Texas Water Development Board

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Summary of Groundwater Conditions in Texas: Recent (2012–2013) and Historical Water-Level Changes in the TWDB Recorder Network

by

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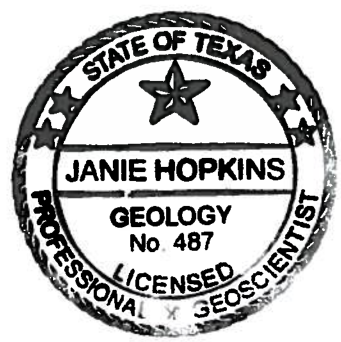

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1.0 Executive Summary

Texas Water Development Board (TWDB) staff, in partnership with its cooperators, continues to install and monitor automatic water-level recorders in observation (recorder) wells throughout the state. This report discusses the water-level changes observed from 2012 to 2013 in 156 recorder wells, which includes 138 recorder wells in the state's nine major aquifers, 15 recorder wells in eight minor aquifers, and three recorder wells in three undesignated aquifers. The TWDB posts hydrographs and daily water-level measurements from these wells at http://waterdatafortexas.org/groundwater/. This report does not include water-level data from those recorder wells that were added to the network during 2013.

Since 2011 the recorder well network has expanded by nearly 25 percent. More recorder wells exist in areas where water-level declines have been documented, such as in the Ogallala Aquifer in the High Plains (26 wells) and in the Trinity Aquifer in northern Central Texas (16 wells), and recently in areas where groundwater use is increasing, such as in the Trinity Aquifer in Central Texas (41 wells). All together, these wells represent 60 percent of the 138 recorders in major aquifers discussed in this report. The TWDB recorder well program complements other non-automated groundwater level monitoring programs conducted by groundwater conservation districts and other cooperators such as the U.S. Geological Survey. In addition, the Edwards Aquifer Authority conducts both automated and manual monitoring of indicator wells in the Edwards (Balcones Fault Zone) Aquifer in South Texas. The results of these other programs are not included in this report.

Groundwater levels throughout the state generally declined in 2013, but the decline is less than that observed in the previous two years and fewer wells experienced water-level declines. In the major aquifers, the median water level change for recorder wells was a decline of 0.5 feet from 2012 to 2013, with 68 percent of wells experiencing water-level declines. From 2011 to 2012, the median change in major aquifer recorder wells was a decline of 0.9 feet, with 75 percent of wells experiencing decline. From 2010 to 2011, the median change was a decline of 4.8 feet, with 92 percent of wells experiencing decline. Considering only those wells that experienced water-level declines in the last three years, the amount of yearly decline, expressed as a median value, was 4.9 feet at the end of 2011, 1.9 feet at the end of 2012, and 1.7 feet at the end of 2013. For only those wells that experienced water-level rise, the opposite trend exists. From 2012 to 2013, the median water-level rise was 2.5 feet; from 2011 to 2012 the rise was 1.9 feet; and from 2010 to 2011 the rise was 1.5 feet.

Considering water-level change by region, excluding El Paso with only one recorder well in the Hueco(-Mesilla) Bolson, the Northern segment of the Edwards (Balcones Fault Zone) Aquifer in Central Texas experienced the greatest annual change. The Edwards Aquifer Authority conducts both automated and manual monitoring of indicator wells in the San Antonio Segment of the Balcones Fault Zone of the Edwards Aquifer, but the results of that program are not included in this report. The four Northern segment TWDB recorder wells, three of which are completed in the confined or artesian portion of the aquifer, experienced a median rise of 14.1 feet. The 26 (Panhandle) Ogallala Aquifer wells, which are all completed in an unconfined aquifer, experienced the next largest median change and also the largest median water-level decline from 2012 to 2013, or a decline of 1.0 feet. From 2011 to 2012 and 2010 to 2011, the Ogallala Aquifer wells experienced median changes of -1.8 and -1.9 feet, respectively. Two recorder wells completed in the confined zone of the Trinity Aquifer experienced the greatest annual changes in water levels: the 6819806 Bexar County well (in the

Central Texas region) experienced the greatest decline of any of the recorders (43.2 feet), and the McLennan County well (in the northern Central region) experienced the greatest rise (77.5 feet).

This report addresses water-level changes in 156 wells out of hundreds of thousands of wells throughout the state. To equate these changes, primarily declines, with specific amounts of total volume changes in aquifer groundwater storage is not feasible. Furthermore, the impacts of declining water levels on short- and long-term water supplies is dependent on a number of local factors.

2.0 Introduction

An automatic groundwater-level recorder well, or recorder well, refers to an unused water well installed with water-level recording equipment (a recorder) and a datalogger. The recorder is a sensor that obtains the actual water-level measurement. An optical sensor (or encoder—a measurement device that converts mechanical motion into electronic signals) uses a float and pulley system to obtain measurements, whereas a pressure sensor uses water pressure changes to obtain the data. Typically, older recorders use encoders, and newer ones are outfitted with pressure sensors or transducers. The TWDB operates both. The main electronic unit that receives the data from the sensor and stores the measurements is the logger or datalogger.

Additionally, the majority of TWDB (and cooperator) wells with recorders are also equipped with telemetry. This report summarizes water-level changes from these wells and does not include a discussion of water-level changes in a number of wells (mainly in Pecos County) that are only equipped with dataloggers. A transmitter receives data from the logger at scheduled intervals and transmits the information to a receiving site. TWDB (and cooperator) recorders use the Geostationary Operational Environmental Satellite (GOES satellite) system to relay data, although some groundwater conservation district (GCD) programs use a cell phone network.

In 2013, the TWDB-operated 156 recorders: 138 in the state's nine major aquifers, 15 in eight minor aquifers, and three in three undesignated or local aquifers, all equipped with satellite telemetry that allows publication of near real-time (provisional) data on the TWDB web site. Of the 138 recorder wells in major aquifers, 46 wells were completed in the confined or artesian portion of the aquifer; of the 15 recorder wells in minor aquifers, 6 were completed in the confined portion of the aquifer. This annual summary report includes location maps, tables listing water-level changes, and hydrographs[1] for the period of record (up through the end of 2013) in all online recorders in these geographic areas (Figure 2-1):

- Northwest Texas: Ogallala and Seymour major aquifers; Edwards-Trinity (High Plains) minor aquifer; and one undesignated aquifer,
- West Texas: Hueco(-Mesilla) Bolson, Pecos Valley, and Edwards-Trinity (Plateau) major aquifers; Bone Spring-Victorio Peak, Igneous, West Texas Bolsons, and Lipan minor aquifers, and two undesignated aquifers,
- Northern Central Texas: Trinity and Edwards (BFZ) major aquifers and Woodbine minor aquifer,
- East and South Texas: Carrizo-Wilcox and Gulf Coast major aquifers, and
- Central Texas: Trinity major aquifer and Hickory and Ellenburger-San Saba minor aquifers.

[1] Please note that hydrographs published in the 2010–2011 report presented the vertical or depth axis with different minimum and maximum depths to best illustrate water-level changes within each well. Beginning with the 2011–2012 report, we presented the vertical axis for each hydrograph with the same minimum value, or land surface at '0' depth (except in two wells with historical records indicating flowing conditions), although total maximum values (depths) vary. Both approaches have their merits. The current approach emphasizes the relative difference in water-level depth from land surface for each well compared to others in the same aquifer or geographic region.

