitrate concentrations are presented in figure 9 and table 2. Of the 12 samples collected in 2007, 1 had nitrate as nitrogen (N) concentration greater

than the 10 mg/L MCL (well 12L061 completed in the Upper Floridan aquifer). Since November 2006, nitrate levels have increased in four wells, decreased in six wells, and remained unchanged in two wells (table 2). Since 1998, the general trend of nitrate concentrations has increased slightly; however, during years with below-normal rainfall (such as 2007), samples from a few locations indicate a decrease in nitrates (fig. 9; table 2).

**Table 2.** Nitrate data from selected wells in the Albany area of Dougherty County, Georgia, 1998–2007 (wells are open to the Upper Floridan aquifer, well 12L376 is open to the surficial aquifer, and 2352560 is a gage on the Flint River).

[NO<sub>3</sub>-N, nitrate as nitrogen; NO<sub>2</sub> + NO<sub>3</sub> as N, nitrite plus nitrate as nitrogen; —, no data]

Site name (fig. 9)	September 1998	April 1999	April 2001	November 2001	November 2002	May 2003	November 2003	November 2004	November 2005	November 2006	October 2007
	NO <sub>3</sub> -N	NO <sub>3</sub> -N	NO <sub>2</sub> + NO <sub>3</sub> as N	Dissolved NO <sub>2</sub> + NO <sub>3</sub> as N	NO <sub>3</sub> -N	Dissolved NO <sub>2</sub> + NO <sub>3</sub> as N	Dissolved NO <sub>2</sub> + NO <sub>3</sub> as N				
Concentration, in milligrams per liter											
Wells											
12K053	—	—	—	—	2.0	—	2.2	1.9	2.2	2.2	2.1
12K101	1.8	1.9	—	2.2	2.1	—	2.1	2.0	2.4	2.6	2.7
12K129	—	—	—	3.1	2.9	—	2.9	2.8	2.7	3.3	3.3
12K175	3.8	5.7	5.0	5.9	5.4	—	6.1	5.5	7.0	6.2	6.0
12K180	—	—	—	—	1.56	1.7	1.4	1.4	1.7	2.0	2.1
12L061	11	12	12	12	12.5	—	13.4	13.1	13.7	12.5	12.3
12L277	7.5	6.9	6.5	8.0	6.3	9.0	8.2	8.4	8.9	8.9	8.9
12L339	5.9	5.4	—	5.0	—	—	—	—	6.0	—	—
12L340	—	—	—	—	—	—	—	4.7	5.0	5.8	3.7
12L344	6.0	5.1	2.7	1.6	1.7	—	1.9	2.1	3.0	—	—
12L346	—	—	—	—	—	—	7.2	6.6	8.1	—	—
12L348	—	6.5	6.4	7.1	6.8	—	6.9	6.6	7.0	7.1	7.4
12L350	3.0	2.9	—	4.8	5.5	—	2.6	2.0	1.8	3.3	2.7
12L357	5.9	3.1	—	2.0	—	—	—	3.5	5.1	3.8	—
12L370	—	—	—	—	—	—	7.1	—	—	—	—
12L373	—	—	—	7.2	6.6	8.6	7.5	7.2	7.6	7.9	8.3
12L376	—	—	—	—	6.5	8.8	8.3	9.2	11.5	10.9	9.9
Surface-water site											
02352560	—	—	—	—	—	0.4	0.45	0.41	0.45	0.38	0.26

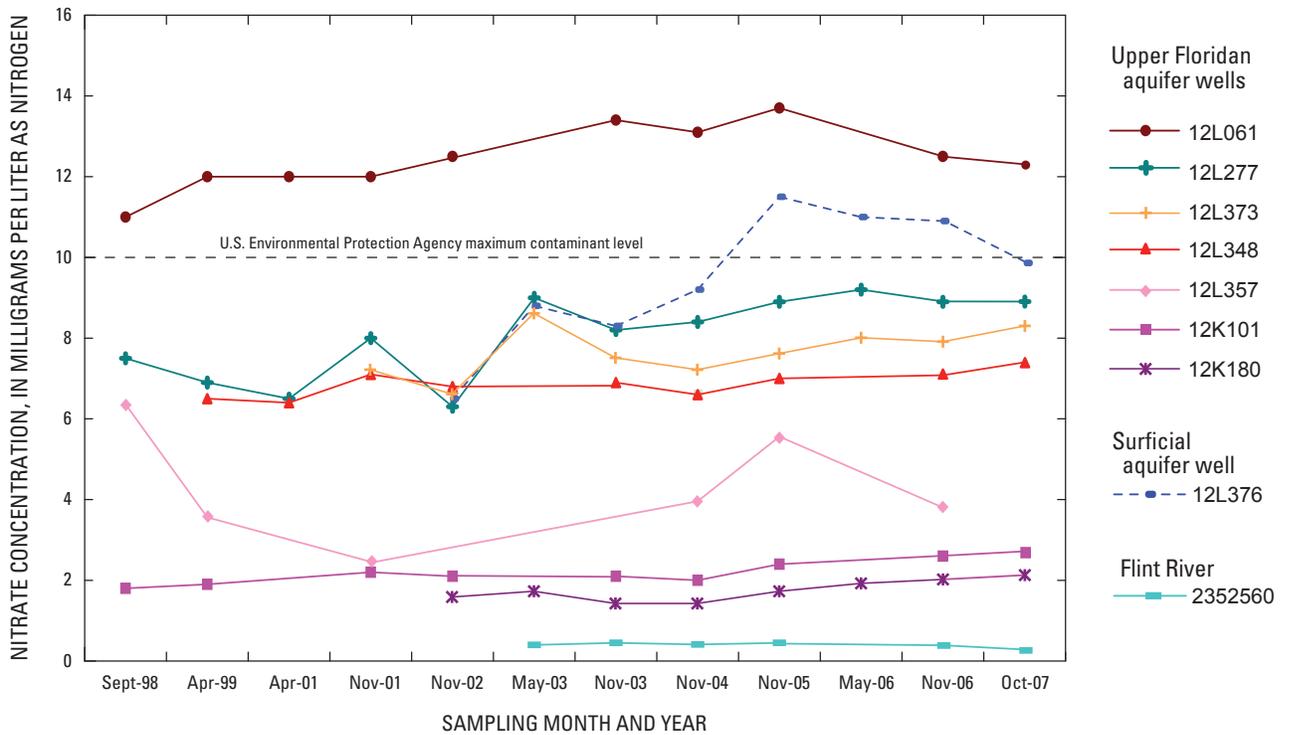
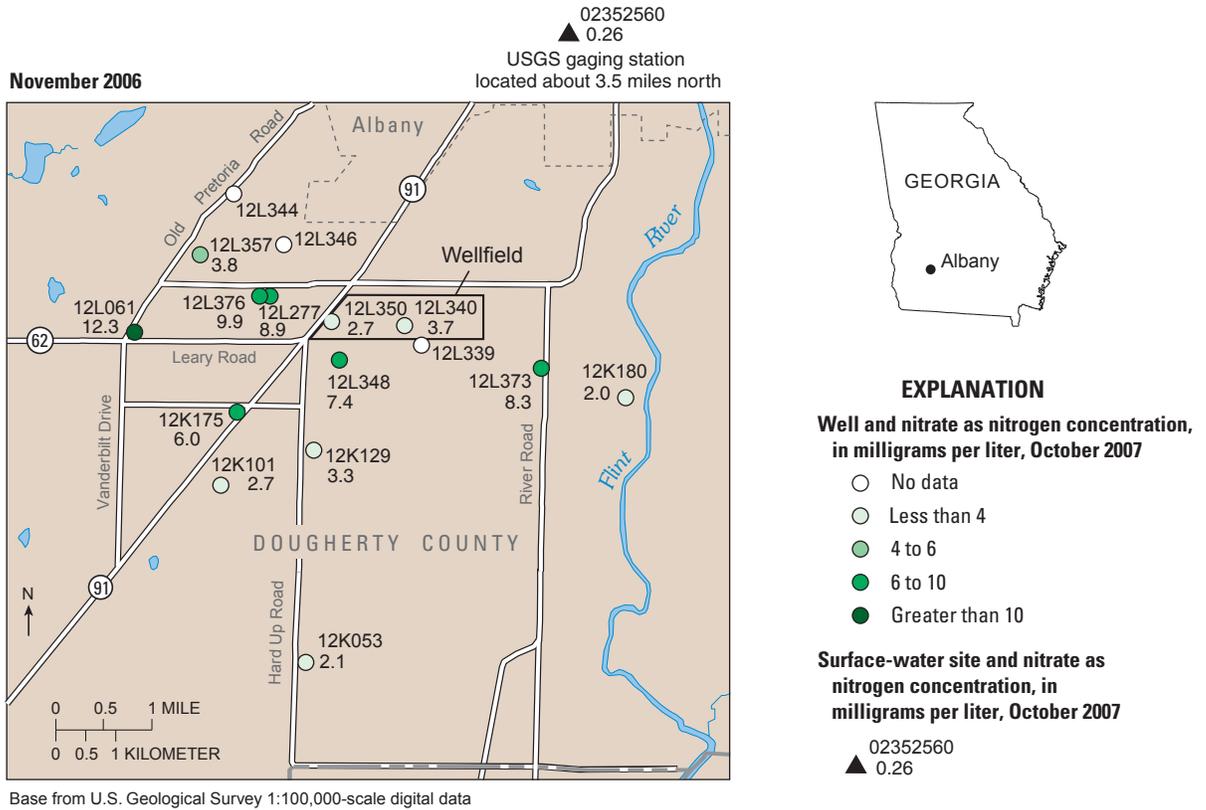


Figure 9. Location of wells and nitrate concentrations in the Albany area, Georgia, October 2007.

12 Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007

A surface-water sample was collected from the Flint River on October 15, 2007 (gage 02352530, fig. 1) to compare the water-quality characteristics of ground and surface water. A trilinear diagram showing the percent composition of selected major cations and anions is presented in figure 10. This diagram shows that the ground-water quality of the

Upper Floridan aquifer remains distinctly different from the water quality of the Flint River, as was the case during 2003–2006 (Gordon, 2006b). Water from the Upper Floridan aquifer is supersaturated with calcium, and water from the Flint River contains more of the other constituents such as sodium, potassium, and magnesium.

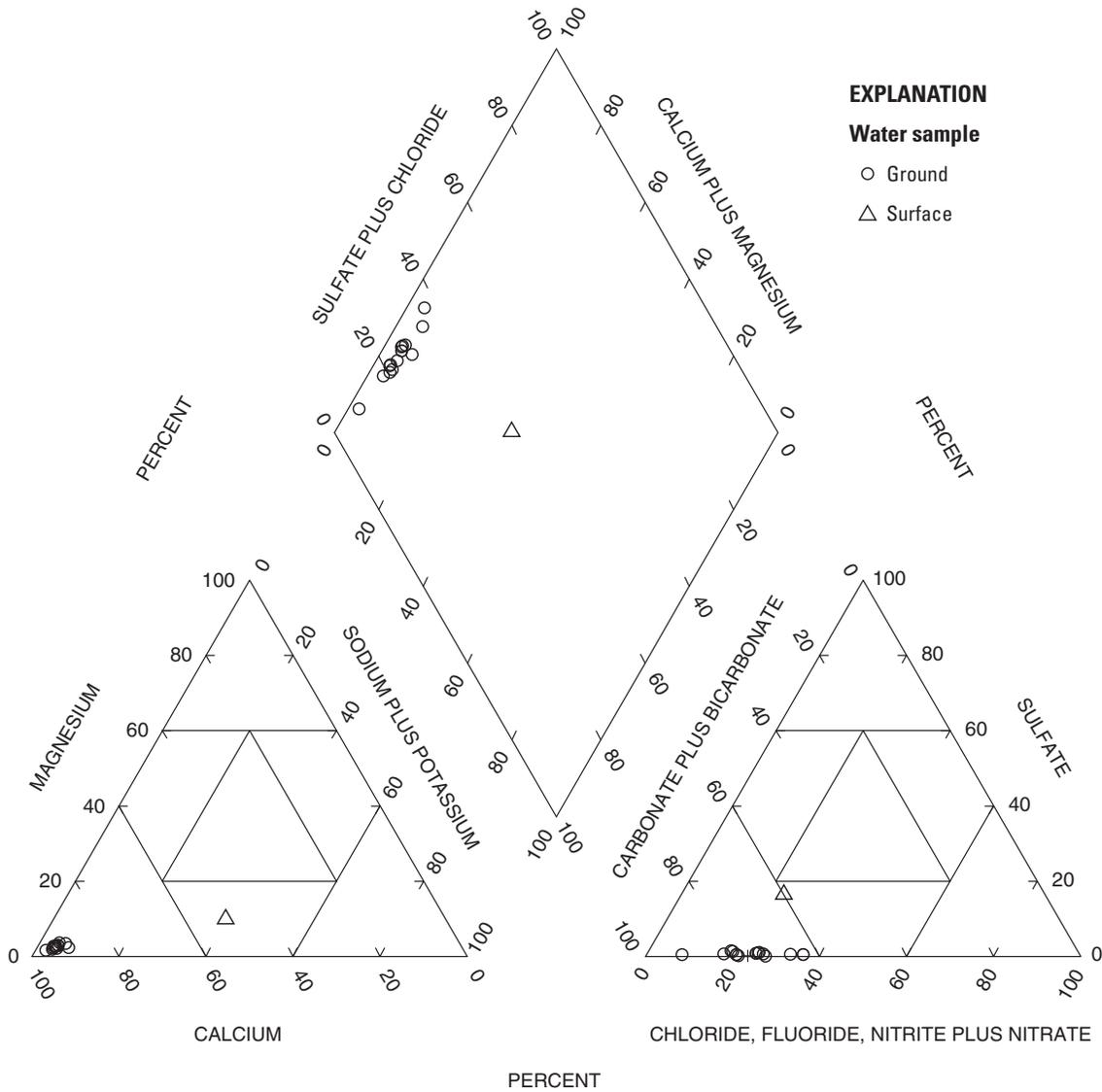
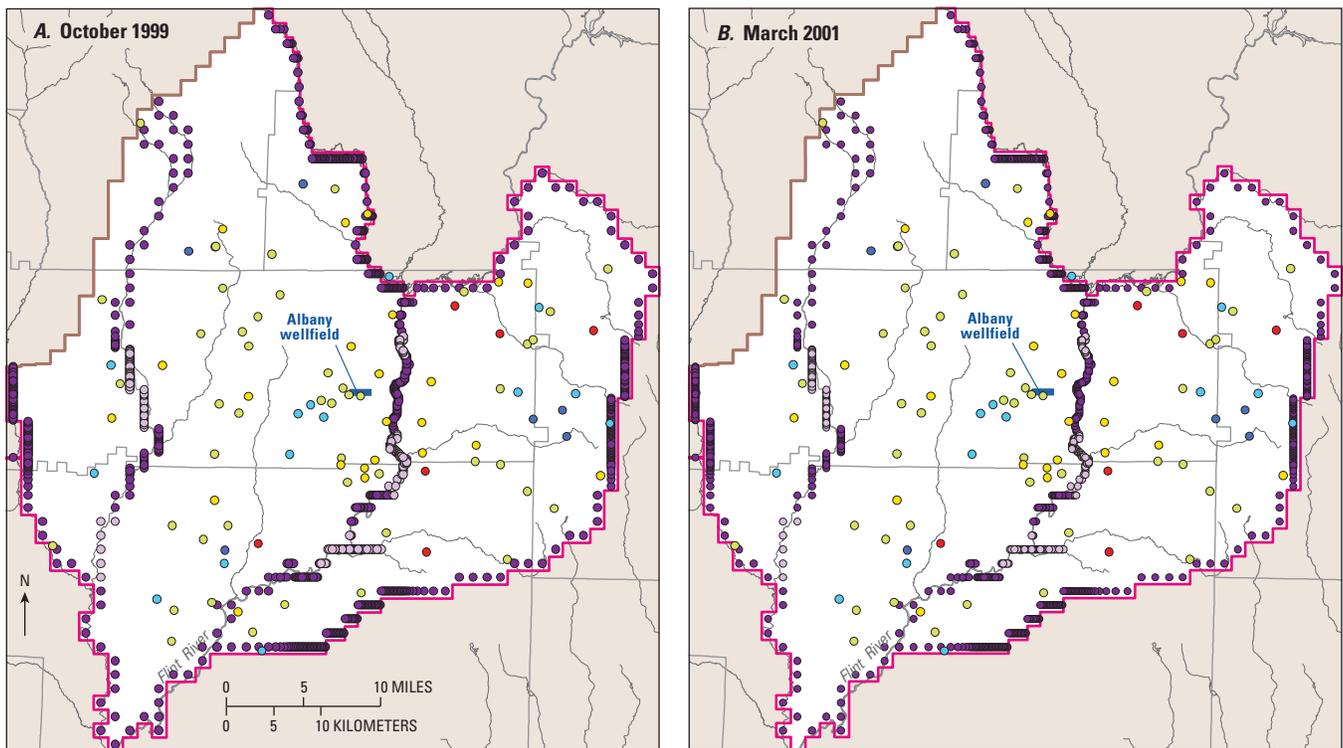


Figure 10. Trilinear diagram showing water quality of the Upper Floridan aquifer and the Flint River at Albany, Georgia, October 2007.

# Ground-Water Studies

The CWP provides for the ongoing collection of hydrologic data to provide a better understanding of hydrologic conditions, water quality, and ground-water flowpaths in the Albany area of Dougherty County. During 2007, the principal focus of ground-water studies for the CWP was the development of a ground-water flow model to simulate flowpaths of the Upper Floridan aquifer near the Albany wellfield. A variety of changes were made to the model design, including layering

and boundary conditions. The model is being calibrated to simulate conditions during a dry period (October 1999) and a relatively wet period (March 2001). Preliminary residual values (observed minus simulated water levels) are presented in figure 11. Initial simulated water levels show a generally good match to observed October 1999 water levels (root mean squared error, rmse, is about 7 feet). Initial simulated water levels up to 15 feet lower than March 2001 measured water levels (rmse is about 9 ft). Aquifer and confining unit hydraulic properties are being adjusted within a reasonable range to achieve a better calibration for both time periods.



### EXPLANATION

<b>BOUNDARY</b>		<b>CALCULATED RESIDUALS FOR CALIBRATED MODEL</b>	
	<b>Model</b>	<b>October 1999</b>	<b>March 2001</b>
	<b>Fixed head</b>		
<b>General head</b>			
	Upper Floridan aquifer		
	Undifferentiated overburden		

**Figure 11.** Albany wellfield model area, boundary conditions, and preliminary ground-water-level residuals for (A) October 1999 and (B) March 2001.

## Reports and Technical Presentations

The USGS prepared several reports and technical presentations on southwestern Georgia during 2007 (<http://ga.water.usgs.gov/pubsgw.html>). Recent reports and presentations include:

- “Potentiometric surface of the Upper Floridan aquifer in the southwestern Albany area, Georgia, 1998–2005, based on revised land-surface altitudes” (Gordon, 2006a) was published as an article in the report “Ground-water conditions and studies in Georgia, 2004–2005” (<http://pubs.usgs.gov/sir/2007/5017/>, accessed August 28, 2007).
- Poster by Debbie Warner Gordon and Dorothy F. Payne at the 2007 Georgia Water Resources Conference in Athens titled, “Simulation of ground-water flow and nitrate transport in the Upper Floridan aquifer in the southwestern Albany area, Georgia.” (The abstract may be found at [http://ga.water.usgs.gov/publications/gwrc07/pdf/Gordon\\_GWRC07.pdf](http://ga.water.usgs.gov/publications/gwrc07/pdf/Gordon_GWRC07.pdf).)

## Selected References

- Gordon, D.W., 2006a, U.S. Geological Survey Georgia Water Science Center and Albany Water, Gas, and Light Commission Cooperative Water Program—Summary of activities, July 2005 through June 2006: U.S. Geological Survey Open-File Report 2006–1294, 41 p.
- Gordon, D.W., 2006b, Potentiometric surface of the Upper Floridan aquifer in the southwestern Albany area, Georgia, 1998–2005, based on revised land-surface altitudes, *in* Ground-water conditions and studies in Georgia, 2004–2005: U.S. Geological Survey Scientific Investigations Report 2007–5017, p. 82–92.
- Gordon, D.W., and Payne, D.F., 2007, Simulation of ground-water flow and nitrate transport in the Upper Floridan aquifer in the southwestern Albany area, Georgia, *in* Proceedings of the 2007 Georgia Water Resources Conference, held March 27–29, 2007, at the University of Georgia, Athens, Georgia.
- U.S. Environmental Protection Agency, 2000, Maximum contaminant levels (Subpart B of part 141, National Primary Drinking-Water Regulations): U.S. Code of Federal Regulations, Title 40, parts 100–149, revised as of July 1, 2000, p. 334–560.

**Appendix A. Ground-Water-Level Hydrographs and  
Statistics for Continuously-Monitored Recorder Wells  
and Wells Recorded Monthly for 2007 and Period of  
Record in the Albany Area of Dougherty County, Georgia**

Surficial Aquifer

31301908410402

Site Name: 12L371

Latitude: 31° 30' 19" Longitude: 84° 10' 46"  
Well Depth: 44.1 feet

Dougherty County  
Datum: 191 feet

Period of Record: 2002 - 2008  
Well Diameter: 2 inches

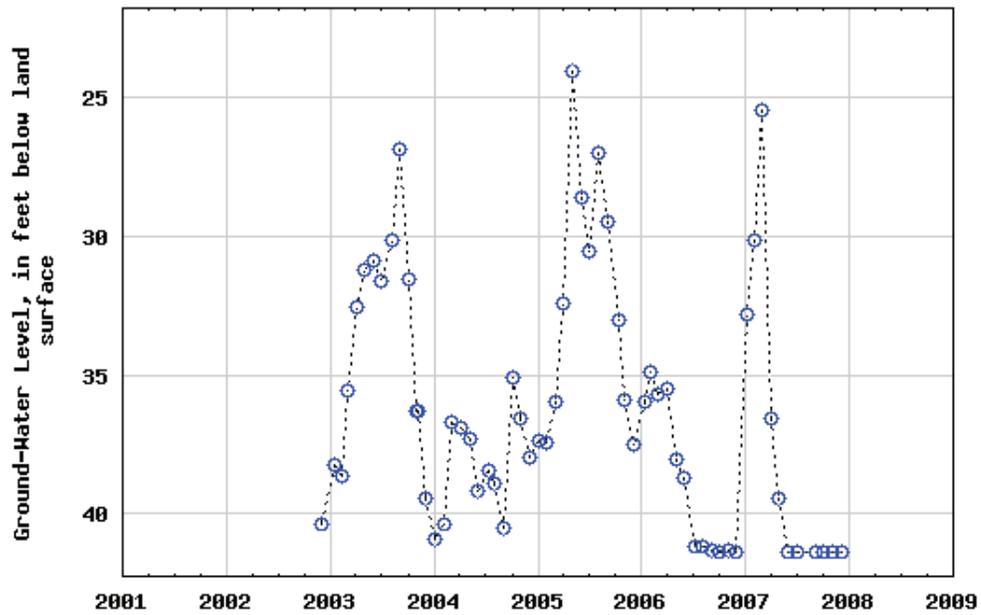
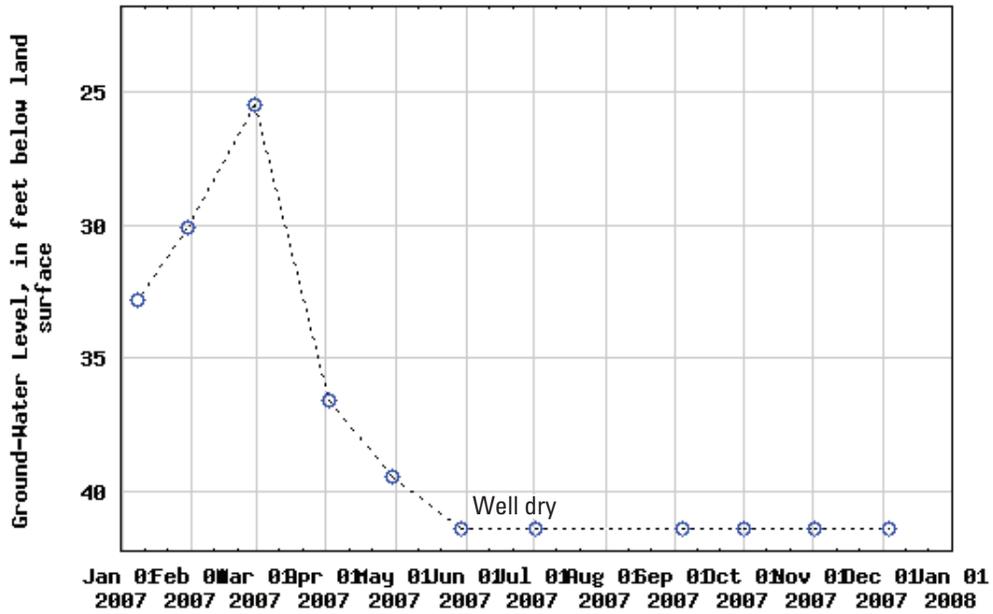


Figure A1. Periodic water levels in well 12L371, surficial aquifer, 2002–2007.

Surficial Aquifer

313038084122501

Site Name: 12L376

Latitude: 31° 30' 42" Longitude: 84° 12' 33"  
Well Depth: 45 feet

Dougherty County  
Datum: 191 feet

Period of Record: 2002 - 2008  
Well Diameter: 2 inches

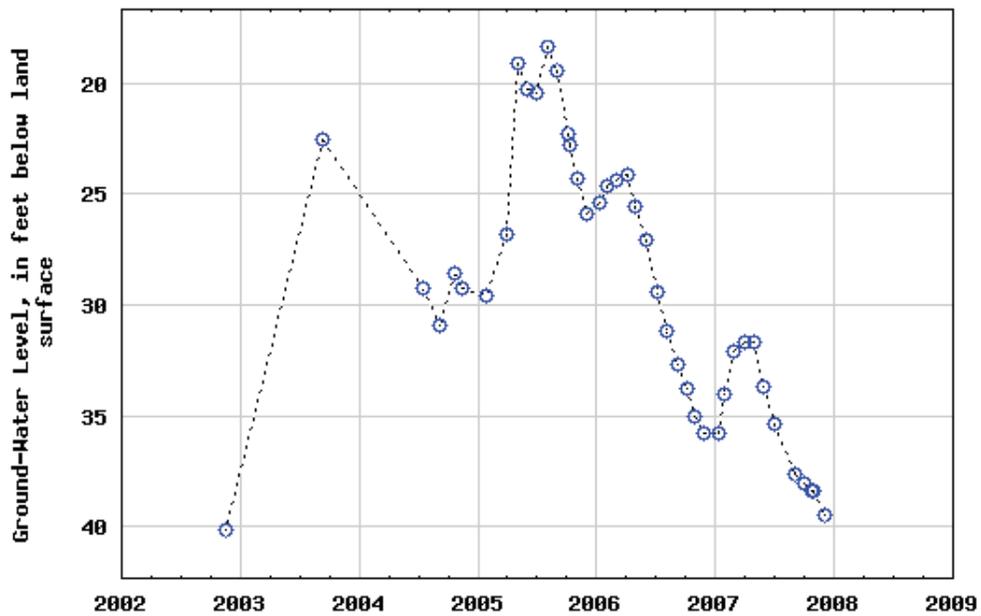
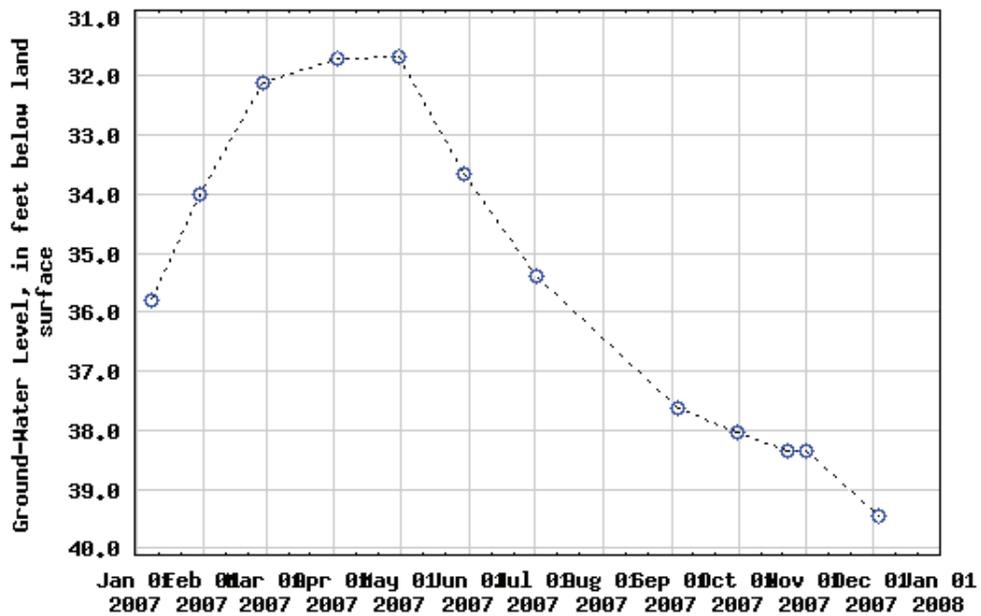


Figure A2. Periodic water levels in well 12L376, surficial aquifer, 2002–2007.

Upper Floridan Aquifer

312919084153801

Site Name: 11K003

Latitude: 31° 29' 15" Longitude: 84° 15' 31"

Dougherty County

Period of Record: 1979 - 2008

Well Depth: 150 feet

Datum: 195 feet

Well Diameter: 4 inches

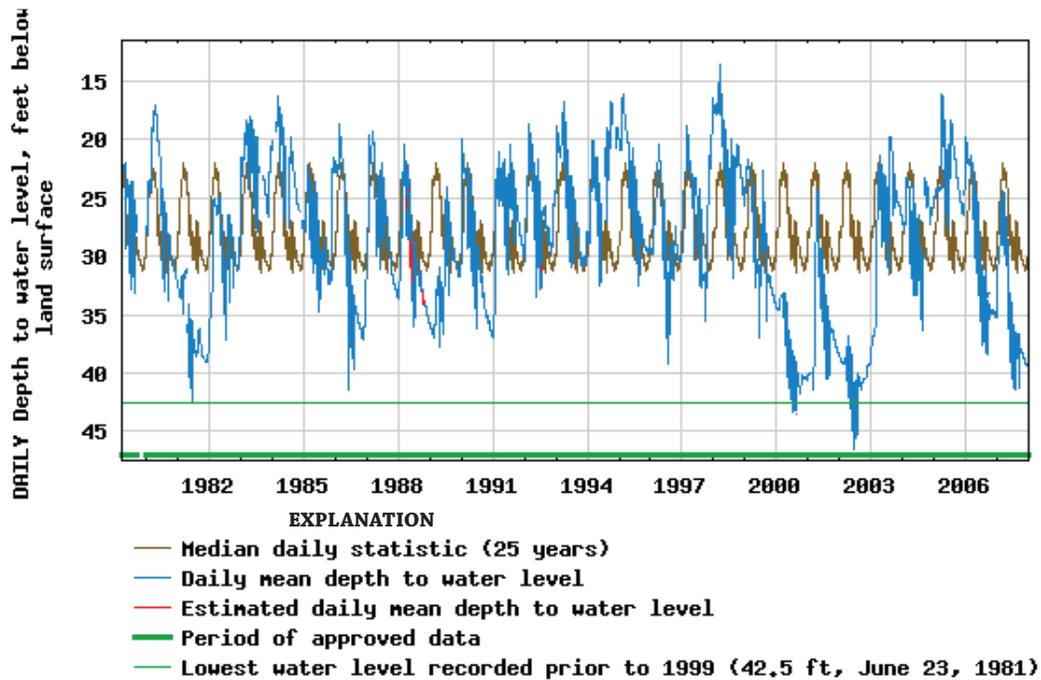
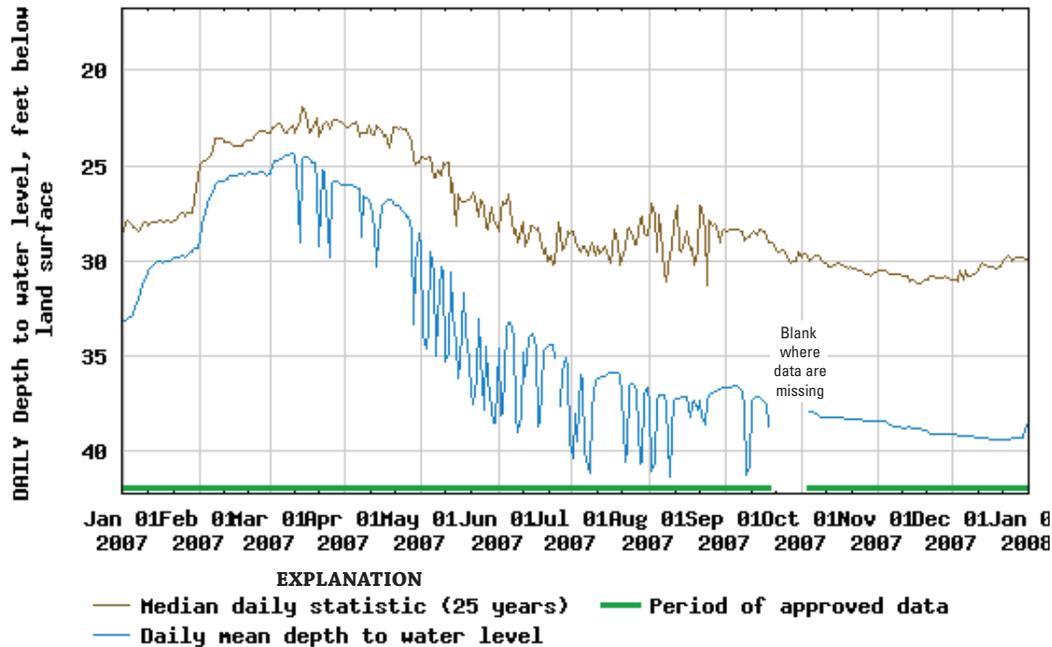


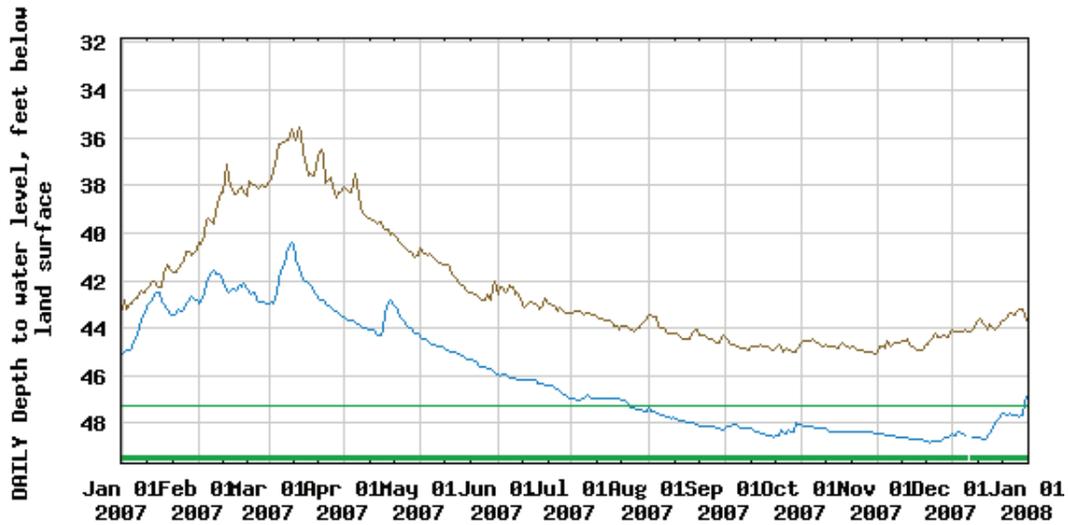
Figure A3. Periodic and daily mean water levels in well 11K003, Upper Floridan aquifer, 1979–2007.

Upper Floridan Aquifer

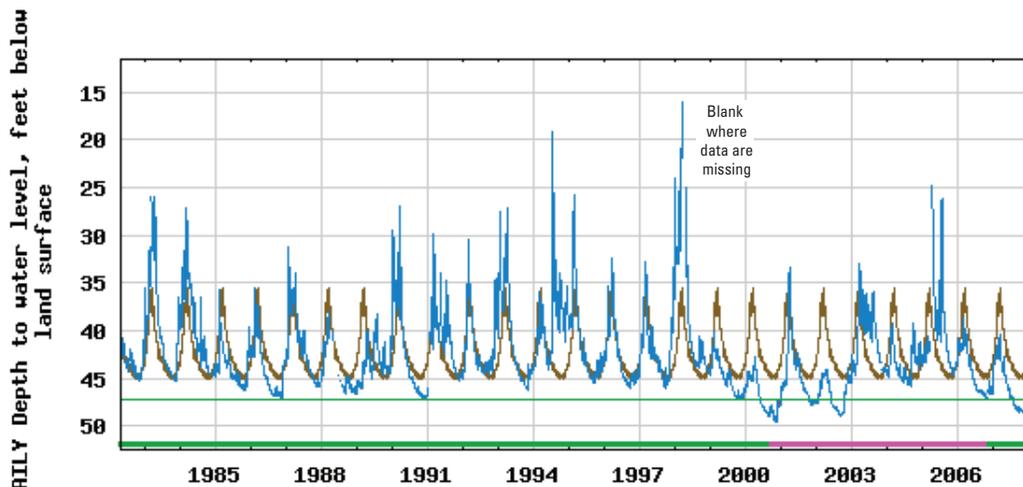
312617084110701

Site Name: 12K014

Latitude: 31°26'12" Longitude: 84°11'05" Baker County Period of Record: 1982 - 2007  
 Well Depth: 137 feet Datum: 185 feet Well Diameter: 2 inches



EXPLANATION  
 — Median daily statistic (15 years)  
 — Daily mean depth to water level  
 — Period of approved data  
 — Lowest water level recorded prior to 1999 (47.3 ft, Dec 16-18, 1990)



EXPLANATION  
 — Median daily statistic (15 years)  
 — Daily mean depth to water level  
 — Estimated daily mean depth to water level  
 — Period of approved data  
 — Period of provisional data  
 — Lowest water level recorded prior to 1999 (47.3 ft, Dec 16-18, 1990)

Figure A4. Periodic and daily mean water levels in well 12K014, Upper Floridan aquifer, 1982–2007.

Upper Floridan Aquifer

312950084131801

Site Name: 12K141

Latitude: 31° 29' 51" Longitude: 84° 13' 18" Dougherty County Period of Record: 1996 - 2002  
 Well Depth: 200 feet Datum: 195 feet Well Diameter: 4 inches

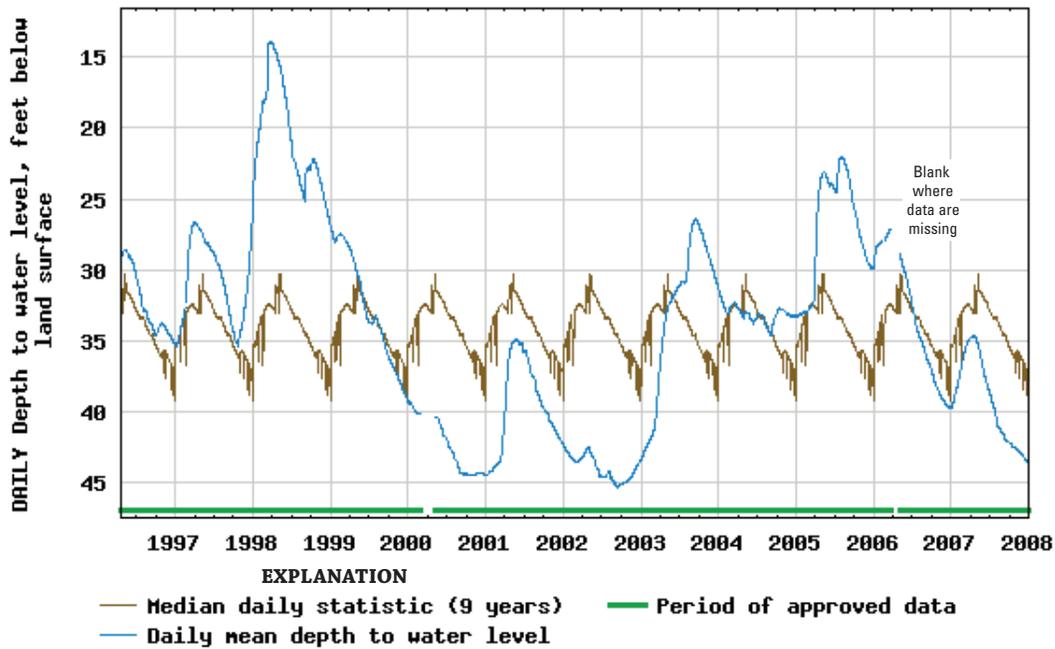
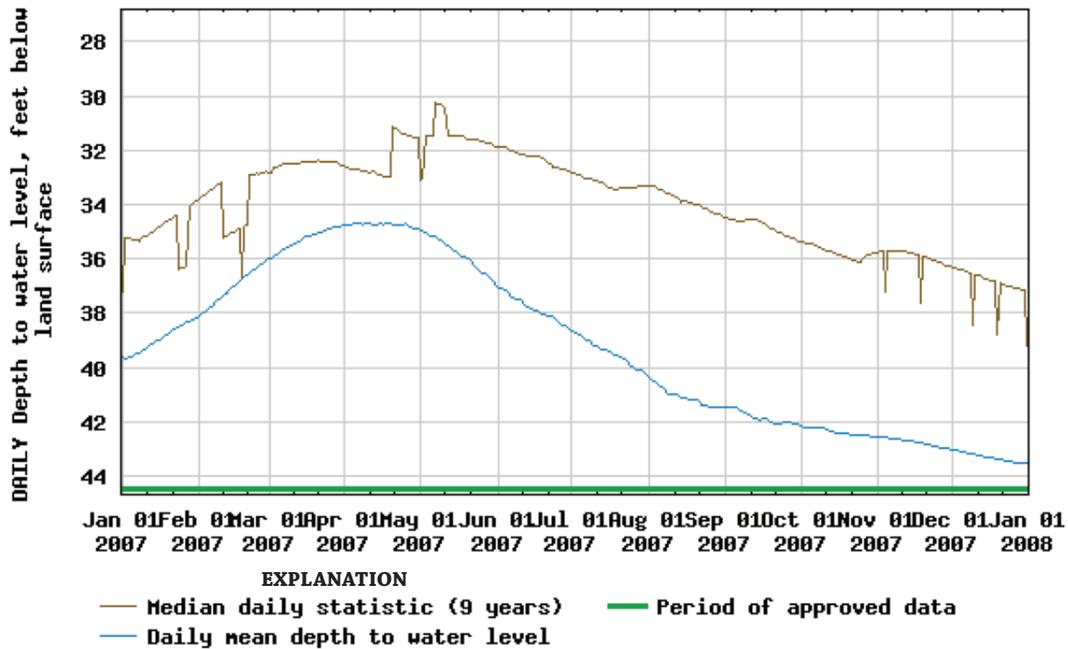


Figure A5. Periodic and daily mean water levels in well 12K141, Upper Floridan aquifer, 1996–2002.