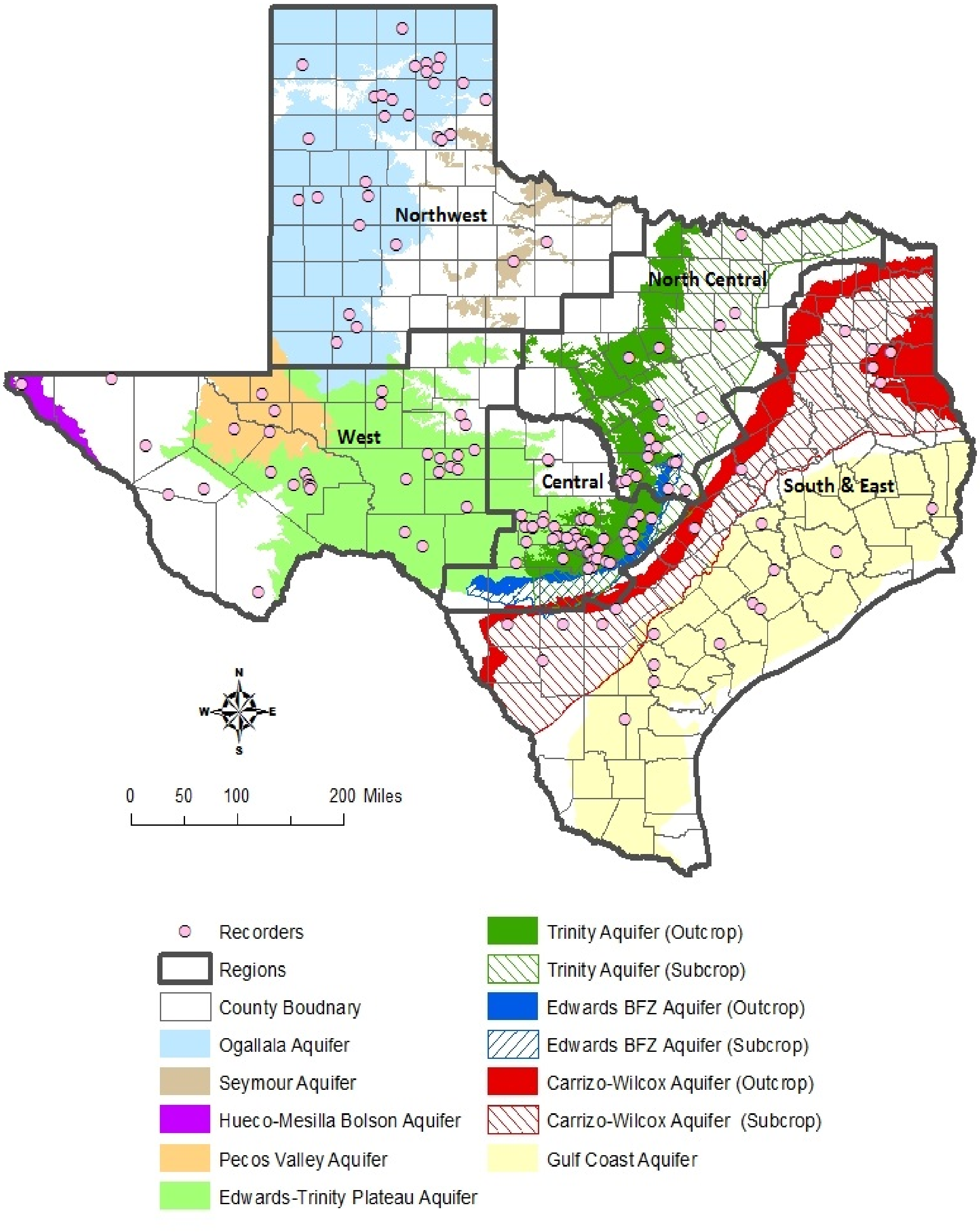

Figure 2-1. Location of 156 recorder wells operated by the TWDB and cooperators and areas discussed in this report. BFZ = Balcones Fault Zone

3.0 Northwest Texas (including the High Plains and Rolling Plains)

The TWDB monitors 30 recorder wells in the northwest part of the state in the High Plains (Panhandle) and Rolling Plains (Figure 3-1). Water levels in these recorder wells, all completed in unconfined aquifers or their unconfined portions, exist under water-table conditions. An Ogallala Aquifer well (0529505) in Wheeler County was equipped with a recorder to replace a well taken out of the network in 2012. The twenty-eight wells in the High Plains include 26 wells completed in the Ogallala Aquifer, one in the Edwards-Trinity (High Plains) Aquifer in Hale County, and one in the Whitehorse Aquifer in Wheeler County. The two wells in the Rolling Plains are completed in the Seymour Aquifer.

3.1 Major aquifers

Water levels declined in all but two of the 26 Ogallala Aquifer wells from 2012 to 2013 (Table 3-1 and Figure 3-2) but at a slower rate than in the last two years (2011 to 2012 and 2010 to 2011). Changes in levels ranged from +1.8 to -5.2 feet with a median of -1.0 and an average of -1.3 feet. By contrast, water-level changes in the (25) Ogallala wells from 2011 to 2012 ranged from +1.2 feet to -10.1 feet, with median and average changes of -1.9 and -1.8 feet, respectively.

The Ogallala Aquifer is used primarily for crop irrigation and has experienced water-level declines throughout its extent as corroborated in the historical and yearly average changes. The Panhandle Groundwater Conservation District maintains its monitoring program in Roberts, Carson, Potter, and Armstrong counties where groundwater is also being pumped for municipal purposes. One Ogallala well in Roberts County (0510953) experienced the greatest water-level decline in each of the last three years: 5.2 feet from 2012 to 2013, 10.1 feet from 2011 to 2012, and nearly 37 feet from 2010 to 2011. Two recorder wells in the Ogallala Aquifer experienced water-level rises from 2012 to 2013 where irrigation and municipal pumping decreased during the year. Water levels rose 0.7 feet in the Bailey County well (after the previous year's decline of 2.1 feet) and 1.8 feet in the newly added Wheeler well.

The Seymour Aquifer wells both experienced declines of 0.8 feet in Haskell and Baylor counties from 2012 to 2013 after declines in each of -1.4 and -0.4 feet, respectively, between 2011 and 2012. Shallow well depths in this aquifer account for greater sensitivity to rainfall and pumpage and subsequent more pronounced groundwater level rises and declines.

3.2 Minor and undesignated aquifers

The water level in the Hale County Edwards-Trinity (High Plains) Aquifer well increased by 0.6 feet between 2012 and 2013 in comparison to its decline of 0.3 feet from 2011 to 2012. The water level continued to decline in the Wheeler County Whitehorse Aquifer recorder well, although at a slower rate—1.9 feet—compared to its declines of 2.3 feet from 2011 to 2012 and 4.5 feet from 2010 to 2011.