Upper Floridan Aquifer

312947084092201

Site Name: 12K180

Latitude: 31° 29' 46" Longitude: 84° 09' 22" Dougherty County Period of Record: 2002-2007  
 Well Depth: 170 feet Datum: 172 feet Well Diameter: 4 inches

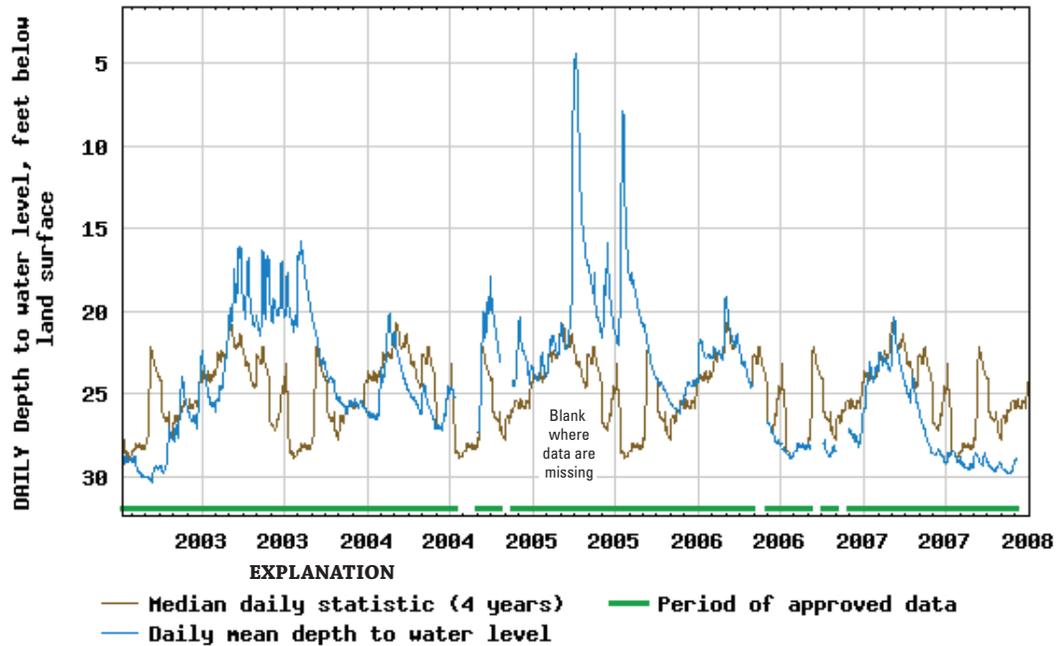
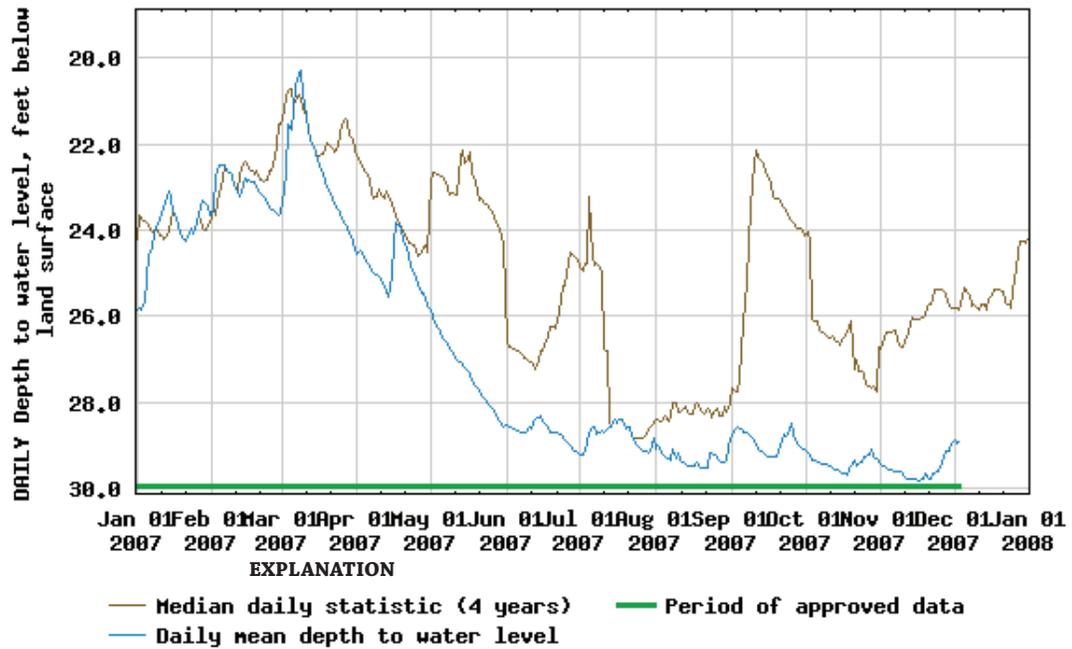


Figure A6. Periodic and daily mean water levels in well 12K180, Upper Floridan aquifer, 2002–2007.

Upper Floridan Aquifer

313450084091801

Site Name: 12L029

Latitude: 31° 34' 51" Longitude: 84° 09' 18" Dougherty County Period of Record: 1982 - 2007  
 Well Depth: 178 feet Datum: 198 feet Well Diameter: 6 inches

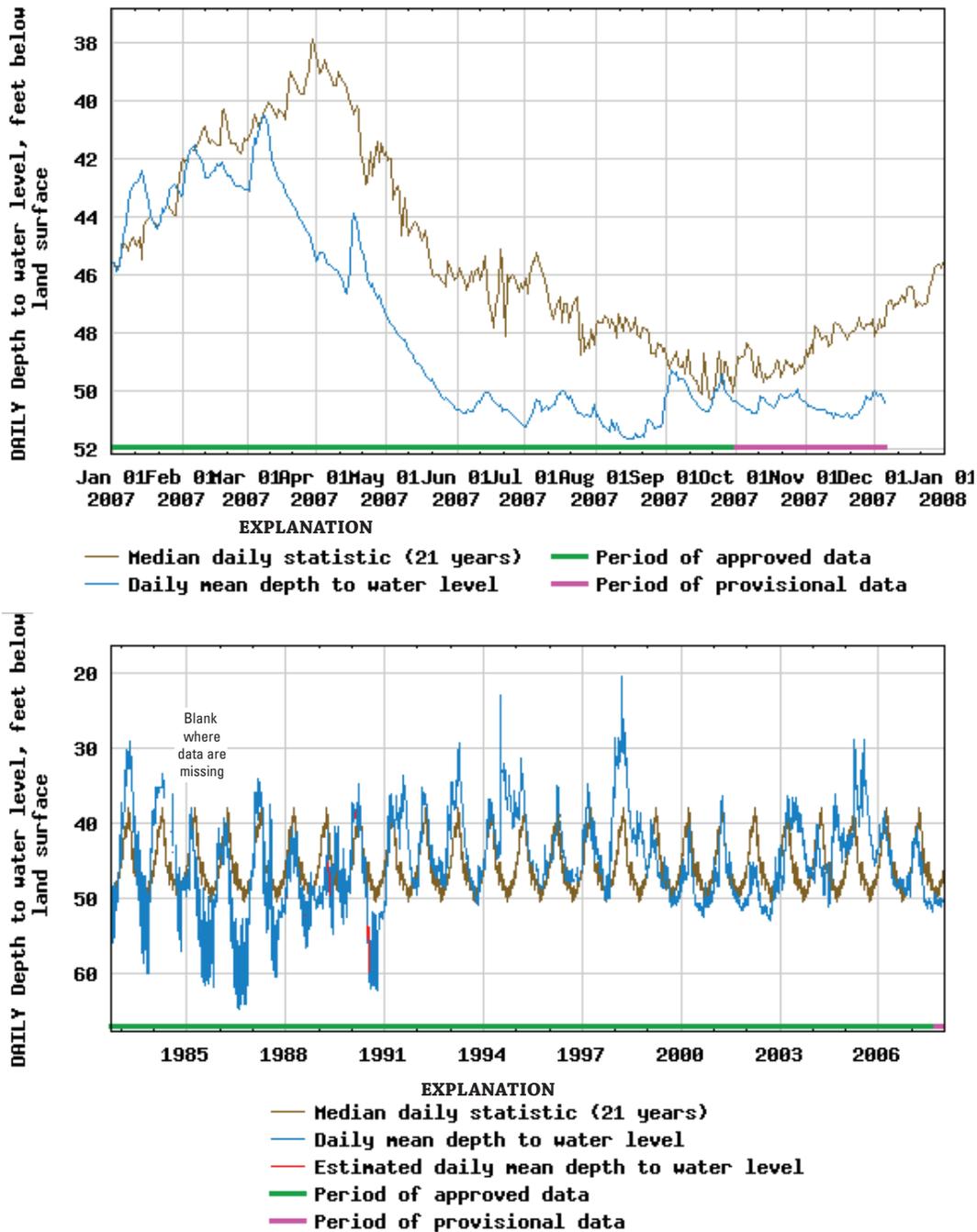


Figure A7. Periodic and daily mean water levels in well 12L029, Upper Floridan aquifer, 1982–2007.

Upper Floridan Aquifer

313130084101001

Site Name: 12L030

Latitude: 31° 31' 31" Longitude: 84° 10' 10" Dougherty County Period of Record: 1985 - 2007  
 Well Depth: 180 feet Datum: 179 feet Well Diameter: 4 inches

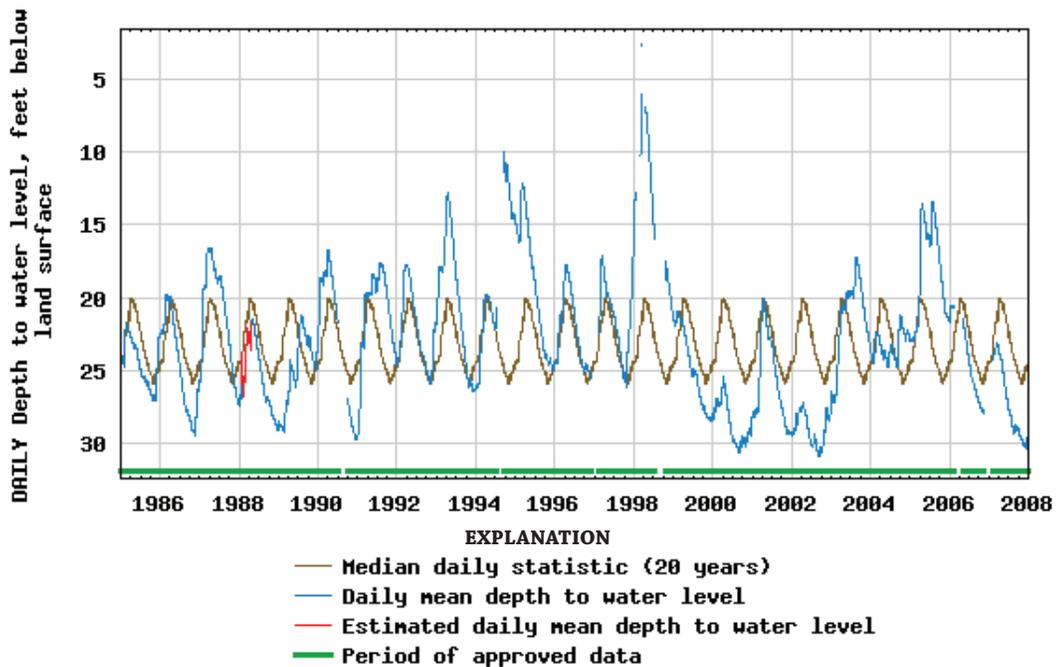
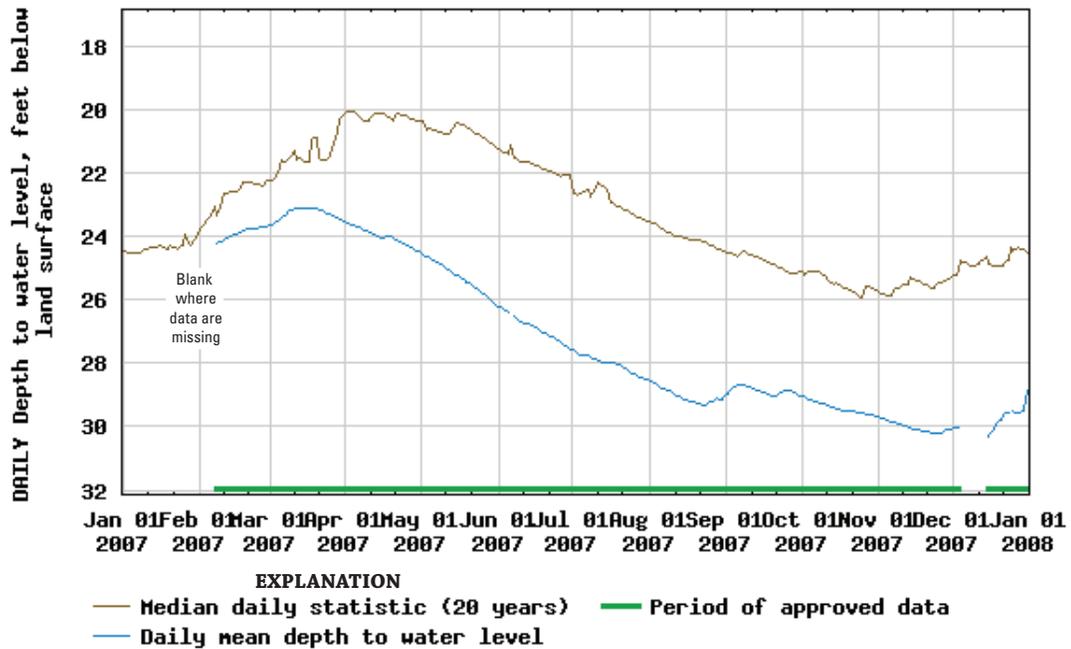


Figure A8. Periodic and daily mean water levels in well 12L030, Upper Floridan aquifer, 1985–2007.

Upper Floridan Aquifer

313040084125901

Site Name: 12L277

Latitude: 31° 30' 41" Longitude: 84° 12' 59" Dougherty County Period of Record: 1998 - 2007  
 Well Depth: 203 feet Datum: 185 feet Well Diameter: 4 inches

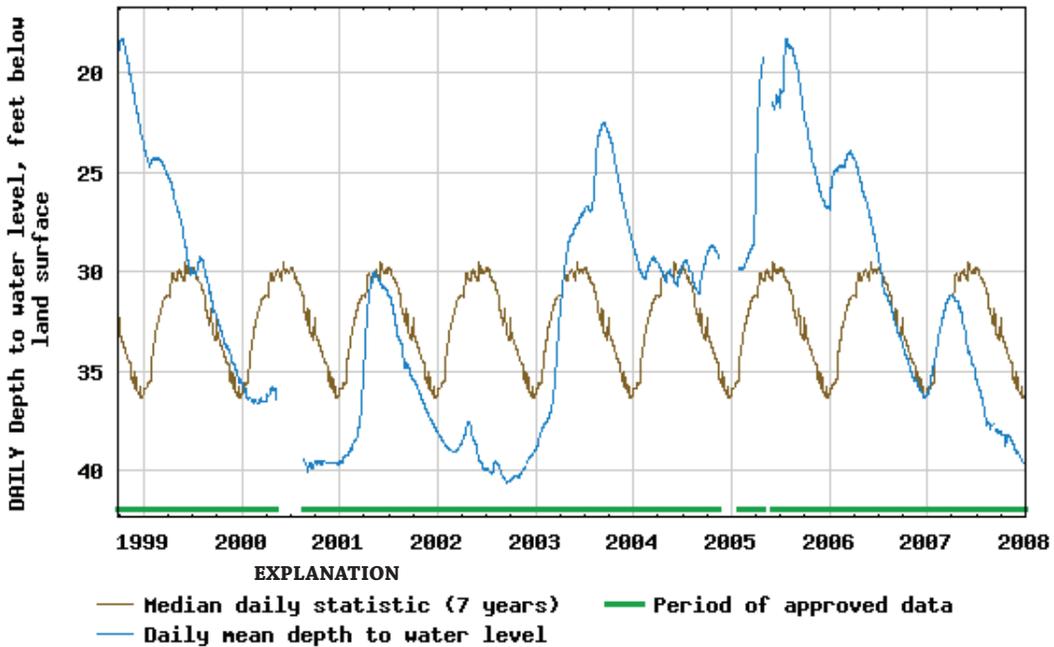
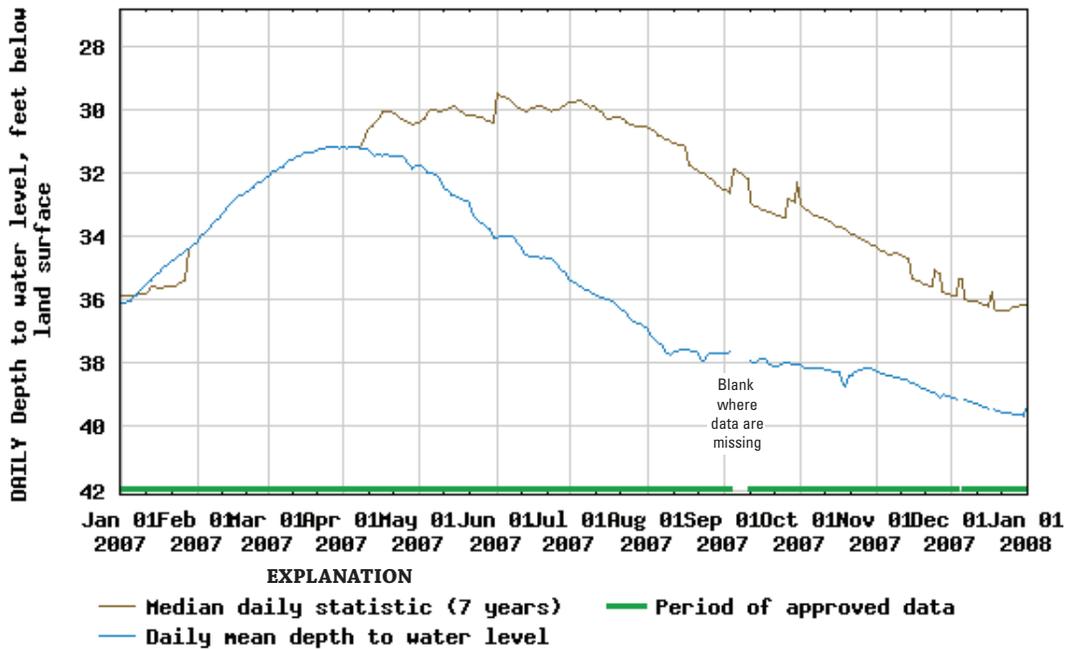


Figure A9. Periodic and daily mean water levels in well 12L277, Upper Floridan aquifer, 1998–2007.