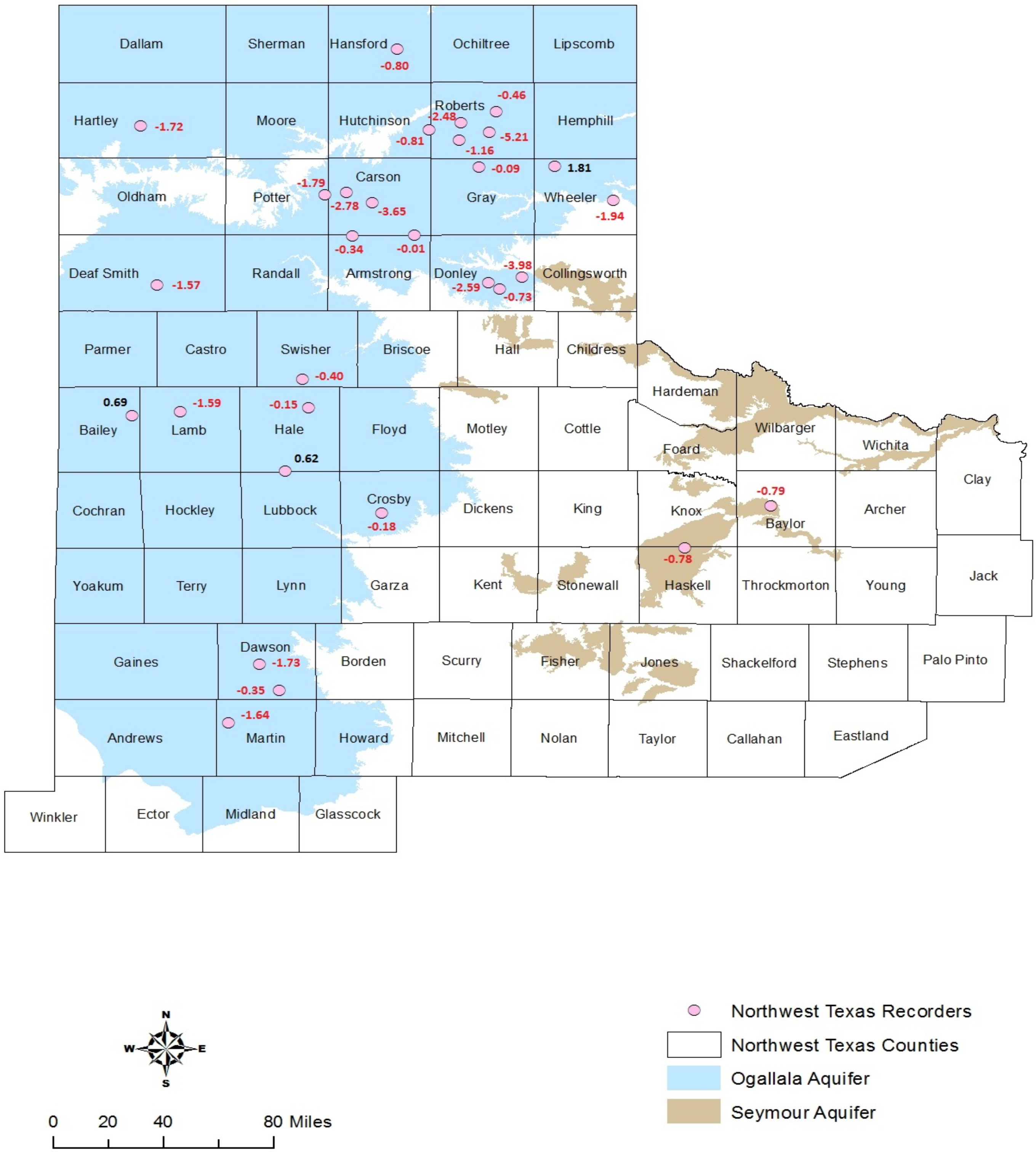

Figure 3-1. Location of wells with TWDB-operated automatic water-level recorders in northwest Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water levels, and red indicates decline.

Table 3-1. Water-level changes in TWDB recorder wells in northwest Texas counties for various time periods. Blue indicates a rise in water level, and red indicates decline. (Minor aquifer indicated in green text, and undesignated or local aquifer indicated in purple.)

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
Hansford 0354301	Ogallala	-0.80	-0.30	-3.68	-9.14	-84.28 (1951)	-1.34
Roberts 0503709	Ogallala	-0.46	-0.53	-0.93	N/A	-1.99 (2005)	-0.23
Roberts 0509553	Ogallala	-2.48	-1.99	-9.59	-19.10	-20.77 (2002)	-1.89
Roberts 0510953	Ogallala	-5.21	-10.10	-71.89	-72.19	-72.49 (2002)	-6.04
Roberts 0517203	Ogallala	-1.16	-0.74	-4.16	-7.71	-8.63 (2000)	-0.62
Gray 0526501	Ogallala	-0.09	-0.06	-4.46	N/A	-25.20 (1958)	-0.45
***Wheeler 0529505**	Ogallala	1.81	N/A	N/A	N/A	6.60 (2012)	5.50
Wheeler 0539904	Whitehorse	-1.94	-2.29	-10.61	N/A	-19.67 (1966)	-0.41
Hutchinson 0616702	Ogallala	-0.81	-0.53	-4.49	-5.51	-5.51 (2003)	-0.55
Potter 0635912	Ogallala	-1.79	-2.24	-7.15	N/A	-9.36(2006)	-1.25
Carson 0636602	Ogallala	-2.78	-2.92	-13.80	-33.67	-101.16 (1955)	-1.77
Carson 0645305	Ogallala	-3.65	-4.60	-13.12	-17.33	-17.43 (2003)	-1.58
Armstrong 0652603	Ogallala	-0.34	-0.35	-1.94	-3.36	-2.86 (2001)	-0.24
Armstrong 0655504	Ogallala	-0.01	-1.85	-5.88	N/A	-33.61 (1975)	-0.88
Hartley 0712401	Ogallala	-1.72	-1.30	-8.51	-18.91	-32.58 (1963)	-0.64
Deaf Smith 1004901	Ogallala	-1.57	-2.10	-8.73	-9.33	-31.34 (1975)	-0.80
Bailey 1051909	Ogallala	0.69	-2.08	-5.14	-9.34	-18.76 (1981)	-0.59
Lamb 1053602	Ogallala	-1.59	-2.04	-7.65	-21.59	-115.96 (1951)	-1.84
Swisher 1142315	Ogallala	-0.40	-0.33	-2.12	-4.52	-16.40 (1988)	-0.64
Hale 1151403	Ogallala	-0.15	-4.21	-11.11	-20.11	-49.49 (1988)	-1.94
Donley 1202959	Ogallala	-2.59	-3.69	N/A	N/A	-10.36 (2010)	-3.45
Donley 1204452	Ogallala	-3.98	-1.04	N/A	N/A	-9.24 (2009)	-2.05
Donley 1211118	Ogallala	-0.73	-0.47	-3.08	N/A	-3.61 (2008)	-0.63
Baylor 2122850	Seymour	-0.79	-0.39	-4.12	N/A	-4.12 (2009)	-0.82
Haskell 2135748	Seymour	-0.78	-1.40	-4.80	-6.38	-6.93 (2002)	-0.62
Hale 2310401	Edwards-Trinity (High Plains)	0.62	-0.28	-2.59	0.84	0.92 (2001)	0.07
Crosby 2330103	Ogallala	-0.18	1.16	-2.95	-7.48	-7.15 (1965)	-0.15
Martin 2739903	Ogallala	-1.64	-0.13	-9.37	-9.88	-37.14 (1964)	-0.75
Dawson 2817119	Ogallala	-1.73	0.86	-2.35	-7.48	-17.15 (2001)	-1.32
Dawson 2825604	Ogallala	-0.35	-3.75	-0.84	2.35	0.46 (2000)	0.03

* = recorder added for the 2012–2013 report
ft = feet
yr = earliest year measured
N/A = not available

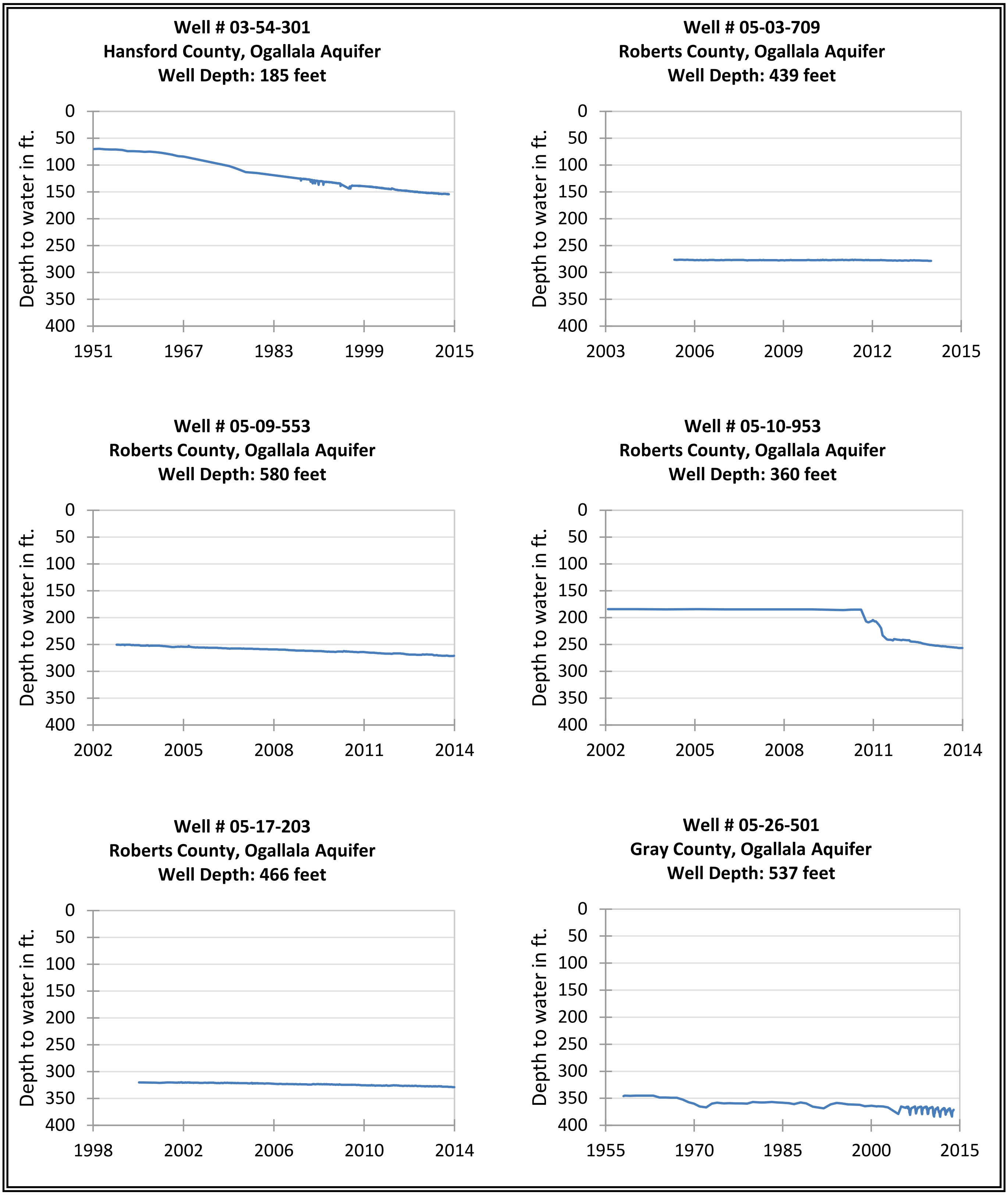

Figure 3-2. Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas.

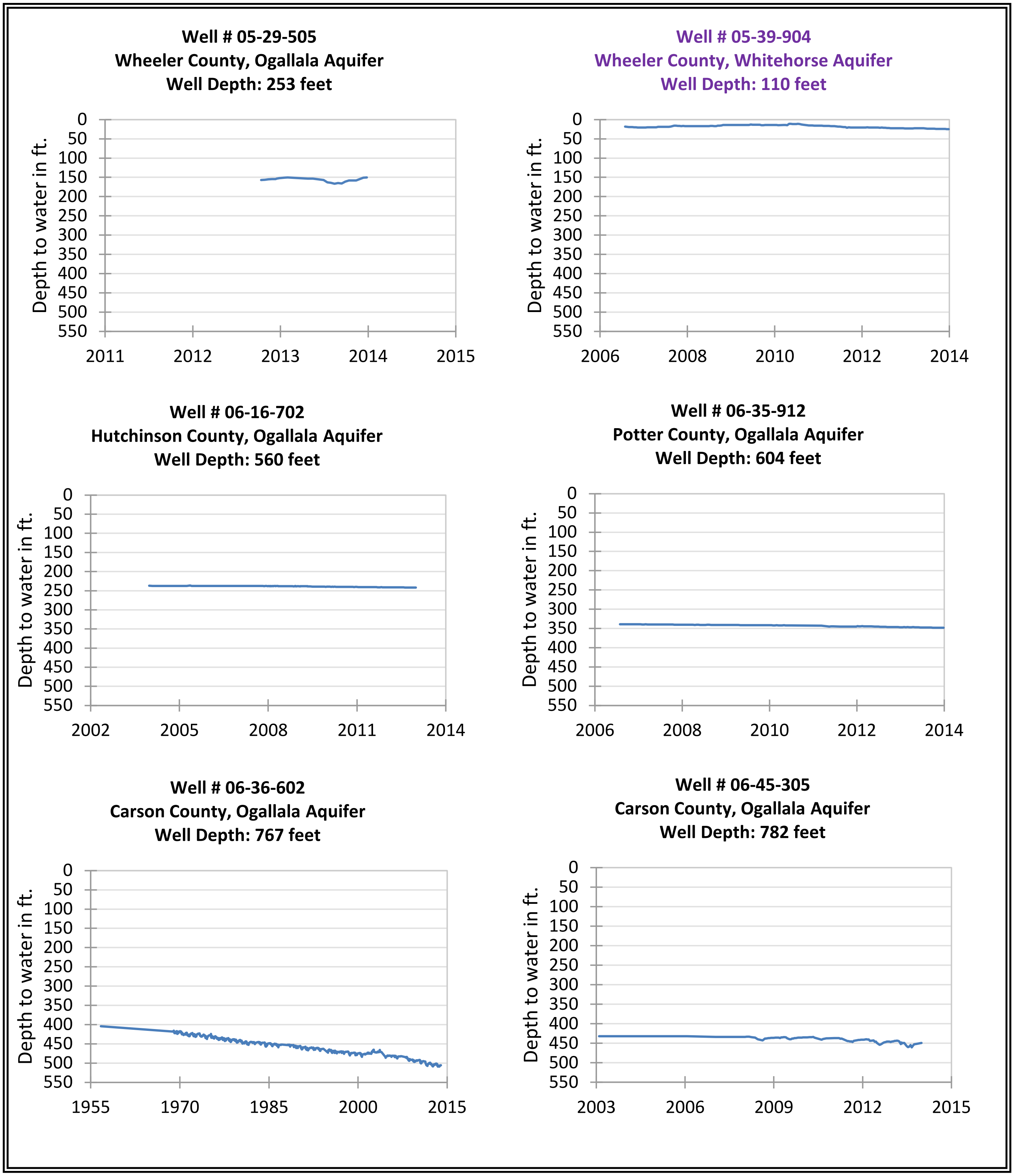

Figure 3-2 (continued). Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas. (Undesignated or local aquifer indicated in purple text.)