Upper Floridan Aquifer

313019084104601

Site Name: 12L370

Latitude: 31° 30' 20" Longitude: 84° 10' 46" Dougherty County Period of Record: 2000 - 2007  
 Well Depth: 172 feet Datum: 190 feet Well Diameter: 6 inches

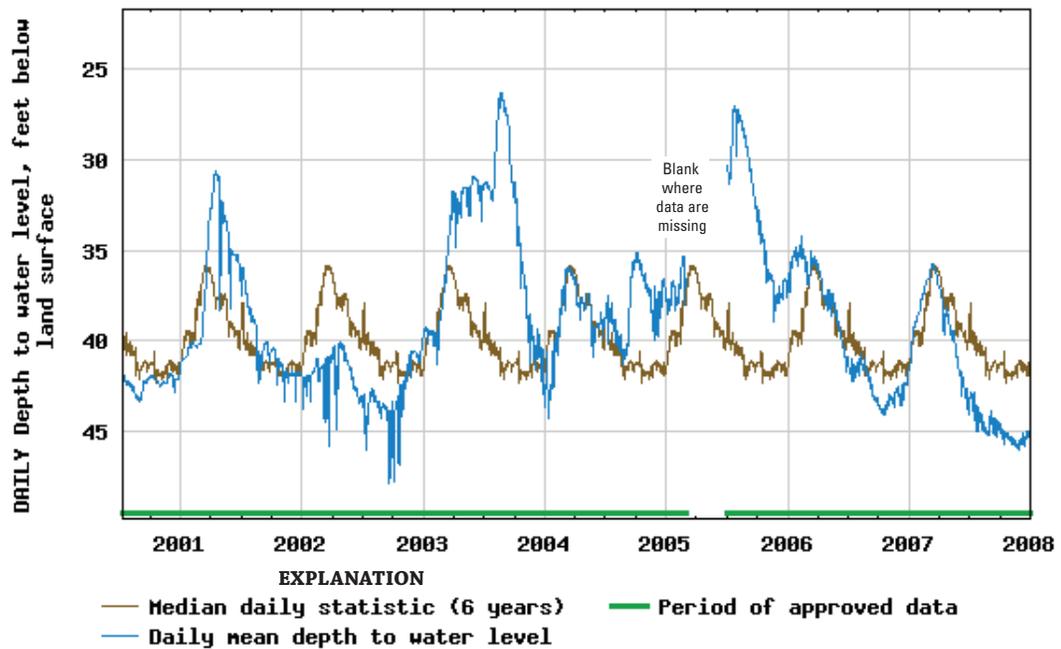
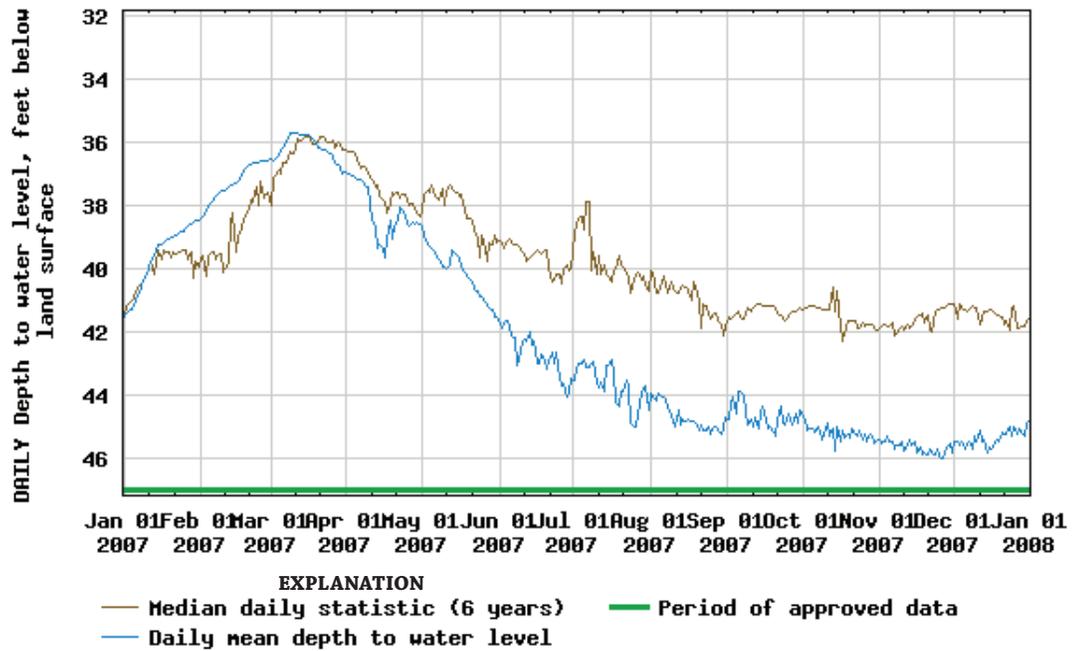


Figure A10. Periodic and daily mean water levels in well 12L370, Upper Floridan aquifer, 2000–2007.

Upper Floridan Aquifer

313019084104603

Site Name: 12L372

Latitude: 31° 30' 19" Longitude: 84° 10' 46" Dougherty County Period of Record: 2000 - 2007  
 Well Depth: 58 feet Datum: 188 feet Well Diameter: 2 inches

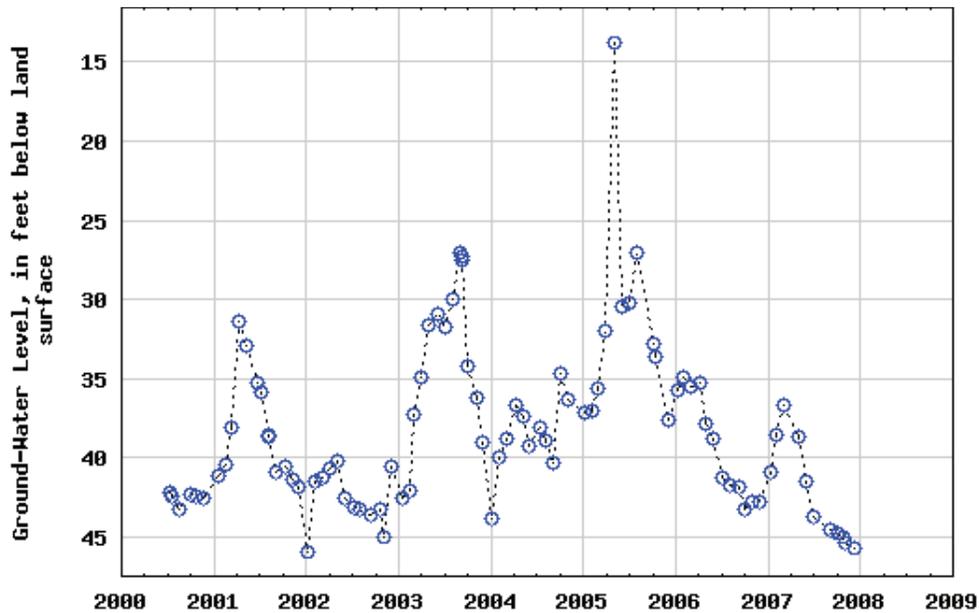
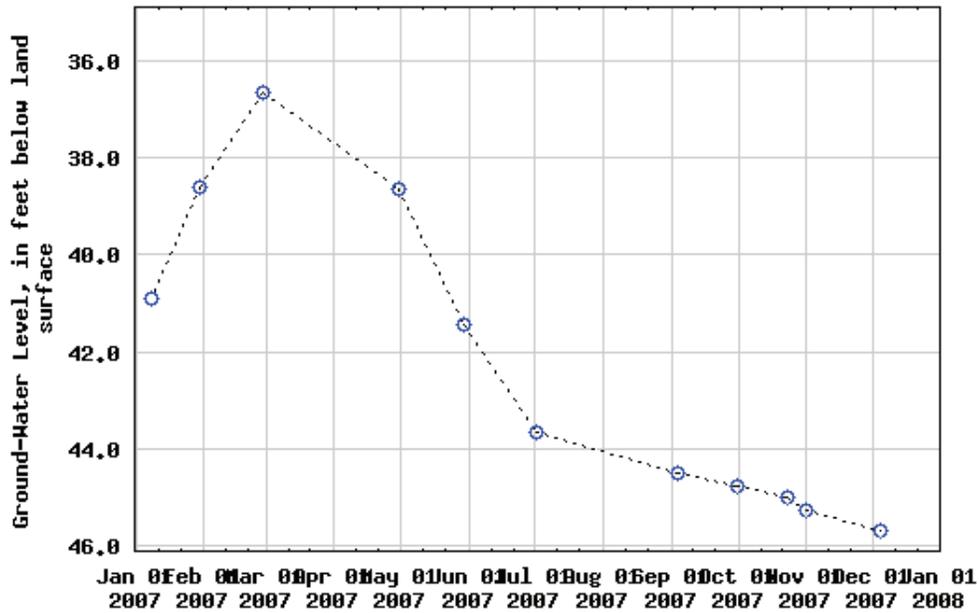


Figure A11. Periodic and daily mean water levels in well 12L372, Upper Floridan aquifer, 2000–2007.

Upper Floridan Aquifer

313000084100301

Site Name: 12L373

Latitude: 31° 30' 00" Longitude: 84° 10' 02" Dougherty County Period of Record: 2002 - 2007  
 Well Depth: 170 feet Datum: 186 feet Well Diameter: 4 inches

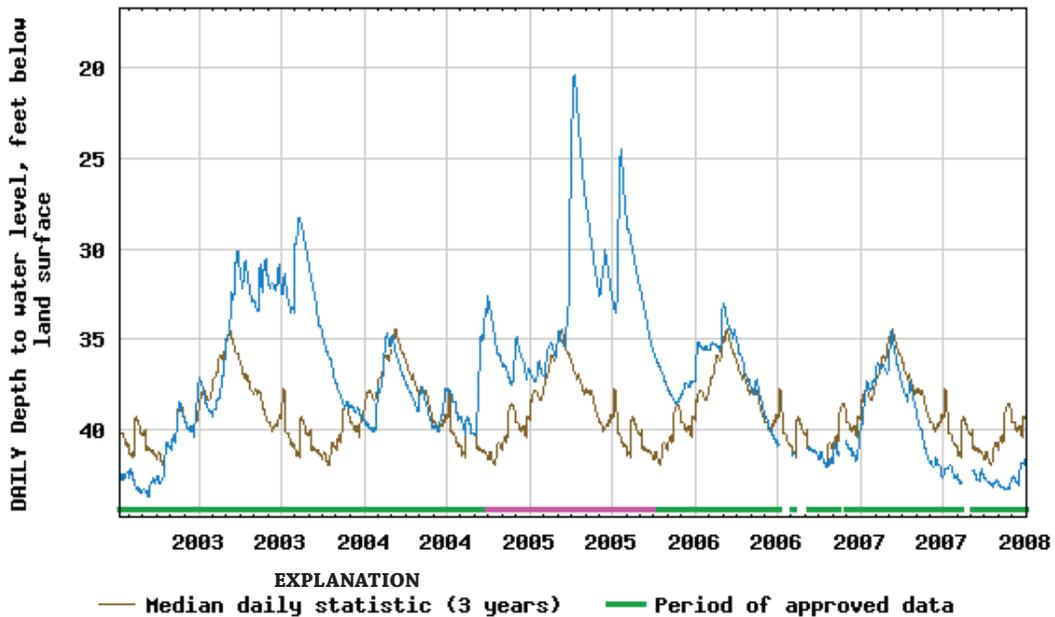
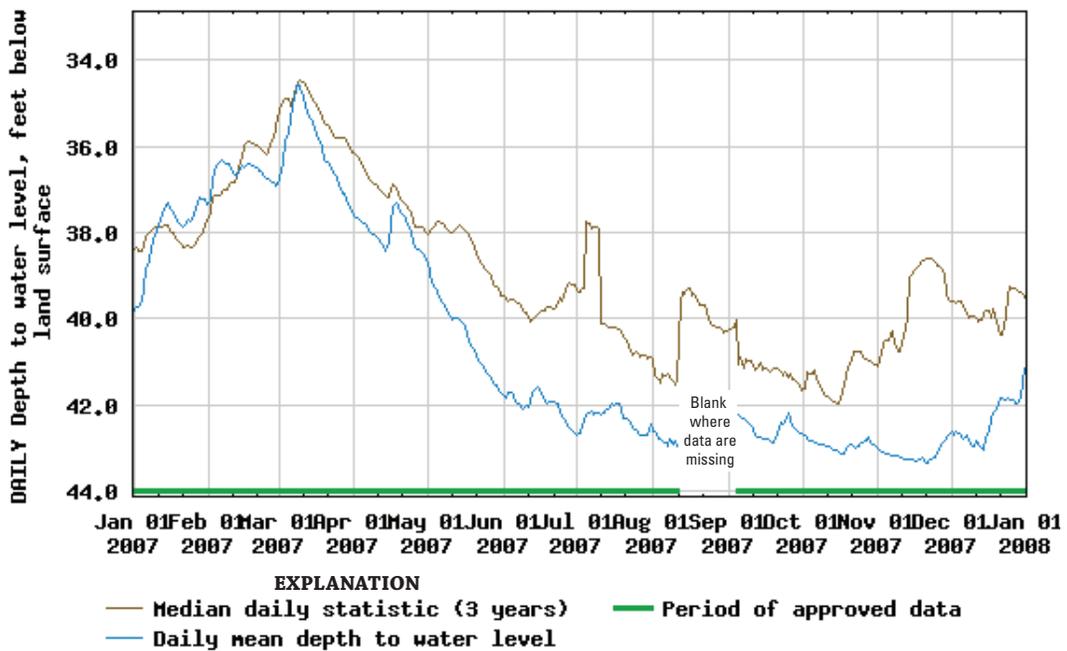


Figure A12. Periodic and daily mean water levels in well 12L373, Upper Floridan aquifer, 2002–2007.

Upper Floridan Aquifer

313808084093601

Site Name: 12M017

Latitude: 31° 38' 09" Longitude: 84° 09' 36"

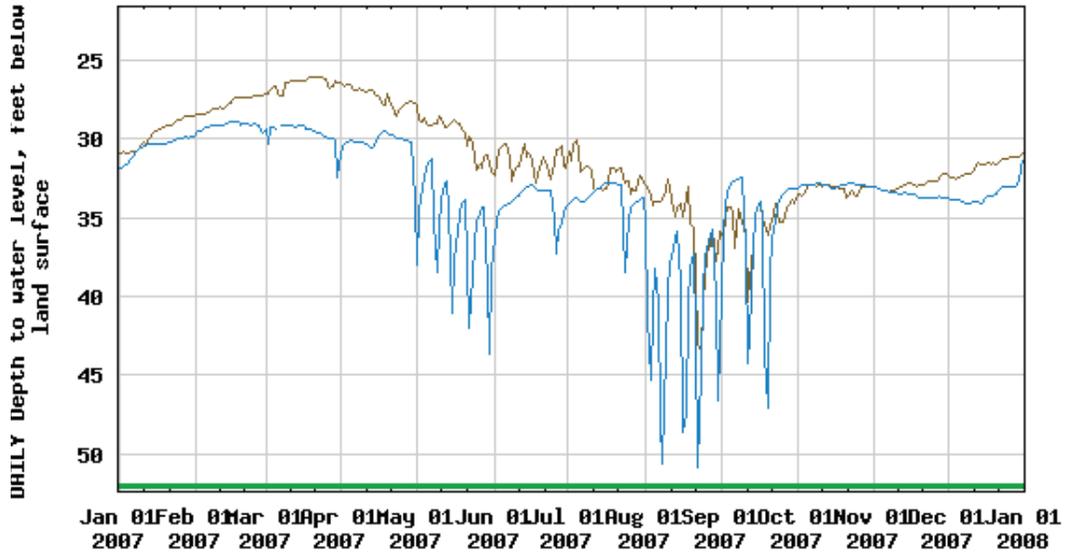
Lee County

Period of Record: 1982 - 2007

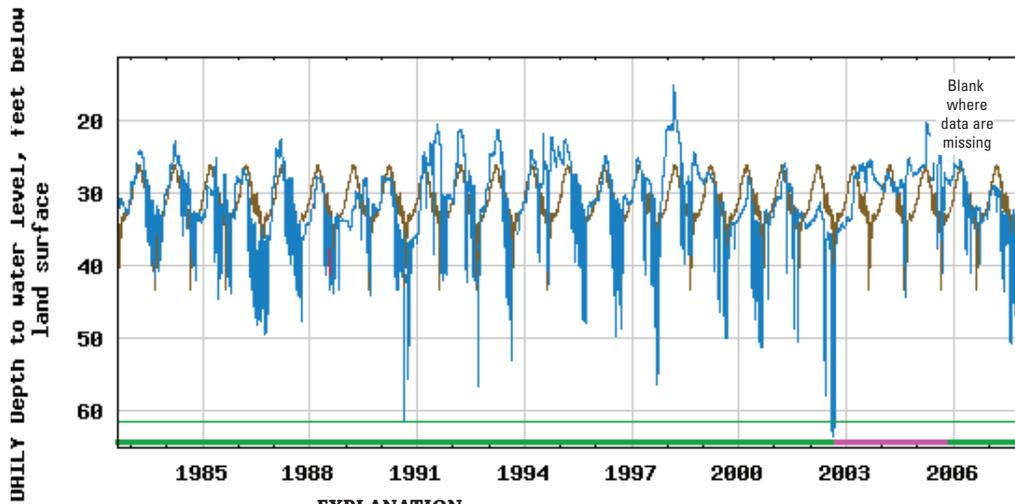
Well Depth: 181 feet

Datum: 225 feet

Well Diameter: 4 inches



EXPLANATION  
 — Median daily statistic (19 years) — Period of approved data  
 — Daily mean depth to water level



EXPLANATION  
 — Median daily statistic (19 years)  
 — Daily mean depth to water level  
 — Estimated daily mean depth to water level  
 — Period of approved data  
 — Period of provisional data  
 — Lowest water level recorded prior to 1999 (61.7 ft, Aug 24 1998)

Figure A13. Periodic and daily mean water levels in well 12M017, Upper Floridan aquifer, 1982–2007.

Upper Floridan Aquifer

312704084071601

Site Name: 13K014

Latitude: 31° 27' 05" Longitude: 84° 07' 16"

Dougherty County

Period of Record: 1982 - 2007

Well Depth: 131 feet

Datum: 180 feet

Well Diameter: 4 inches

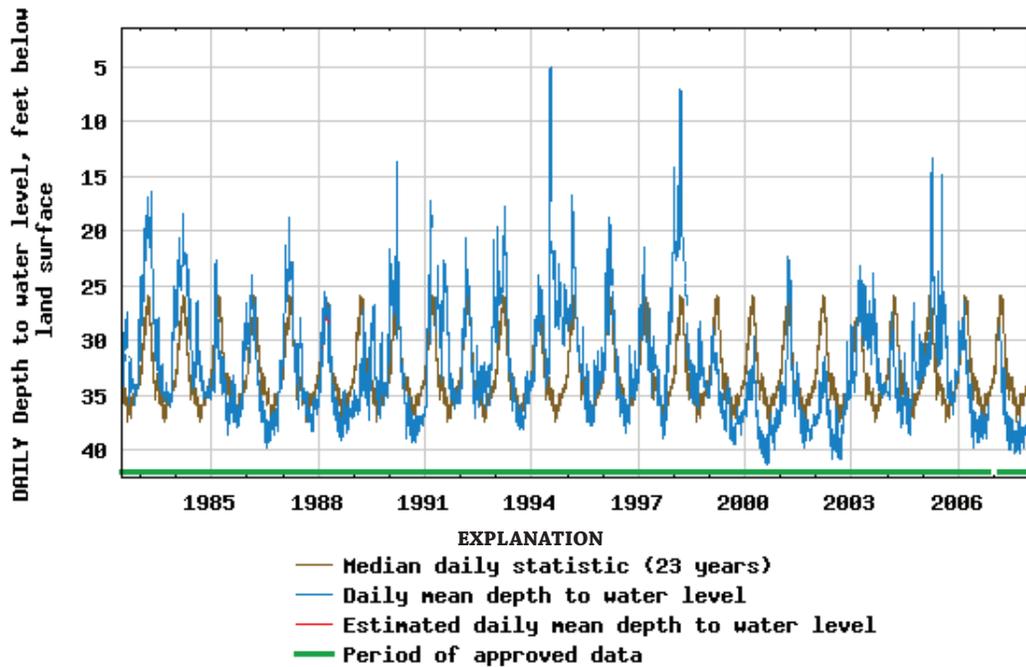
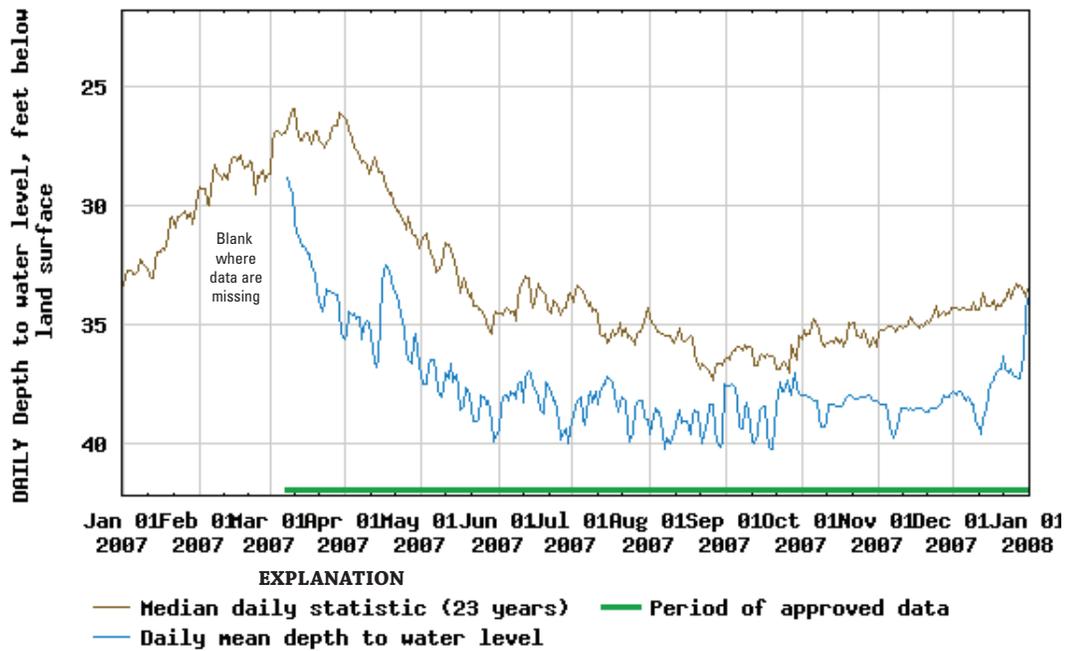


Figure A14. Periodic and daily mean water levels in well 13K014, Upper Floridan aquifer, 1982–2007.