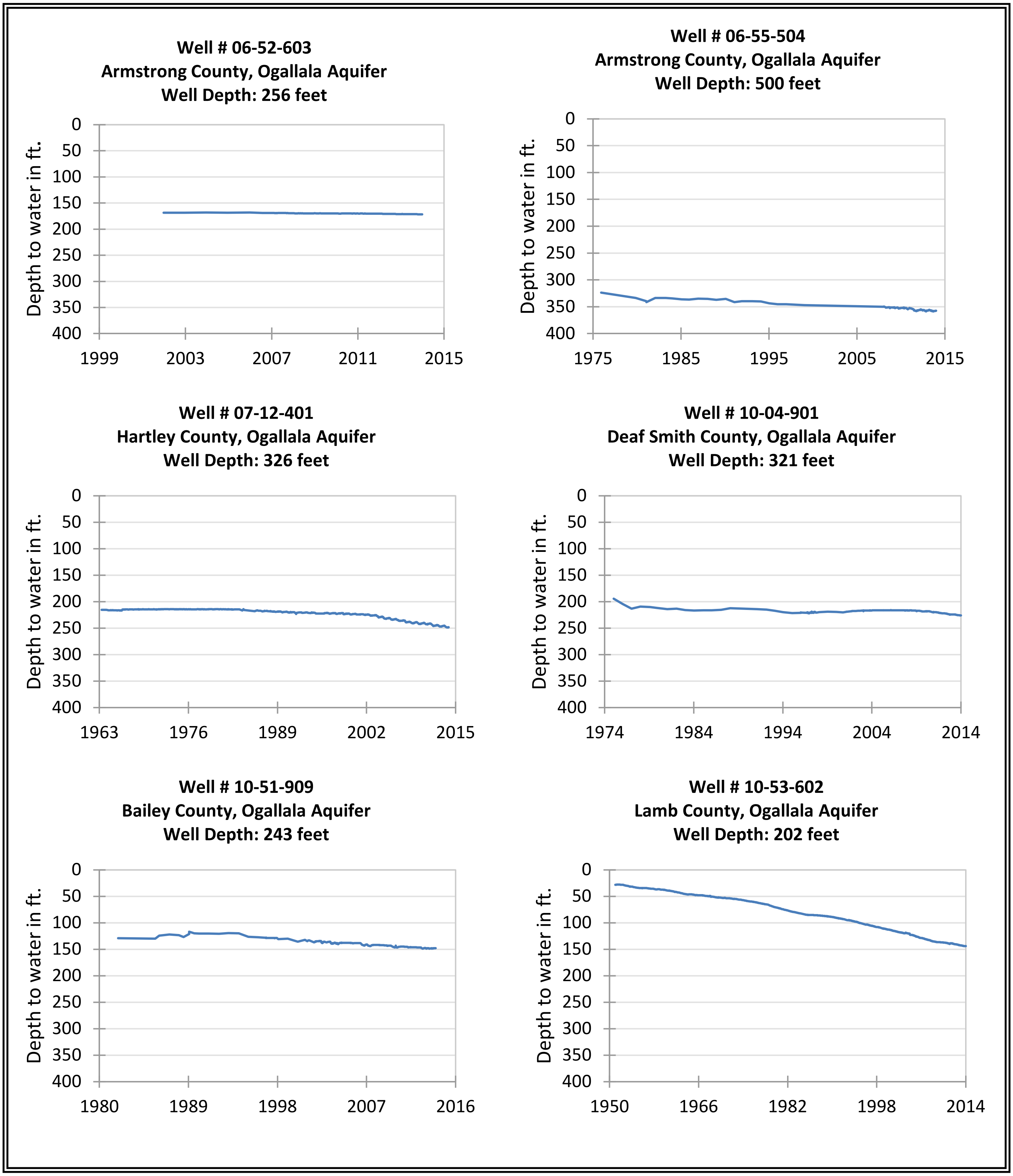

Figure 3-2 (continued). Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas.