Upper Floridan Aquifer

313105084064302

Site Name: 13L012

Latitude: 31° 31' 06" Longitude: 84° 06' 43"  
Well Depth: 218 feet

Dougherty County  
Datum: 195 feet

Period of Record: 1977 - 2007  
Well Diameter: 4 inches

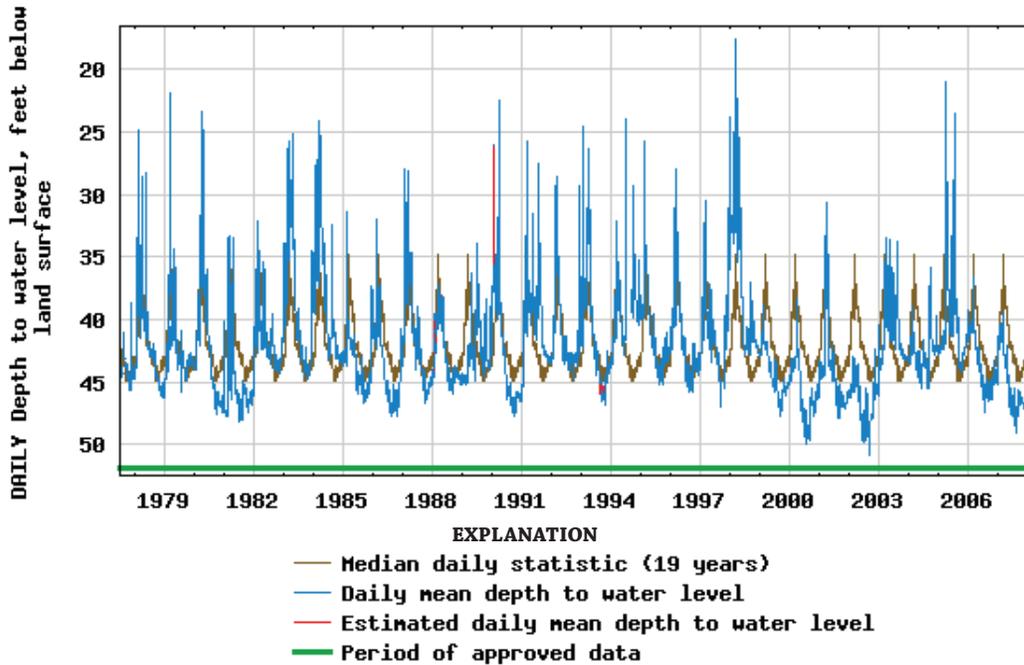
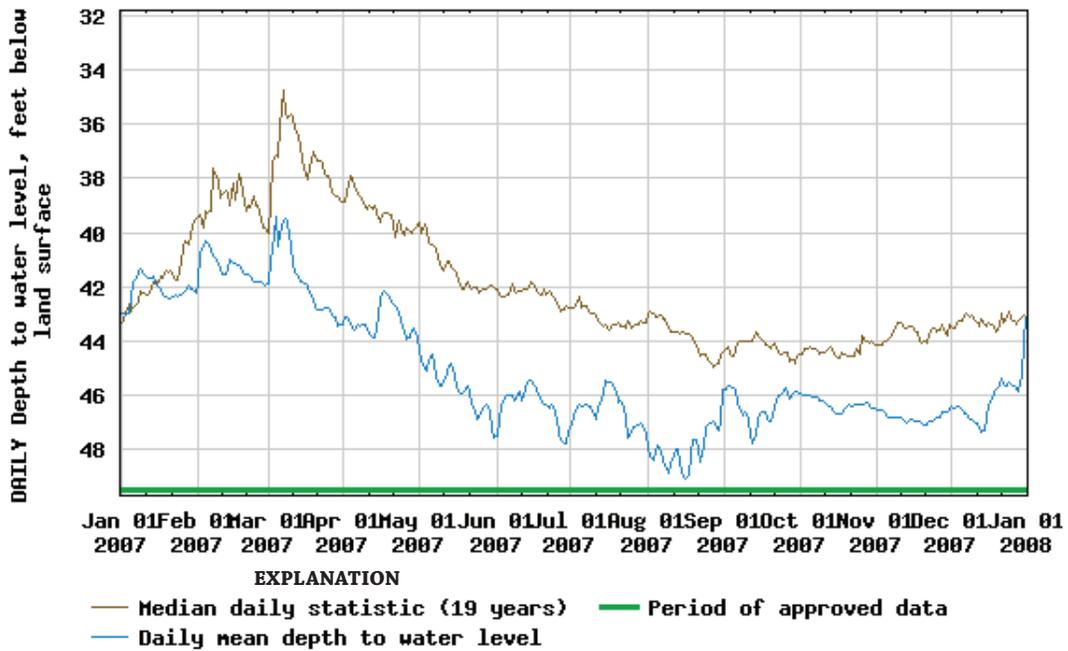


Figure A15. Periodic and daily mean water levels in well 13L012, Upper Floridan aquifer, 1977–2007.

Upper Floridan Aquifer

313521084051001

Site Name: 13L049

Latitude: 31° 35' 22" Longitude: 84° 05' 10"  
Well Depth: 170 feet

Dougherty County  
Datum: 205 feet

Period of Record: 1985 - 2007  
Well Diameter: 6 inches

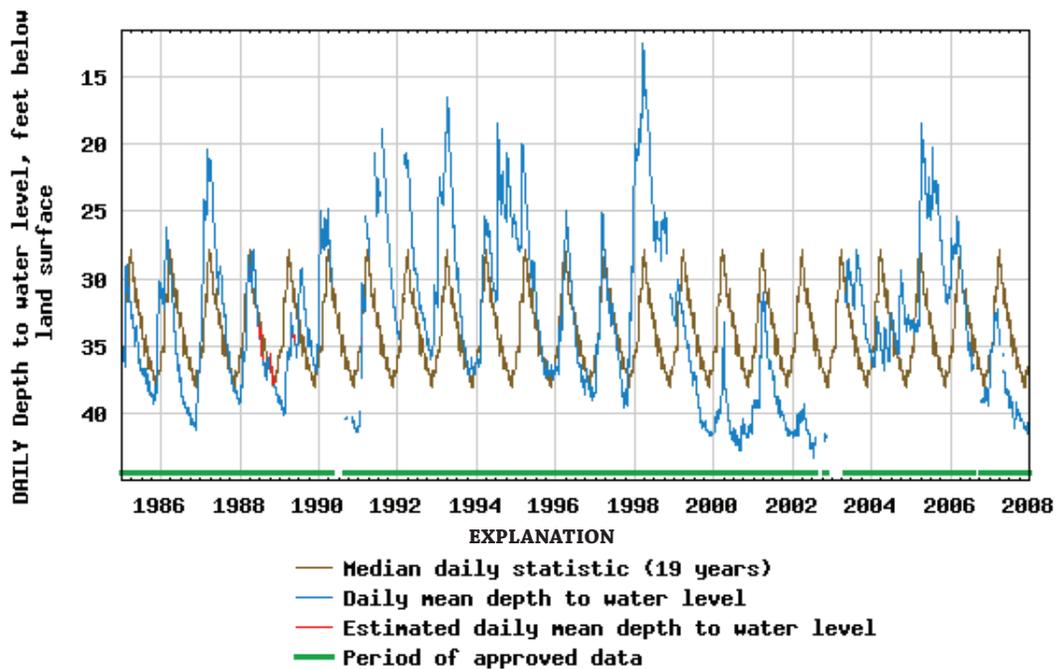
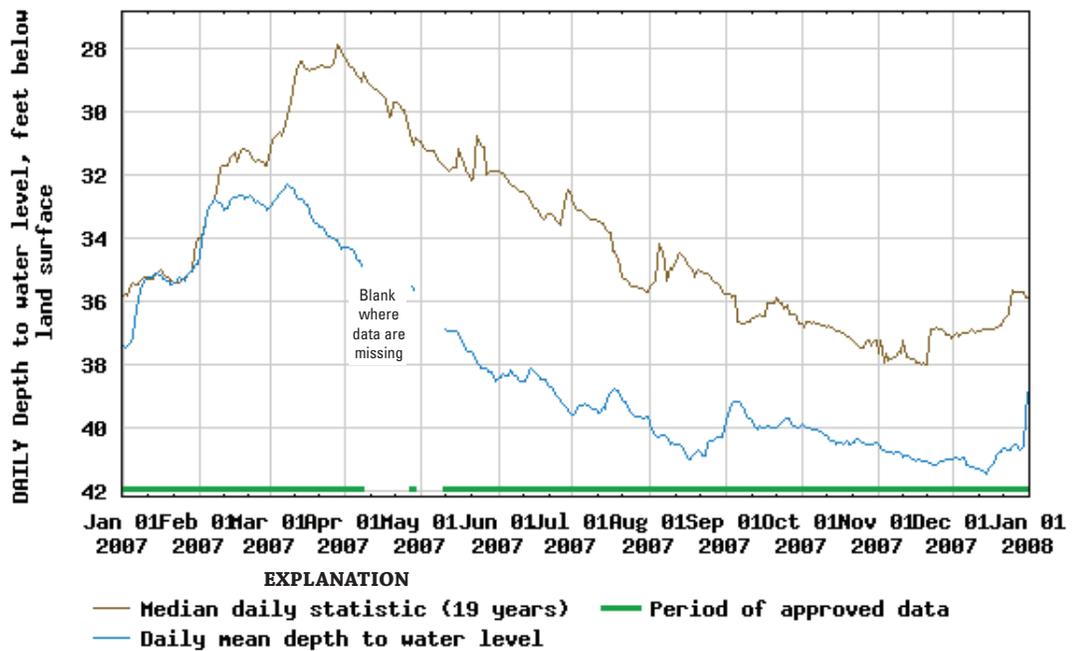


Figure A16. Periodic and daily mean water levels in well 13L049, Upper Floridan aquifer, 1985–2007.

Upper Floridan Aquifer

313247084005001

Site Name: 13L180

Latitude: 31° 32' 48" Longitude: 84° 00' 50"

Dougherty County

Period of Record: 1996 - 2007

Well Depth: 310 feet

Datum: 230 feet

Well Diameter: 4 inches

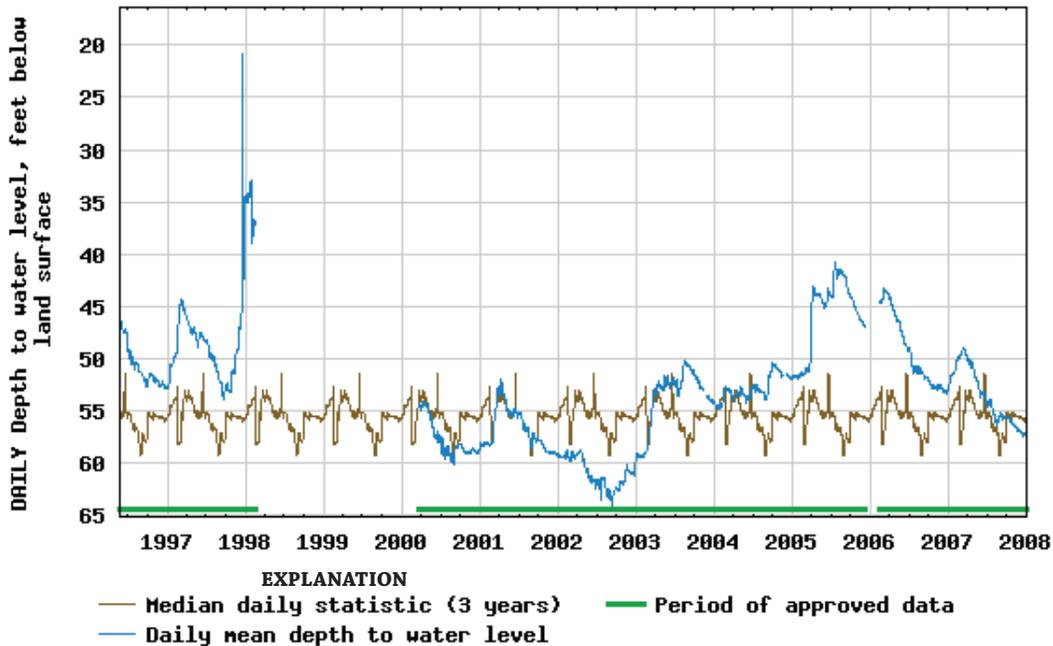
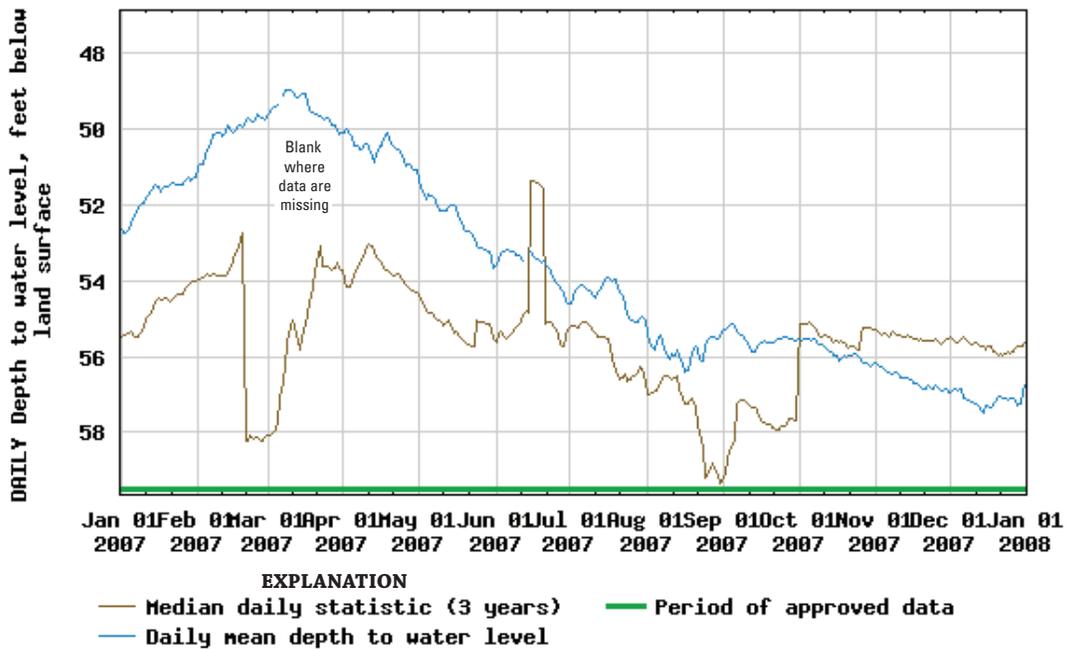


Figure A17. Periodic and daily mean water levels in well 13L180, Upper Floridan aquifer, 1996–2007.

**Claiborne Aquifer**

**313534084103001**

**Site Name: 12L019**

Latitude: 31° 35' 37" Longitude: 84° 10' 30"

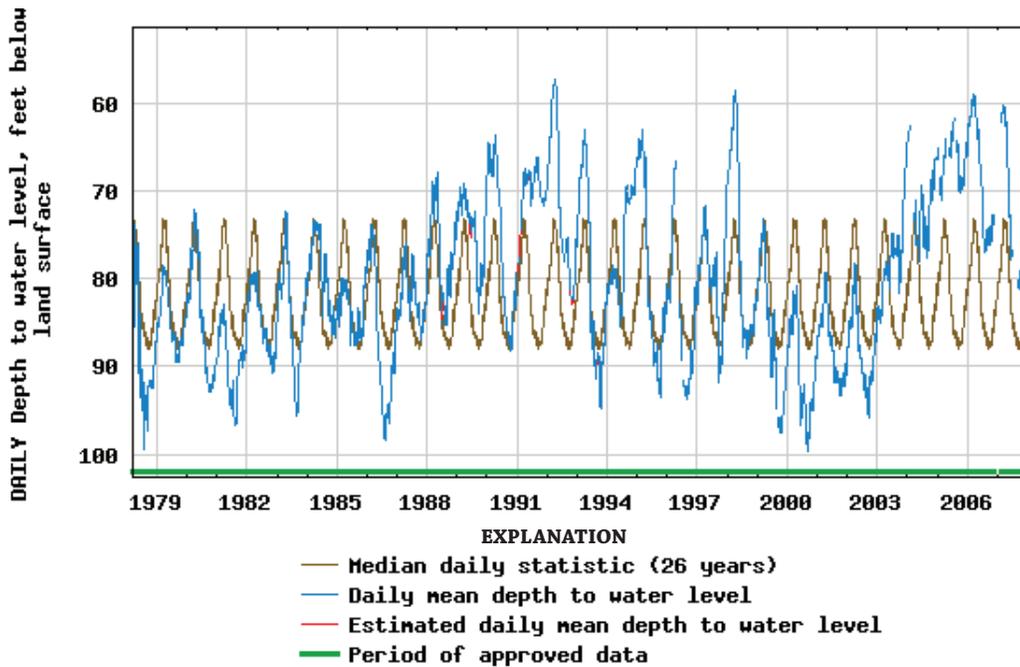
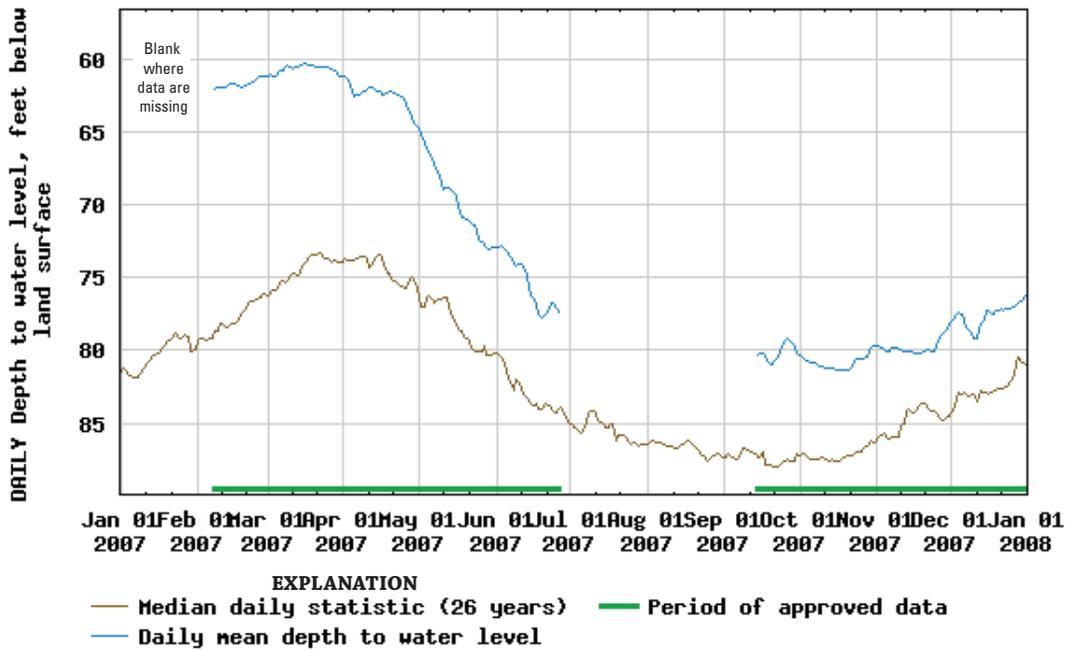
Dougherty County