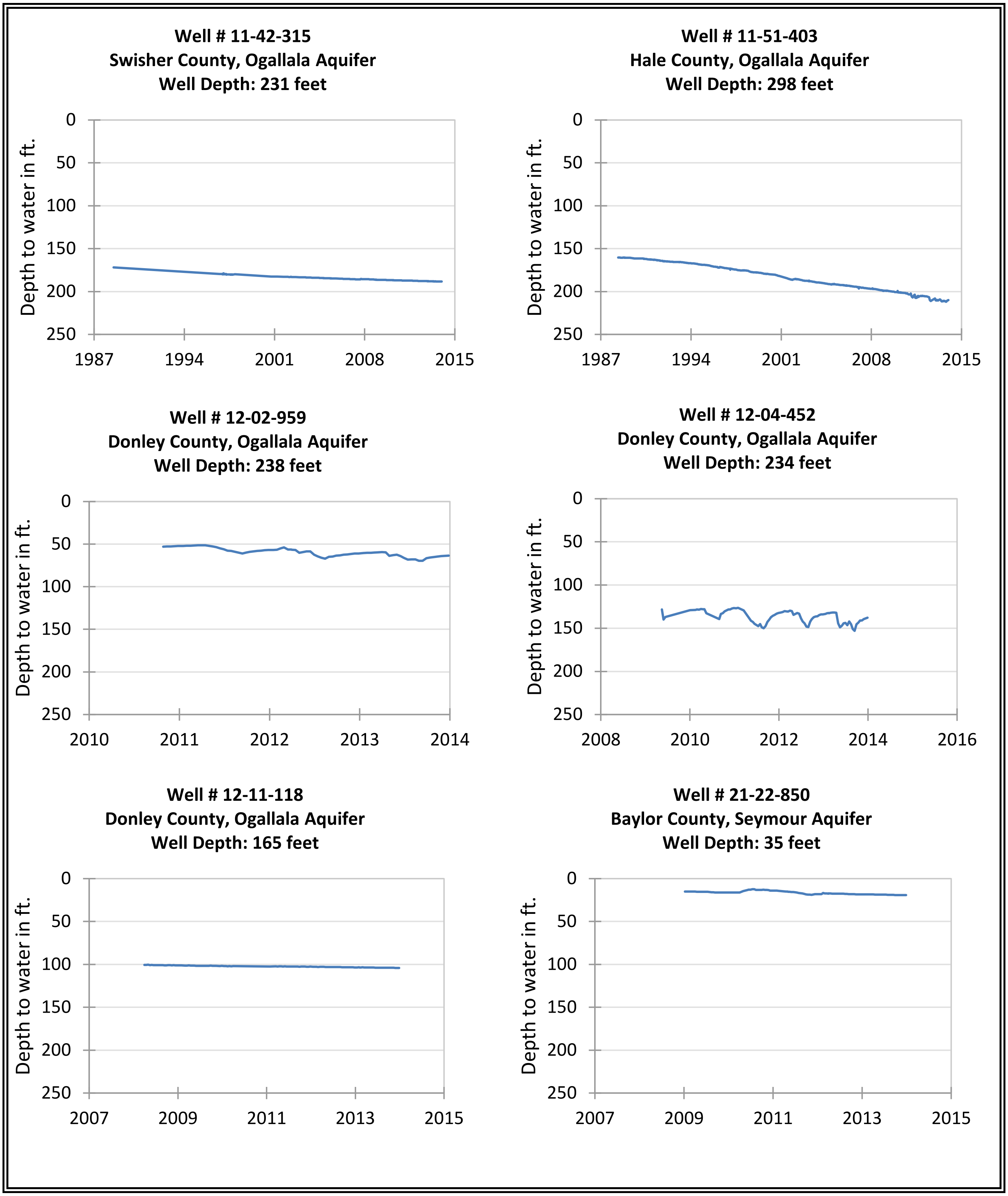

Figure 3-2 (continued). Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas.

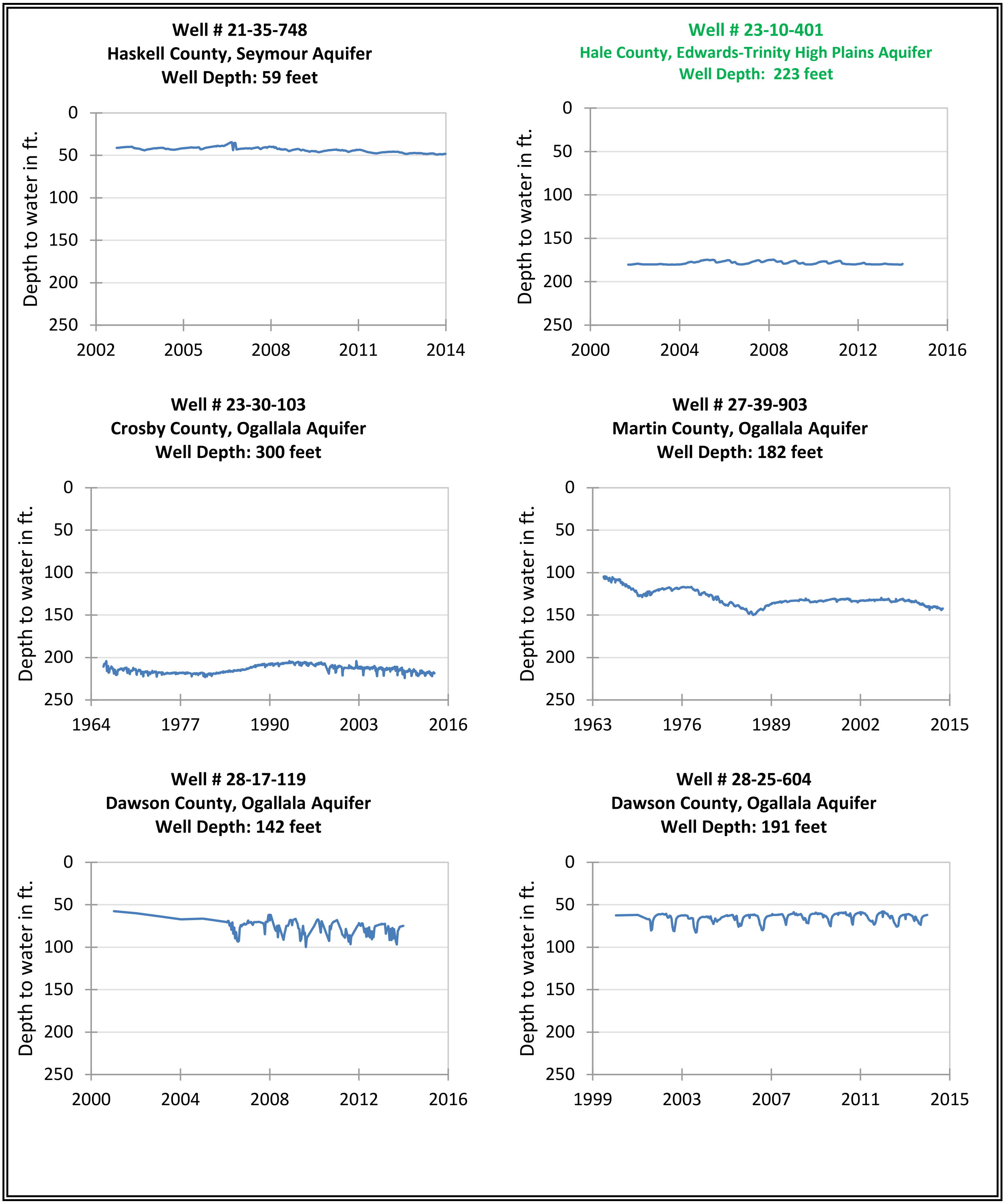

Figure 3-2 (continued). Hydrographs of TWDB recorder wells in Northwest Texas. (Minor aquifer indicated in green text.)

4.0 West Texas

TWDB staff monitor 33 wells in west Texas (Figure 4-1) of which 26 are completed in major aquifers and seven are completed in minor or undesignated aquifers. Water levels in these recorder wells are all completed in unconfined aquifers or their unconfined portions. Wells completed in the major aquifers include 21 wells in the Edwards-Trinity (Plateau) Aquifer after two wells in Schleicher County were added this year; four wells in the Pecos Valley Aquifer after one well in Ward County and a second in Winkler County were added; and one well in the Hueco-Mesilla Bolson Aquifer. The five recorder wells in minor aquifers include two in the Lipan, one in the Bone Spring-Victorio Peak, one in the West Texas Bolsons, and one in the Igneous aquifers. One recorder well is completed in Quaternary volcanic rocks of an undesignated aquifer in Brewster County, and another is completed in the Cretaceous Aquifer in Culberson County.

4.1 Major Aquifers

Water-level changes in the wells completed in major aquifers were mainly declines (Table 4-1 and Figure 4-2). Water-level changes in the 21 Edwards-Trinity (Plateau) Aquifer wells between 2012 and 2013 ranged from +0.6 to -6.2 feet with a median of -0.8 feet and an average of -1.2 feet. Water-level changes in the 19 available wells from the preceding year (2011 to 2012) ranged from +0.8 to -8.7 feet with a median change also at -0.8 feet and an average change of -2.5 feet.

Two Pecos Valley Aquifer recorders wells were added to the program in areas close to newly developed municipal well fields: 4525715 in Ward County and 4615924 in Winkler County. Water-level changes in the four Pecos Valley Aquifer recorder wells from 2012 to 2013 ranged from +0.8 to -2.2 feet with a median change of -0.9 feet and an average change -1.0 feet.

The water level in the Hueco-Mesilla Bolson well declined 0.4 feet from 2012 to 2013, compared to its decline of 3.6 feet from 2011 to 2012 and its preceding year's rise of 1.5 feet. Although the level has declined 61 feet over a nearly 60-year period, the level has remained relatively flat for the past several years while continuing to fluctuate a negligible amount.

4.2 Minor and Undesignated Aquifers

Water-level changes in wells completed in minor aquifers from 2012 to 2013 continued to be the greatest in the two Lipan Aquifer wells in Tom Green County as they were in the previous two one-year periods. The water-level changes from 2012 to 2013 were declines of 3.5 and 11.7 feet. From 2011 to 2012, these recorder wells experienced rises of 10.5 and 14.9 feet; but from 2010 to 2011, they experienced declines of 13.1 and 14.0 feet, respectively. Swings of this magnitude are characteristic of highly transmissive shallow aquifers that are sensitive to recharge from rainfall and fluctuations in pumping demands.

The water level in the Bone Spring-Victorio Peak well in Hudspeth County rose slightly, or 0.2 feet from 2012 to 2013, compared to declines of 2.2 and 2.9 feet in the previous two years. The other Hudspeth County 4815903 recorder was dropped last year due to lack of staff.

Water levels in the recorder well of the Igneous Aquifer of Jeff Davis County (Fort Davis State Park) and in the West Texas Bolsons Aquifer of Presidio County continued to experience little to practically no change, or -0.4 and -0.01 feet, respectively, from 2012 to 2013.

The water-level change from 2012 to 2013 in the Cretaceous Aquifer recorder well in Culberson County was similarly slight: -0.4 feet following a 2011 to 2012 change of-1.1 feet. The water-level change from 2012 to 2013 in the Volcanics Aquifer recorder in Brewster County was a rise but of a smaller value, or 0.9 feet, compared to its rise of 10.1 feet from 2011 to 2012 and following its decline of 10.6 feet from 2010 to 2011. This unused well in Big Bend National Park is within 100 to 200 feet of several active municipal supply park wells, and water-level changes in this type of highly transmissive, fractured aquifer are also sensitive to recharge (rainfall) and pumping.

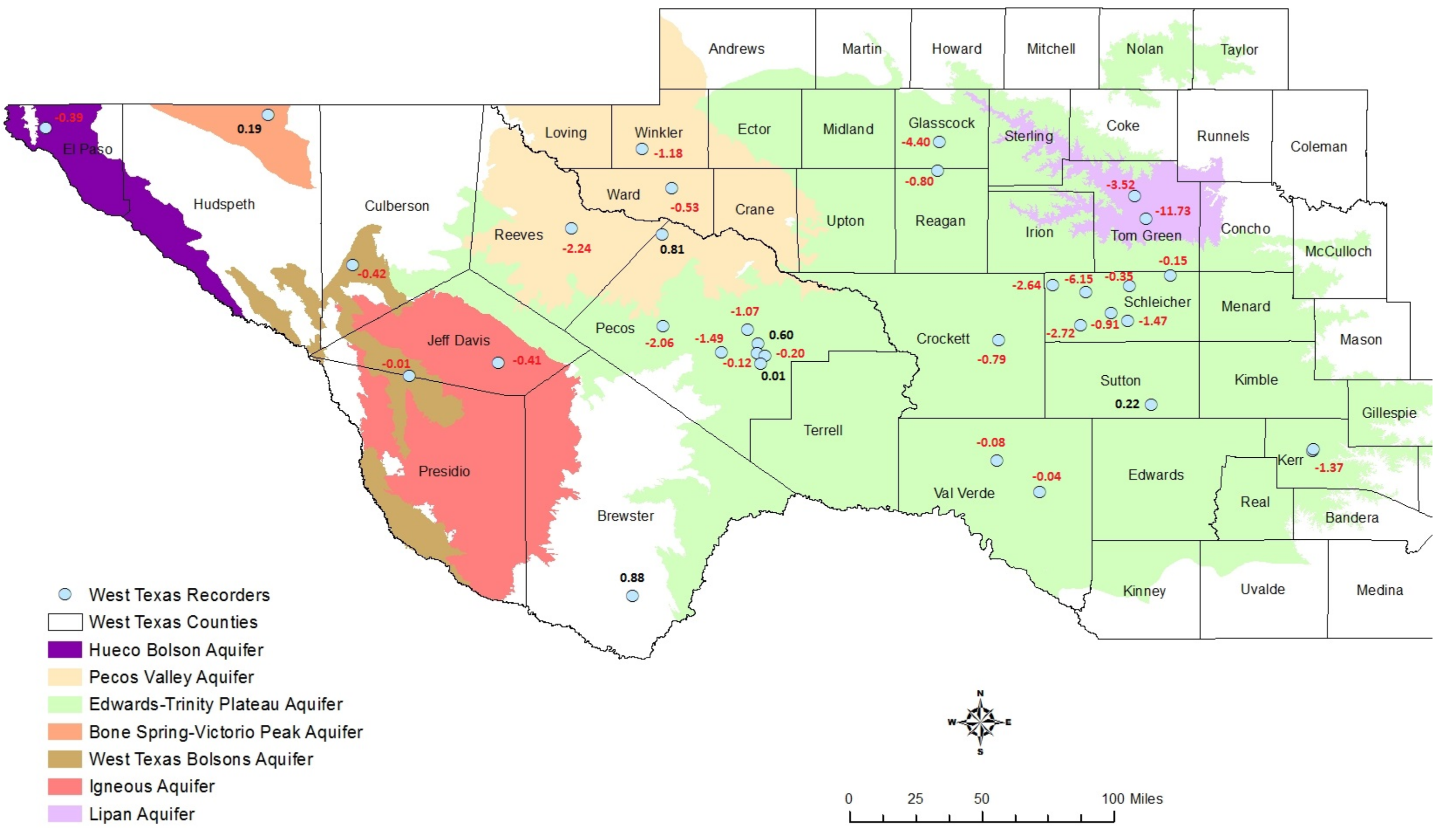

Figure 4-1. Location of wells with TWDB-operated automatic water-level recorders in West Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water levels, and red indicates decline.

Table 4-1. Water-level changes in TWDB recorder wells in west Texas counties for various time periods. Blue indicates a rise in water level, and red indicates decline. (Minor aquifers indicated in green text and undesignated or local aquifers in purple.)