Period of Record: 1978 - 2007

Well Depth: 257 feet

Datum: 195 feet

Well Diameter: 6 inches



**Figure A18.** Periodic and daily mean water levels in well 12L019, Claiborne aquifer, 1978–2007.

**Claiborne Aquifer**

**313105084064301**

**Site Name: 13L011**

Latitude: 31° 31' 06" Longitude: 84° 06' 43"

Dougherty County

Period of Record: 1977 - 2007

Well Depth: 418 feet

Datum: 195 feet

Well Diameter: 4 inches

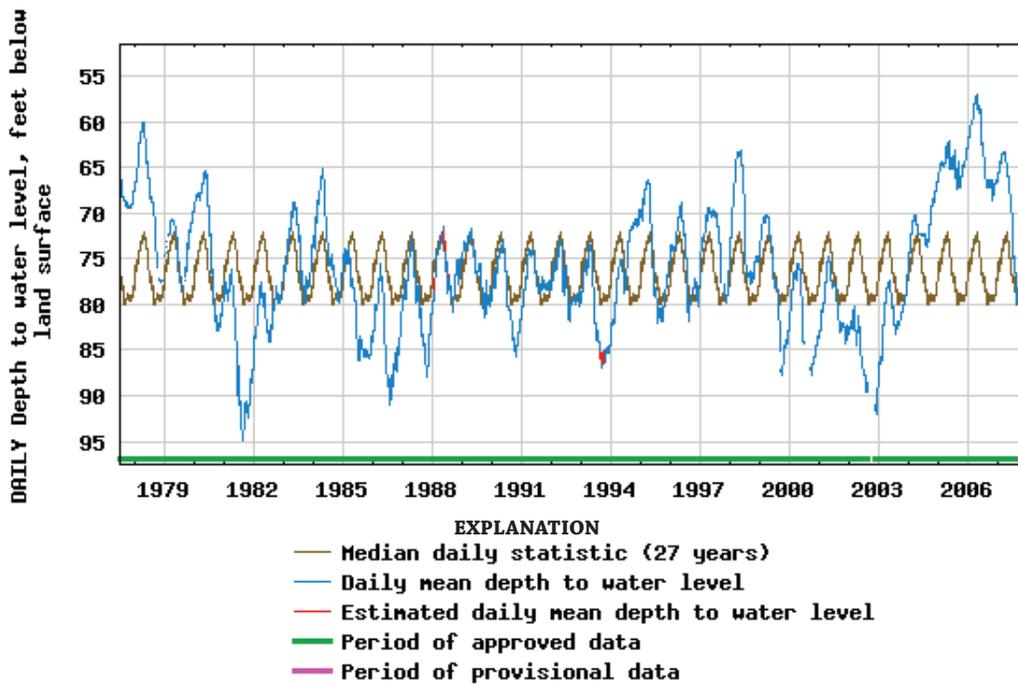
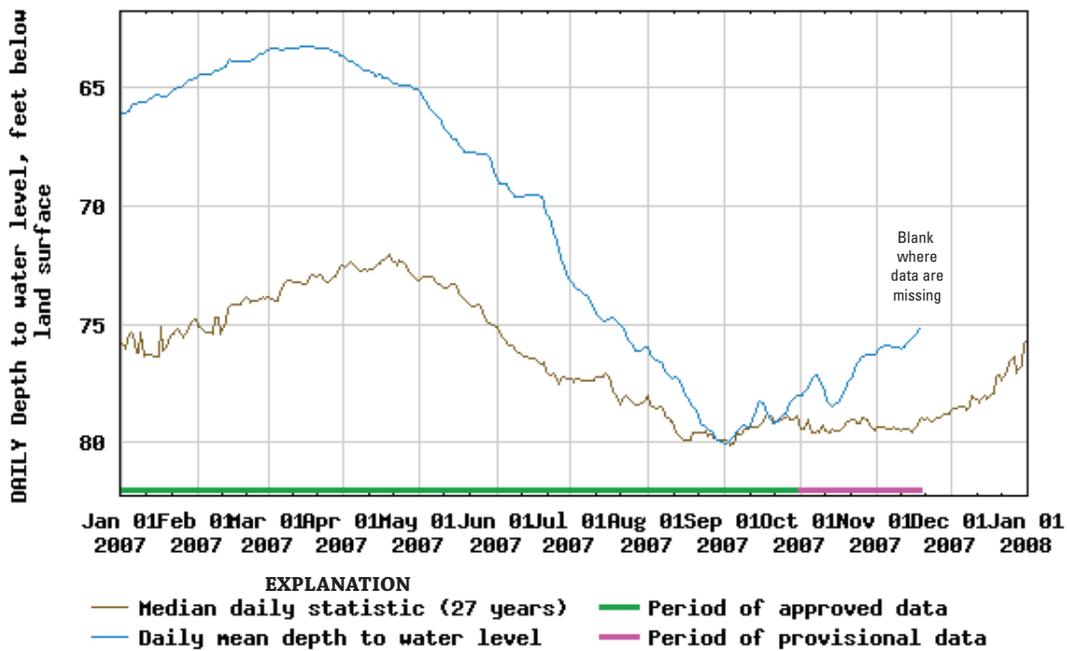


Figure A19. Periodic and daily mean water levels in well 13L011, Claiborne aquifer, 1977–2007.

**Claiborne Aquifer**

**313625084041501**

**Site Name: 13L015**

Latitude: 31° 36' 22" Longitude: 84° 04' 09"  
Well Depth: 351 feet

Dougherty County  
Datum: 200 feet

Period of Record: 1979 - 2007  
Well Diameter: 4 inches

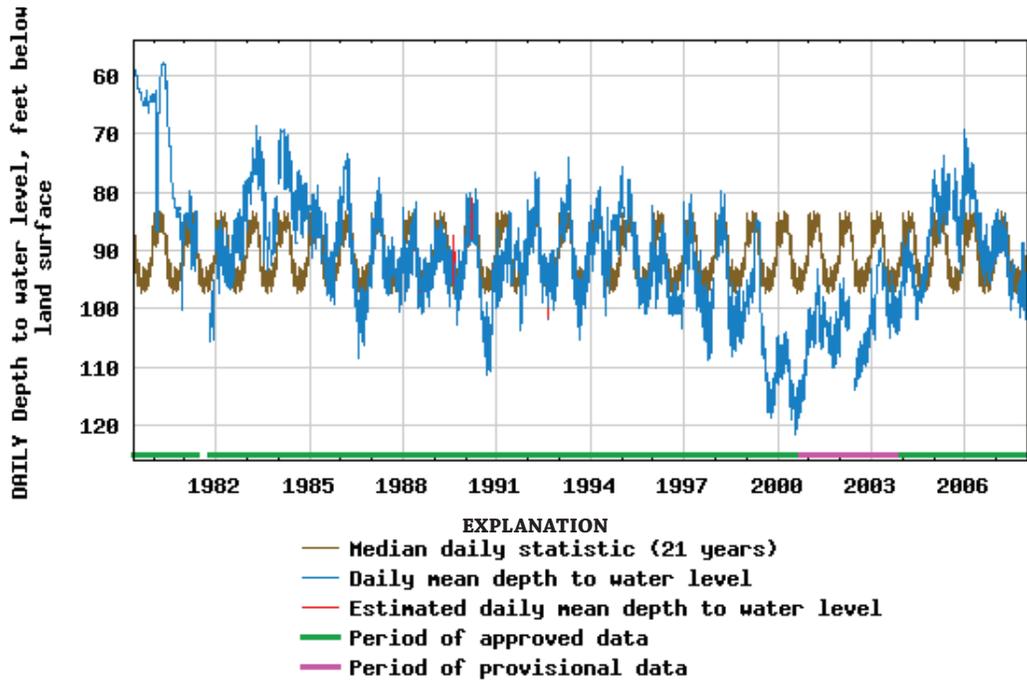
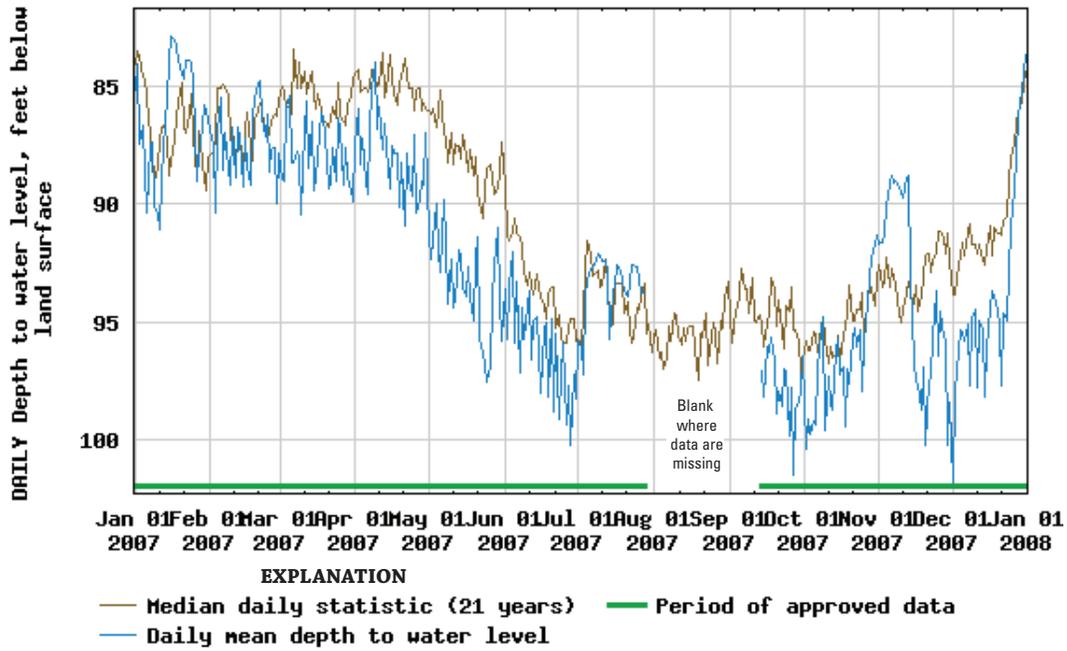


Figure A20. Periodic and daily mean water levels in well 13L015, Claiborne aquifer, 1979–2007.

**Claiborne Aquifer**

**312654084210102**

**Site Name: 11K002**

Latitude: 31° 26' 54" Longitude: 84° 21' 01"

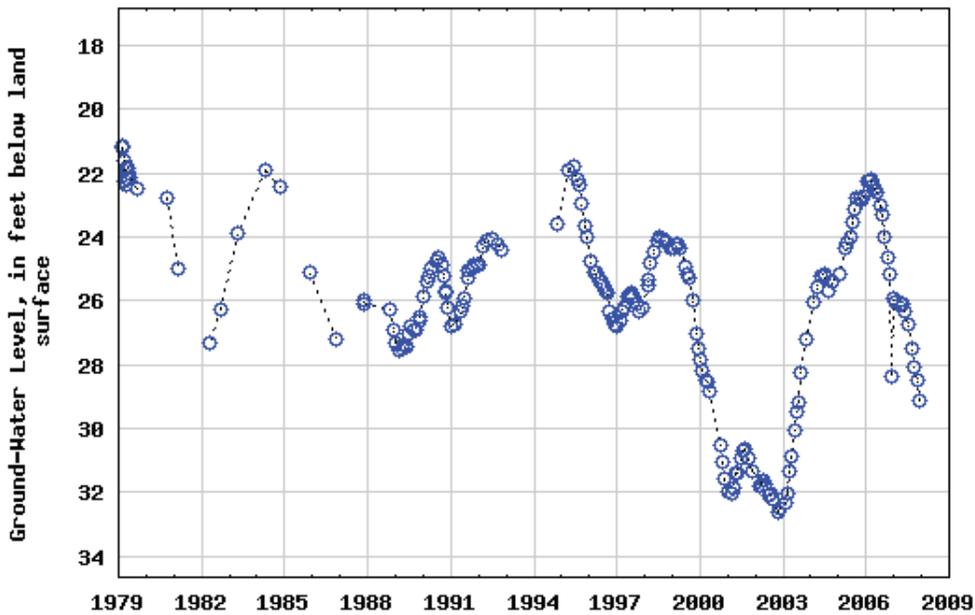
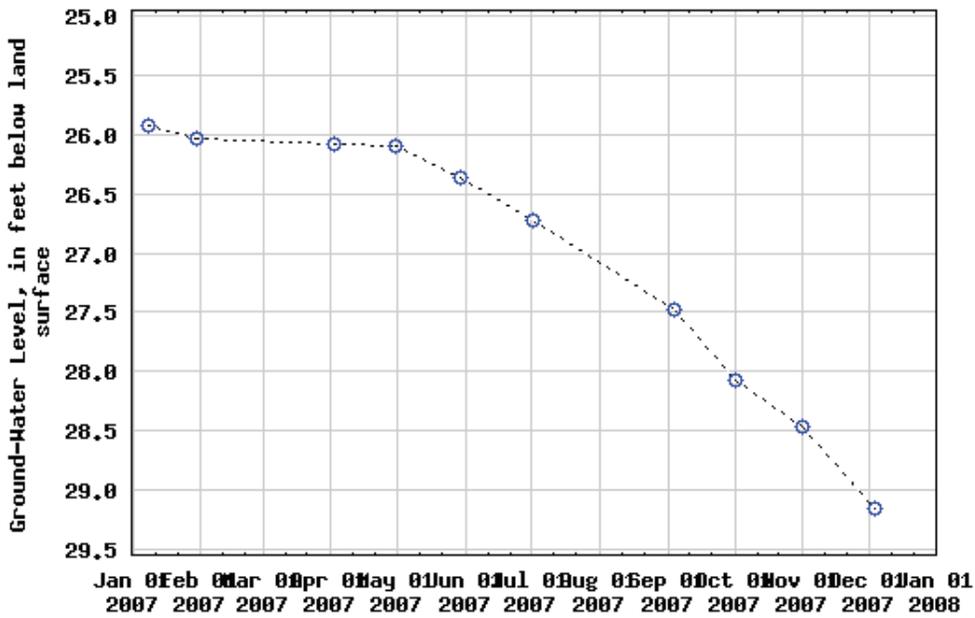
Dougherty County

Period of Record: 1979 - 2007

Well Depth: 320 feet

Datum: 183 feet

Well Diameter: 6 inches



**Figure A21.** Periodic water levels in well 11K002, Claiborne aquifer, 1979–2007.

Claiborne Aquifer

313530084203202

Site Name: 11L001

Latitude: 31°35'30" Longitude: 84°20'34"  
Well Depth: 251 feet

Dougherty County  
Datum: 220 feet

Period of Record: 1978 - 2007  
Well Diameter: 4 inches

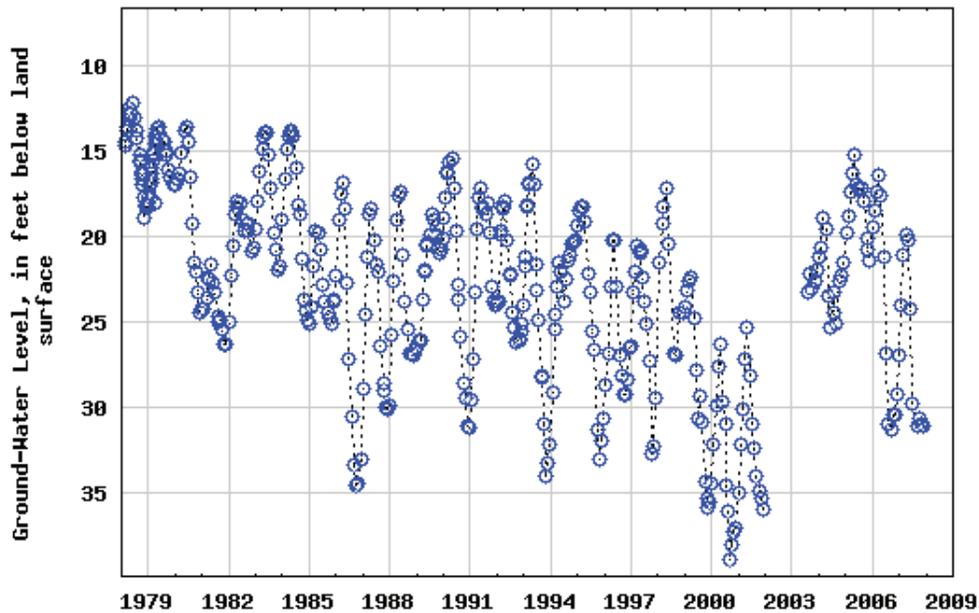
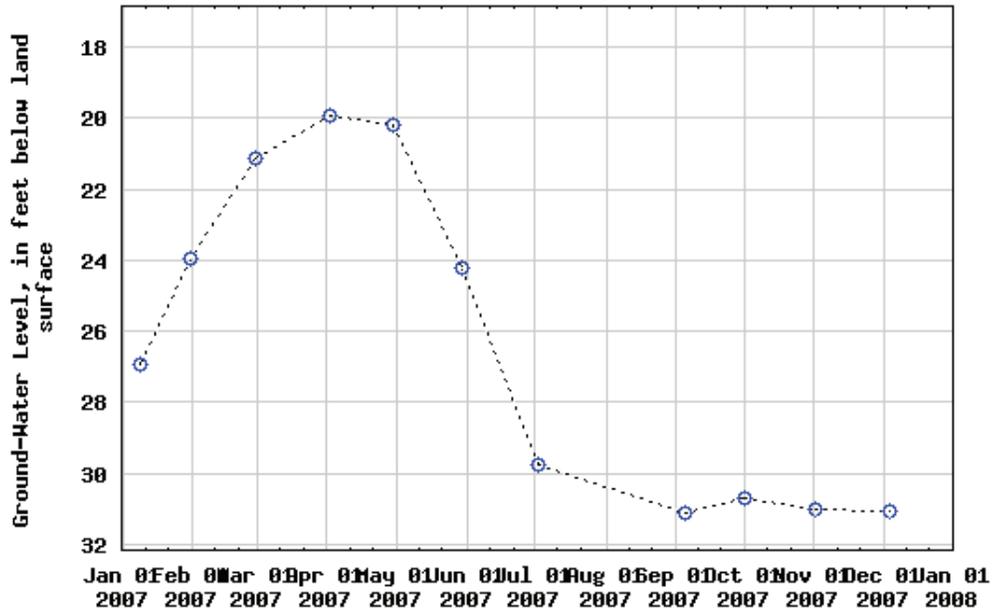


Figure A22. Periodic water levels in well 11L001, Claiborne aquifer, 1978–2007.

Clayton Aquifer

312654084210103

Site Name: 11K005

Latitude: 31°26'55" Longitude: 84°21'01" Dougherty County Period of Record: 1979 - 2007  
 Well Depth: 646 feet Datum: 180 feet Well Diameter: 6 inches

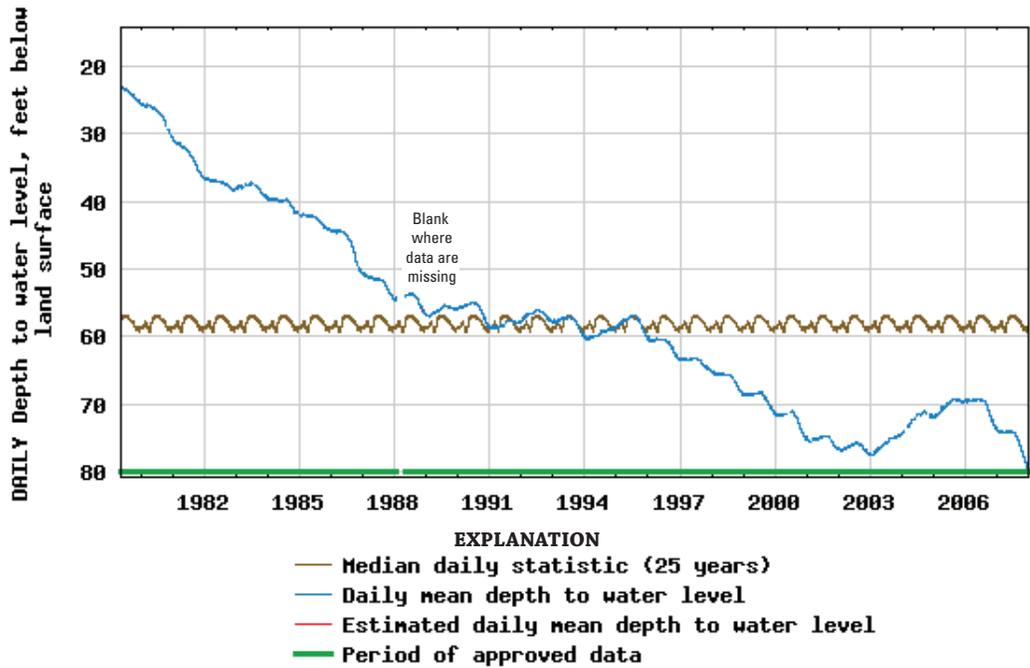
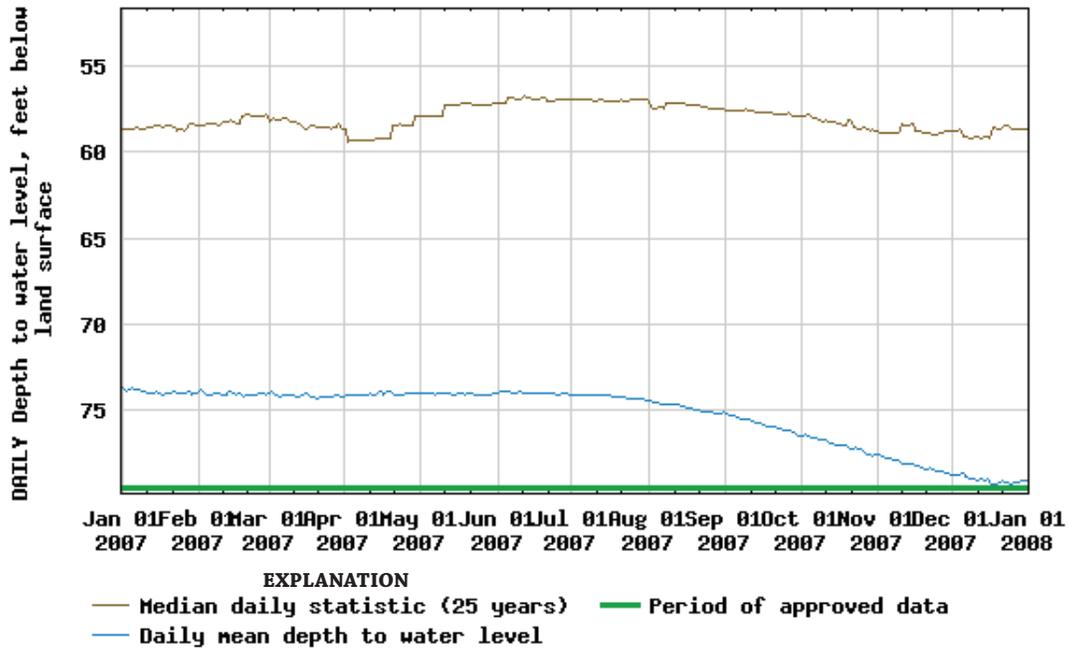


Figure A23. Periodic and daily mean water levels in well 11K005, Clayton aquifer, 1979–2007.

Clayton Aquifer

313532084203501

Site Name: 11L002

Latitude: 31° 35' 33" Longitude: 84° 20' 32"

Dougherty County

Period of Record: 1973 - 2007

Well Depth: 656 feet

Datum: 222 feet

Well Diameter: 3 inches

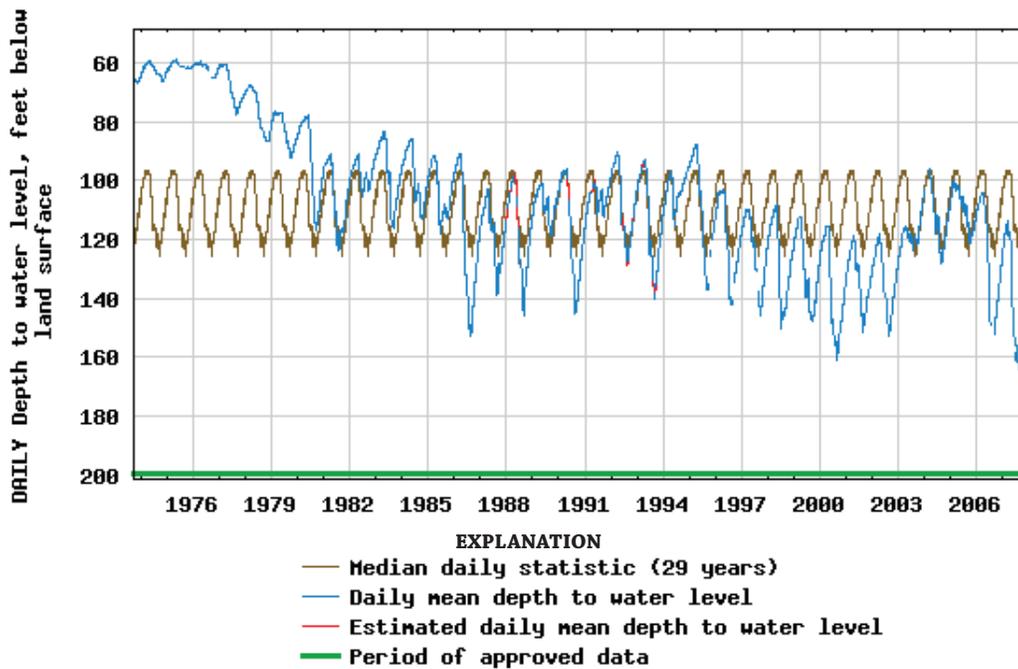
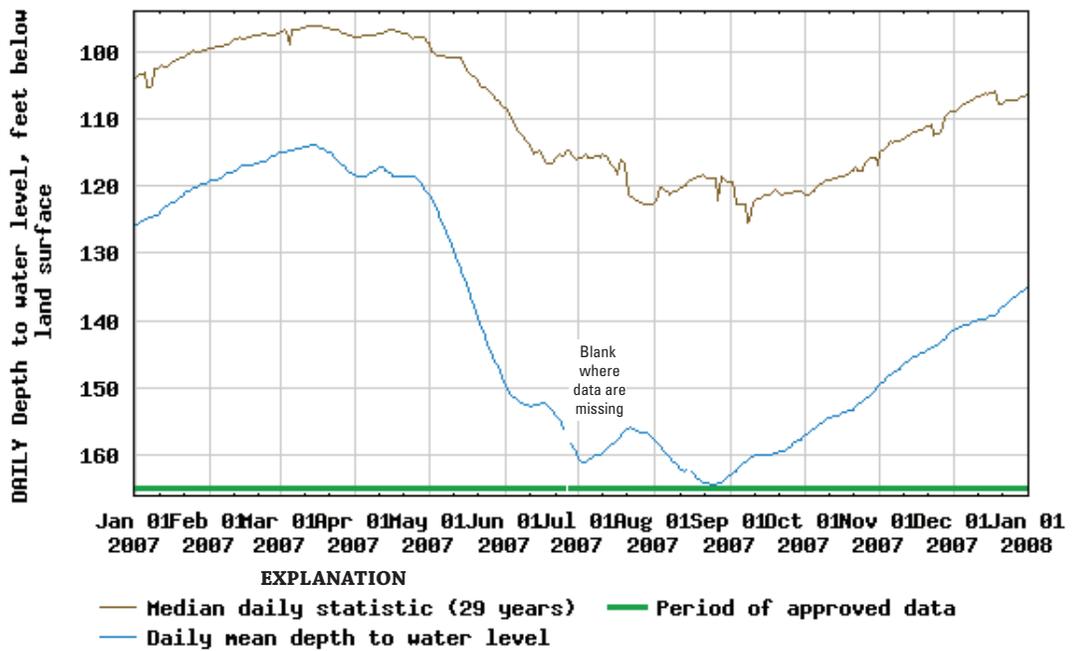


Figure A24. Periodic and daily mean water levels in well 11L002, Clayton aquifer, 1973–2007.

Clayton Aquifer

313534084103002

Site Name: 12L020

Latitude: 31° 35' 35" Longitude: 24° 10' 30"

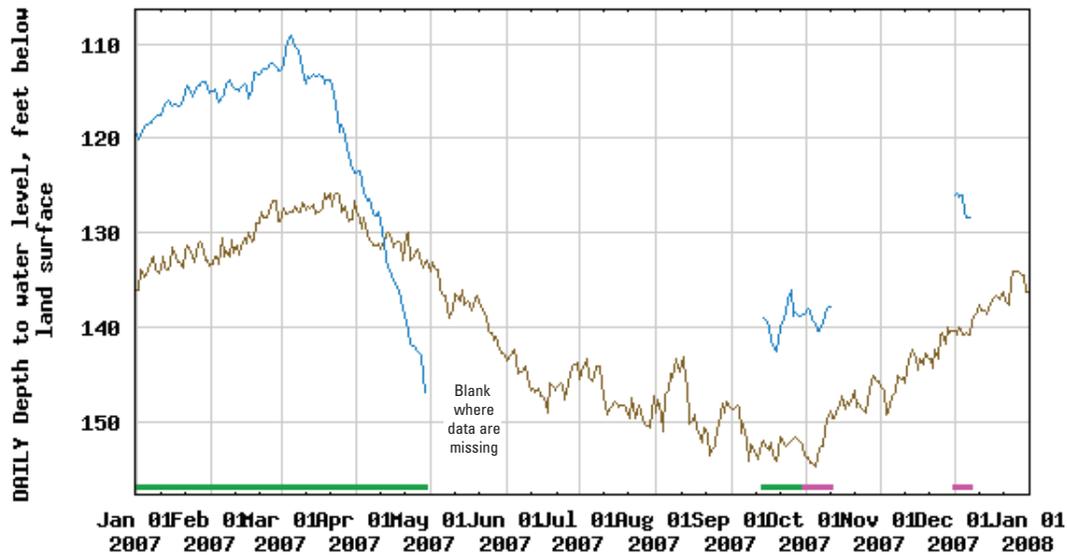
Lee County

Period of Record: 1978 - 2007

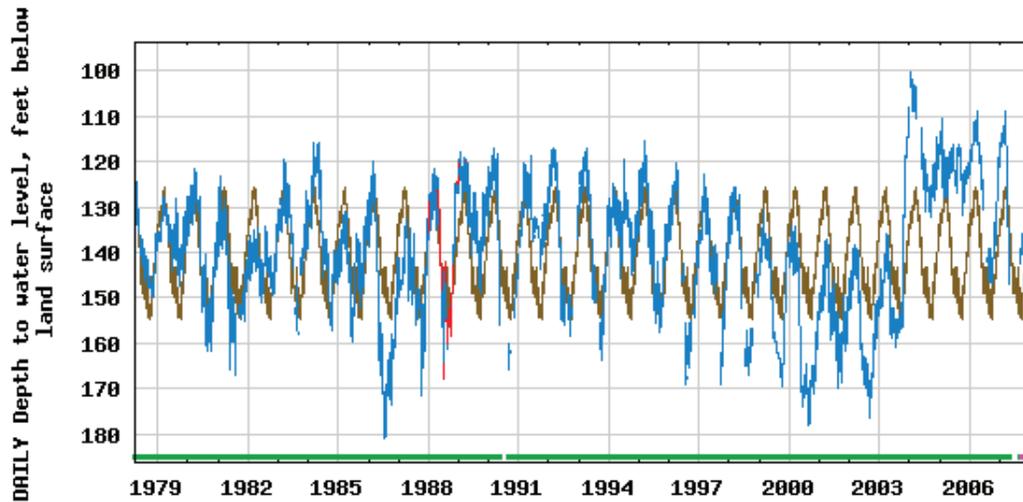
Well Depth: 690 feet

Datum: 195 feet

Well Diameter: 4 inches



EXPLANATION  
 — Median daily statistic (21 years) — Period of approved data  
 — Daily mean depth to water level — Period of provisional data



EXPLANATION  
 — Median daily statistic (21 years)  
 — Daily mean depth to water level  
 — Estimated daily mean depth to water level  
 — Period of approved data  
 — Period of provisional data

Figure A25. Periodic and daily mean water levels in well 12L020, Clayton aquifer, 1978–2007.

Clayton Aquifer

313812084125001

Site Name: 12M002

Latitude: 31° 38' 11" Longitude: 84° 12' 49"

Lee County

Period of Record: 1978 - 2007

Well Depth: 650 feet

Datum: 240 feet

Well Diameter: 6 inches

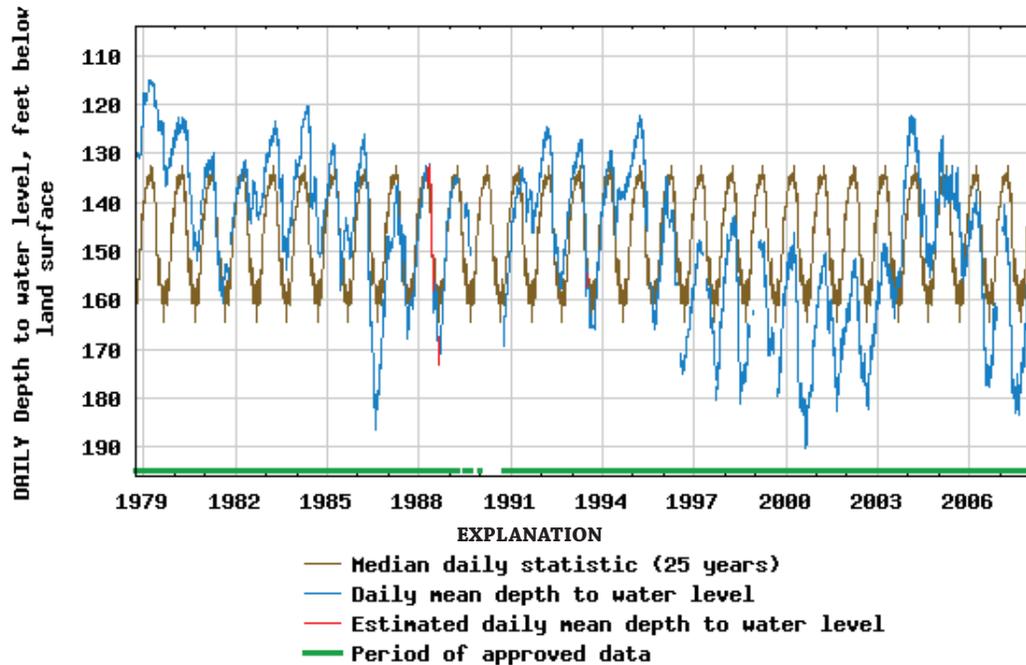
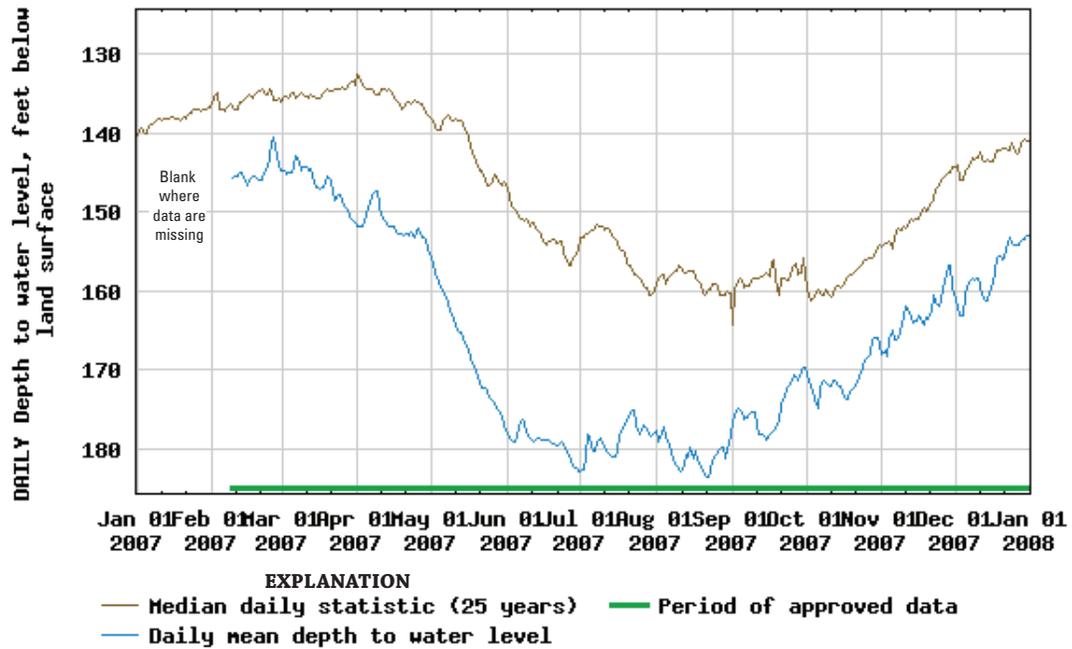


Figure A26. Periodic and daily mean water levels in well 12M002, Clayton aquifer, 1978–2007.

**Clayton Aquifer**

**313554084062501**

**Site Name: 13L002**

Latitude: 31° 35' 52" Longitude: 84° 06' 24"  
Well Depth: 760 feet

Dougherty County  
Datum: 212 feet

Period of Record: 1957 - 2007  
Well Diameter: 12 inches

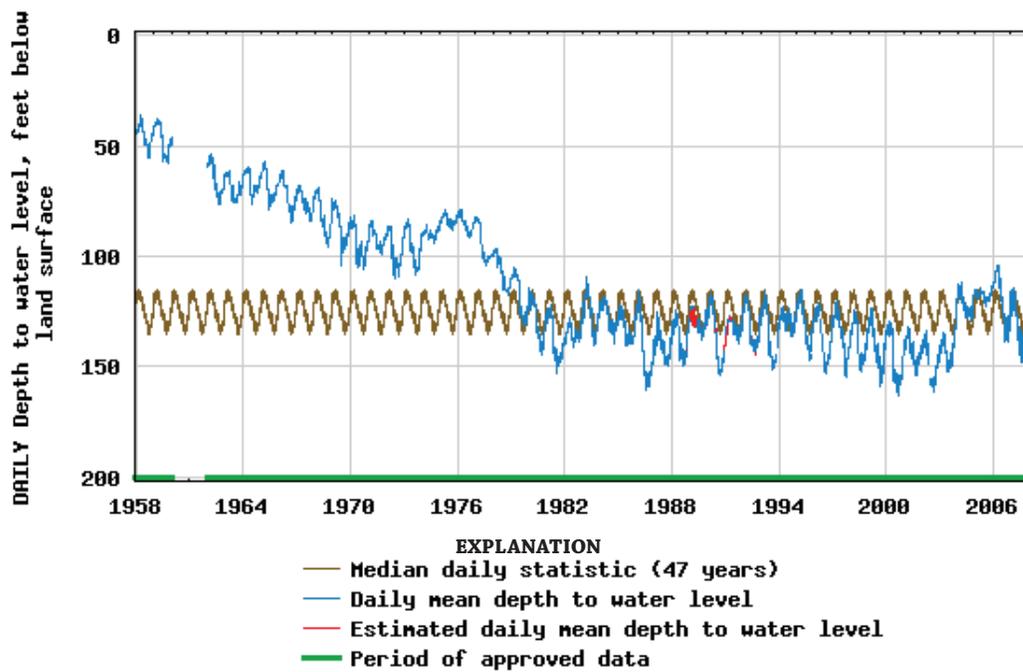
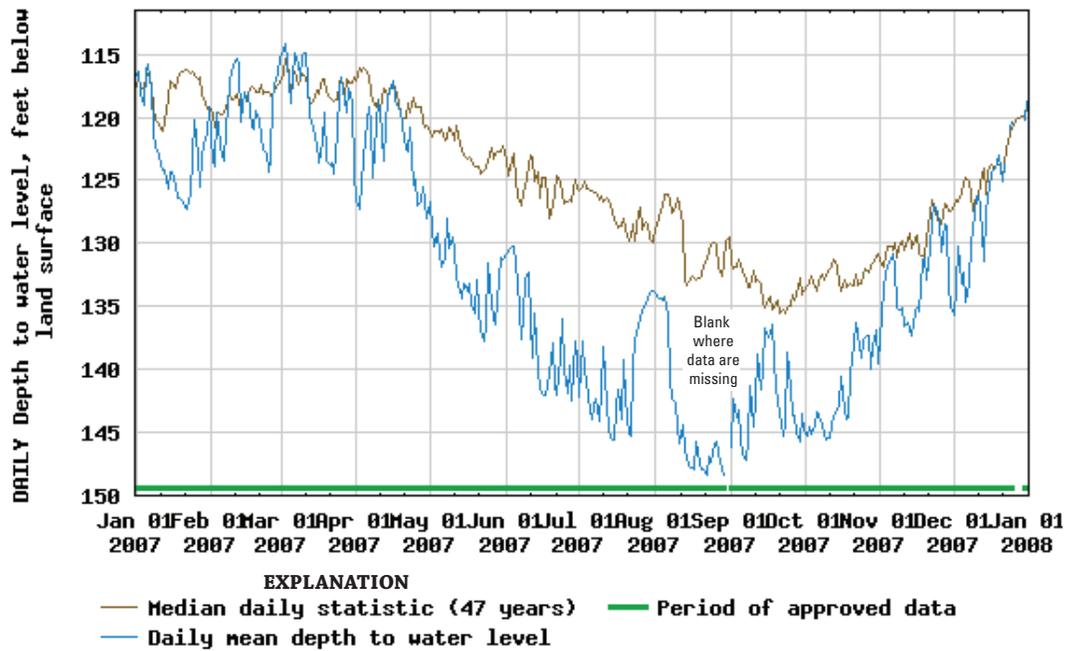


Figure A27. Periodic and daily mean water levels in well 13L002, Clayton aquifer, 1957–2007.

Clayton Aquifer

313105084064202

Site Name: 13L013

Latitude: 31° 31' 06" Longitude: 84° 06' 43"  
Well Depth: 882 feet

Dougherty County  
Datum: 195 feet

Period of Record: 1978 - 2001  
Well Diameter: 60 inches

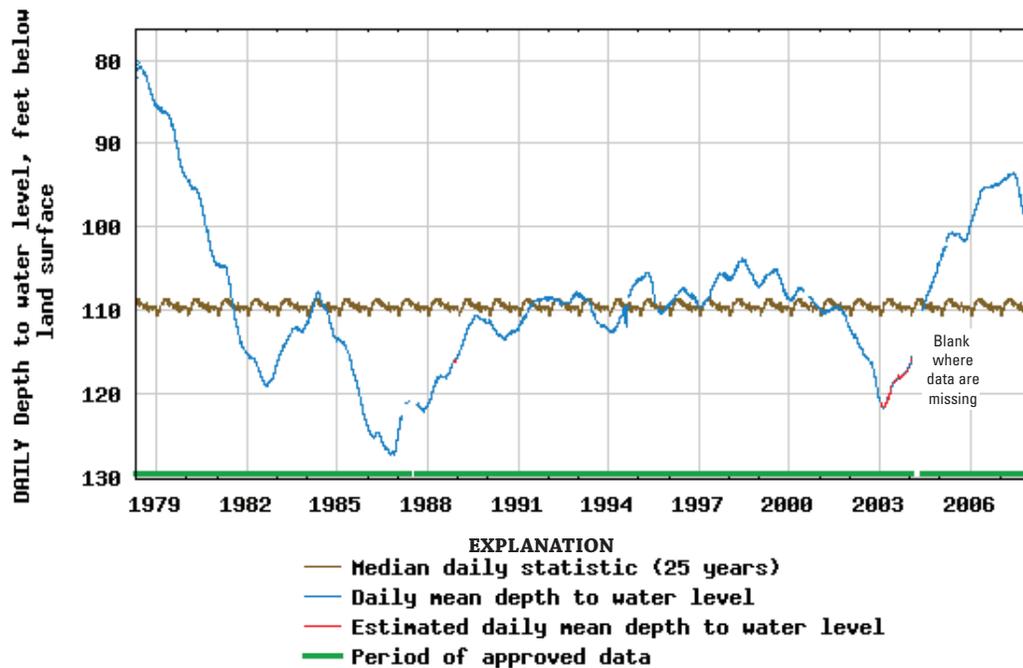
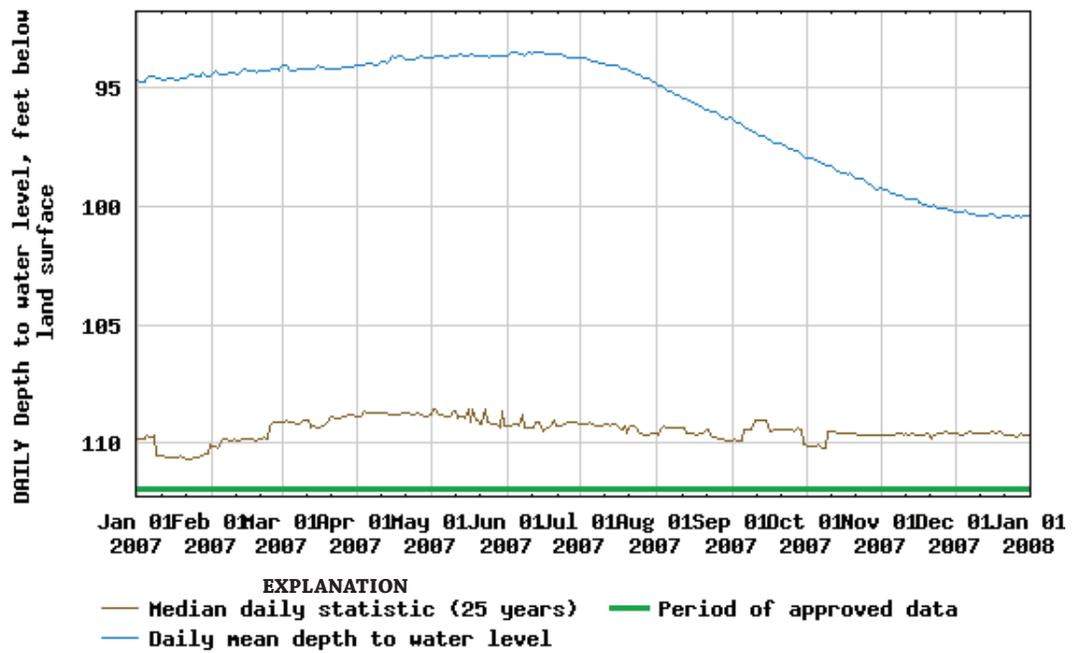


Figure A28. Periodic and daily mean water levels in well 13L013, Clayton aquifer, 1978–2001.

Providence Aquifer

313534084103003

Site Name: 12L021

Latitude: 31° 35' 38" Longitude: 84° 10' 29"  
Well Depth: 846 feet

Dougherty County  
Datum: 195 feet

Period of Record: 1978 - 2001  
Well Diameter: 14 inches

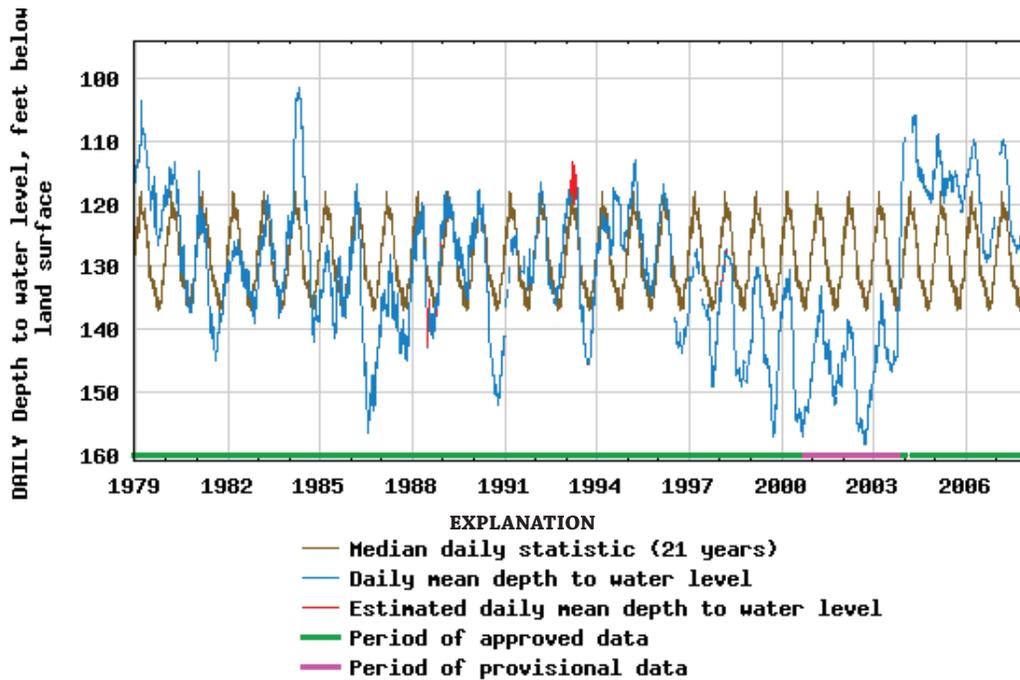
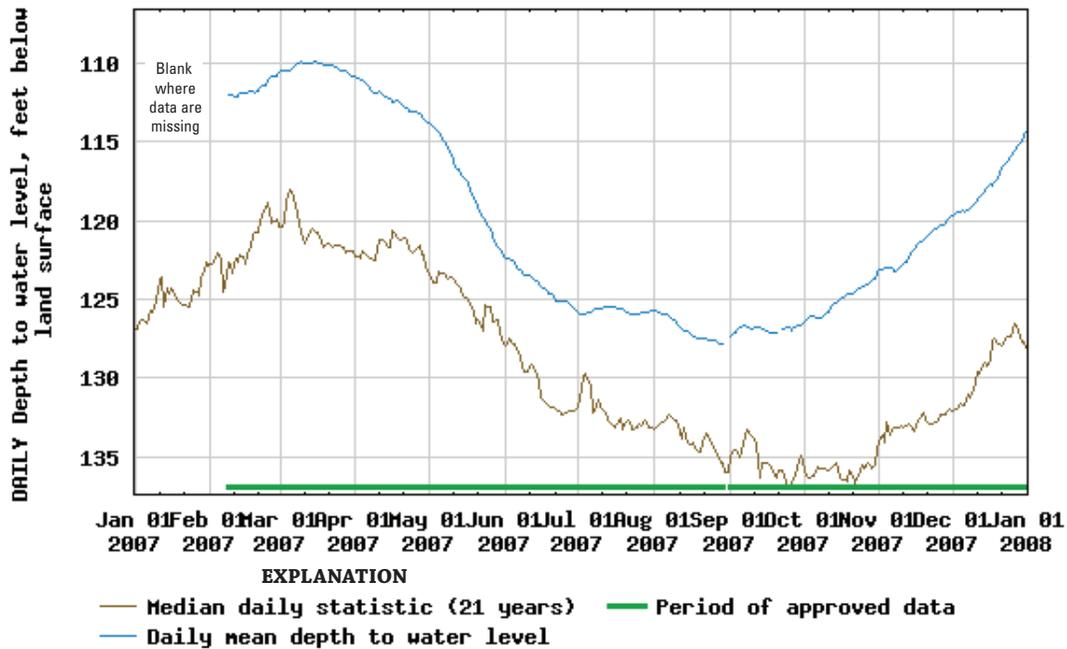


Figure A29. Periodic and daily mean water levels in well 12L021, Cretaceous aquifer, 1978–2001.

**Appendix B. Site Information and Water-Quality Data  
from Surface-Water and Ground-Water Sites in the  
Albany Area of Dougherty County, Georgia, October 2007**

46 Ground-Water Conditions and Studies in the Albany Area of Dougherty County, Georgia, 2007

Table B1. Site information for water-quality data from the Albany area of Dougherty County, Georgia, October 2007.

[—, no data or not applicable]

STAIID Station number	SNAME Station name	DATES Date as yyyymmdd	TIMES Sample start time	P72008 Depth of well, feet below land surface datum	P72019 Depth to water level, feet below land surface	P72000 Altitude of land surface, feet	P61055 Water level, depth below measuring point, feet	P00059 Flow rate, instan- taneous, gallons per minute	P72004 Pump or flow period prior to sampling, minutes	P81024 Drain- age area, square miles	P72104 Sample location, distance down- stream, feet	P00003 Sampling depth, feet
2352560	Flint River at Ga. 234, at Albany, Ga.	20071003	1330	—	—	150	—	—	—	—	—	—
2352560	Flint River at Ga. 234, at Albany, Ga.	20071015	1445	—	—	150	—	—	—	—	0	—
2352560	Flint River at Ga. 234, at Albany, Ga.	20071015	1500	—	—	150	—	—	—	—	—	—
2352560	Flint River at Ga. 234, at Albany, Ga.	20071015	1505	—	—	150	—	—	—	—	—	—
312720084123601	12K053	20071016	1345	85	50.55	193.08	—	—	—	—	—	—
312857084132901	12K101	20071017	0930	120	53.5	205.47	—	—	—	—	—	—
312917084123001	12K129	20071016	1530	211	—	200	50.32	—	—	—	—	—
312937084131901	12K175	20071017	1145	187	45.92	198.66	—	—	—	—	—	—
312947084092201	12K180	20071018	1230	170	32.3	171.8	—	3	20	—	—	—
313000084100301	12L373	20071018	1130	170	42	185.9	—	—	—	—	—	—
313005084121401	12L348	20071016	1130	180	40.23	193	—	—	—	—	—	—
313020084142501	12L061	20071017	1445	195	35.88	190.15	—	—	—	—	—	112
313023084113201	12L340	20071018	1015	178.5	44.53	190.82	—	3	—	—	—	—
313026084121901	12L350	20071018	0900	191	37.4	189.7	—	3	—	—	—	—
313038084122501	12L376	20071015	1830	45	38.13	190.7	39.68	—	—	—	—	—
313040084125901	12L277	20071018	1315	203	39.1	190.7	—	—	—	—	—	—
313132084133201	12L310	20071017	1745	250	43.85	204.8	—	—	—	—	—	—
312947084092201	12K180	20071018	1230	170	32.3	171.8	—	3	20	—	—	—

**Table B2.** Field parameters for water-quality samples from the Albany area of Dougherty County, Georgia, October 2007.

[—, no data or not applicable]

STAD Station number	SNAME Station name	P82079 Turbidity, water, unfiltered, laboratory, nephelo- metric turbidity units	P00025 Barometric pressure, millimeters of mercury	P00300 Dissolved oxygen, water, unfiltered, milligrams per liter	P00400 pH, water, unfiltered, field, standard units	P00403 pH, water, unfiltered, laboratory, standard units	P90095 Specific conductance, water, unfiltered, laboratory, microsiemens per centimeter at 25 degrees Celsius	P00095 Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	P00020 Tempera- ture, air, degrees Celsius	P00010 Tempera- ture, water, degrees Celsius
2352560	Flint River at Ga. 234, at Albany, Ga.	—	766	7.4	7.4	—	—	114	24.5	25.4
2352560	Flint River at Ga. 234, at Albany, Ga.	—	762	8.1	7.5	7.9	110	114	—	24.6
2352560	Flint River at Ga. 234, at Albany, Ga.	4.4	767	8.1	7.5	7.4	110	114	30.0	24.6
2352560	Flint River at Ga. 234, at Albany, Ga.	—	767	8.1	7.5	—	—	114	30.0	24.6
312720084123601	12K053	—	756	7.6	7.9	7.8	192	177	—	20.8
312857084132901	12K101	—	757	8.2	7.8	7.8	216	203	—	20.4
312917084123001	12K129	—	757	8.7	7.9	7.9	214	187	—	20.4
312937084131901	12K175	—	757	10.6	7.7	7.8	274	239	—	20.7
312947084092201	12K180	—	753	6.6	7.9	—	—	175	—	20.8
313000084100301	12L373	—	753	6.8	7.8	7.6	258	227	—	20.9
313005084121401	12L348	—	757	6.8	7.6	7.6	318	258	—	20.4
313020084142501	12L061	—	754	4.2	7.5	7.6	388	355	—	20.9
313023084113201	12L340	—	753	3.9	7.5	7.6	288	282	—	21.2
313026084121901	12L350	—	753	4.4	7.0	7.0	522	519	—	20.1
313038084122501	12L376	—	—	—	7.8	7.6	381	391	24.3	21.3
313040084125901	12L277	—	753	5.2	7.4	—	—	367	—	20.9
313132084133201	12L310	—	753	5.6	7.6	—	—	335	—	20.0
312947084092201	12K180	—	753	6.6	7.94	7.98	183.9	175	—	20.83

**Table B3.** Major cations and anions from the Albany area of Dougherty County, Georgia, October 2007.

[—, no data or not applicable; &lt;, less than; E, estimated]

STAIID Station number	SNAME Station name	P00915	P00925	P00935	P00930	P00417	P90410	P00940	P00950	P00955	P00945
		Calcium, water, filtered	Magnesium, water, filtered	Potassium, water, filtered	Sodium, water, filtered	Acid neutralizing capacity, water, unfil- tered, fixed endpoint (pH 4.5) titration, laboratory, as calcium carbonate	Acid neutralizing capacity, water, unfil- tered, fixed endpoint (pH 4.5) titration, laboratory, as calcium carbonate	Chloride, water, filtered	Fluoride, water, filtered	Silica, water, filtered	Sulfate, water, filtered
Milligrams per liter											
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	—	—	—	—	—	—	—	—
2352560	Flint River at Ga. 234, at Albany, Ga.	10.9	1.32	1.62	9.08	35	—	7.22	<0.12	8.4	7.59
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	—	—	36	—	—	—	—	—
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	—	—	—	—	—	—	—	—
312720084123601	12K053	35.6	0.463	0.26	1.48	—	87	3.52	<0.12	6.9	0.51
312857084132901	12K101	39.9	0.49	0.3	2.2	—	95	4.69	<0.12	7.9	0.28
312917084123001	12K129	38.8	0.527	0.32	2.11	—	91	4.96	<0.12	8	0.18
312937084131901	12K175	46.7	0.732	0.61	4.02	—	104	8.69	<0.12	8.4	E0.15
312947084092201	12K180	—	—	—	—	—	—	—	—	—	—
313000084100301	12L373	46	0.828	0.42	2.11	—	87	7.71	<0.12	7.8	0.55
313005084121401	12L348	58.1	1.1	0.45	3.05	—	123	8.7	<0.12	9.1	0.66
313020084142501	12L061	67.7	1.59	1.04	4.58	—	134	11	<0.12	9.6	1.13
313023084113201	12L340	51.4	0.873	0.56	2.69	—	122	7.38	<0.12	8	1.55
313026084121901	12L350	106	1.09	0.5	2.75	—	267	4.7	<0.12	11.3	1.05
313038084122501	12L376	68.5	1.67	1.54	2.93	—	168	10.7	<0.12	8.8	1.56
313040084125901	12L277	—	—	—	—	—	—	—	—	—	—
313132084133201	12L310	—	—	—	—	—	—	—	—	—	—
312947084092201	12K180	34.58	0.52	0.268	1.424	—	84.33	2.739	<0.12	6.576	0.285

**Table B4.** Nutrients and biological data from the Albany area of Dougherty County, Georgia, October 2007.

[—, no data or not applicable; &lt;, less than]

STAIID Station number	SNAME Station name	P00625 Ammonia plus organic nitrogen, water, unfiltered, as nitrogen	P00610 Ammonia, water, unfiltered, as nitrogen	P00631 Nitrate plus nitrite, water, filtered, as nitrogen	P00630 Nitrate plus nitrite, water, unfiltered, as nitrogen	P00613 Nitrite, water, filtered, as nitrogen	P70507 Ortho- phosphate, water, unfiltered, as phosphorus	P00665 Phosphorus, water, unfiltered,	P00680 Organic carbon, water, unfiltered	P00310 Biochemical oxygen demand, water, unfiltered, 5 days at 20 degrees Celsius	P31615 Fecal coliform, EC broth method, water, most probable number per 100 mil- liliters
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	—	—	—	—	—	—	—	170
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	0.26	—	0.003	—	—	—	—	—
2352560	Flint River at Ga. 234, at Albany, Ga.	0.31	0.08	—	0.26	—	<0.04	<0.02	1.9	<2	—
2352560	Flint River at Ga. 234, at Albany, Ga.	—	—	—	—	—	—	—	—	—	20
312720084123601	12K053	—	—	2.11	—	<0.002	—	—	—	—	—
312857084132901	12K101	—	—	2.69	—	<0.002	—	—	—	—	—
312917084123001	12K129	—	—	3.28	—	<0.002	—	—	—	—	—
312937084131901	12K175	—	—	6.02	—	<0.002	—	—	—	—	—
312947084092201	12K180	—	—	—	—	—	—	—	—	—	—
313000084100301	12L373	—	—	8.29	—	<0.002	—	—	—	—	—
313005084121401	12L348	—	—	7.38	—	<0.002	—	—	—	—	—
313020084142501	12L061	—	—	12.3	—	<0.002	—	—	—	—	—
313023084113201	12L340	—	—	3.69	—	<0.002	—	—	—	—	—
313026084121901	12L350	—	—	2.73	—	<0.002	—	—	—	—	—
313038084122501	12L376	—	—	9.88	—	<0.002	—	—	—	—	—
313040084125901	12L277	—	—	—	—	—	—	—	—	—	—
313132084133201	12L310	—	—	—	—	—	—	—	—	—	—
312947084092201	12K180	—	—	2.056	—	<0.002	—	—	—	—	—