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
4337101 Tom Green	Lipan	-3.52	10.45	-4.66	N/A	-6.51 (2005)	-0.77
4345306 Tom Green	Lipan	-11.73	14.86	-12.81	-0.61	-21.01 (1991)	-0.96
***4357905 Schleicher**	ET (P)	-2.64	N/A	N/A	N/A	-1.76 (2012)	-1.26
4361706 Schleicher	ET (P)	-0.35	-1.03	N/A	N/A	-1.64 (1957)	-0.03
4362607 Schleicher	ET (P)	-0.15	0.79	N/A	N/A	0.78 (2011)	0.39
4412611 Glasscock	ET (P)	-4.40	-0.85	-9.05	-17.76	-20.28 (2001)	-1.59
4420854 Reagan	ET (P)	-0.80	0.31	-2.84	-5.00	-16.41 (1990)	-0.68
***4525715 Ward**	Pecos Valley	-0.53	N/A	N/A	N/A	-3.84 (2012)	-2.40
***4615924 Winkler**	Pecos Valley	-1.18	N/A	N/A	N/A	-1.18 (2012)	-1.18
4644501 Reeves	Pecos Valley	-2.24	-1.01	-8.97	-9.97	-57.64 (1952)	-0.93
4648806 Pecos	Pecos Valley	0.81	-0.89	N/A	N/A	1.07 (2011)	0.50
4759123 Culberson	Cretaceous	-0.42	-1.10	-2.87	-4.36	-13.40 (1995)	-0.74
4807516 Hudspeth	Bone Spring-Victorio Peak	0.19	-1.16	-4.08	-5.02	-32.58 (1966)	-0.68
4913301 El Paso	Hueco Bolson	-0.39	-3.64	-2.63	-6.26	-61.73 (1964)	-1.26
5129805 Presidio	West Texas Bolson	-0.01	0.11	0.72	2.26	16.82 (1979)	0.49
5216802 Pecos	ET (P)	-2.06	-0.07	-22.48	-11.41	43.65 (1976)	1.15
5225209 Jeff Davis	Igneous	-0.41	-0.41	-1.61	-2.90	-4.50 (1999)	-0.31
5312803 Pecos	ET (P)	-1.07	-0.93	N/A	N/A	-1.85 (2011)	-0.67
5319701 Pecos	ET (P)	-1.49	-8.67	N/A	N/A	-26.29 (2009)	-6.57
5320603 Pecos	ET (P)	0.60	0.13	N/A	N/A	-2.07 (2009)	-0.46
5320903 Pecos	ET (P)	-0.12	-0.92	N/A	N/A	-2.37 (2010)	-0.68
5321704 Pecos	ET (P)	-0.20	-1.03	N/A	N/A	-1.45 (2010)	-0.45
5328303 Pecos	ET (P)	0.01	-0.73	-0.42	N/A	-0.03 (2008)	-0.01
5423106 Crockett	ET (P)	-0.79	-0.60	-2.94	-10.56	0.41 (1963)	0.01
5463401 Val Verde	ET (P)	-0.08	-0.28	-0.47	N/A	-0.79 (2005)	-0.09
5503109 Schleicher	ET (P)	-6.15	-2.27	N/A	N/A	-11.26 (2011)	-4.50
5510611 Schleicher	ET (P)	-2.72	-1.98	N/A	N/A	-8.18 (2011)	-3.27
5512134 Schleicher	ET (P)	-0.91	-1.94	-17.82	-14.76	-11.93 (2003)	-1.14
***5512606 Schleicher**	ET (P)	-1.47	N/A	N/A	N/A	-1.39 (2012)	-1.16
5545308 Sutton	ET (P)	0.22	-1.52	-2.79	N/A	-2.79 (2009)	-0.56
5661102 Kerr	ET (P)	-1.37	-0.57	-1.68	N/A	-0.80 (2006)	-0.10
7001707 Val Verde	ET (P)	-0.04	-0.18	-0.80	N/A	-3.77 (2006)	-0.49
7347404 Brewster	Volcanics	0.88	10.09	-15.54	N/A	-10.74 (2007)	-1.65

* = recorder added for the 2012–2013 report
ft = feet
yr = earliest year measured
N/A = not available
ET (P) = Edwards-Trinity (Plateau)

Figure 4-2. Hydrographs of TWDB recorder wells in West Texas. (Minor aquifers indicated in green text.)

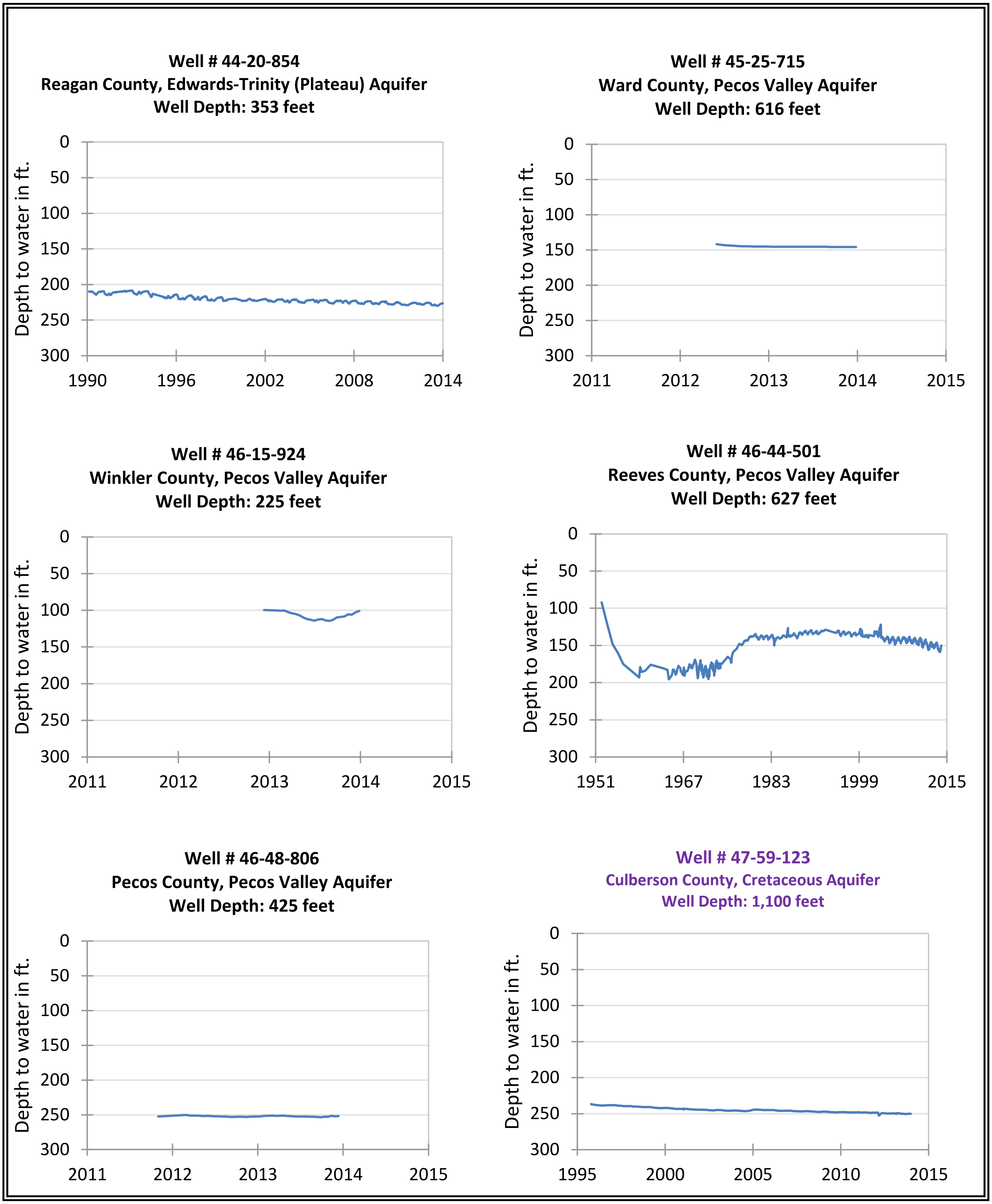

Figure 4-2 (continued). Hydrographs of TWDB recorder wells in West Texas. (Undesignated or local aquifer indicated in purple text.)

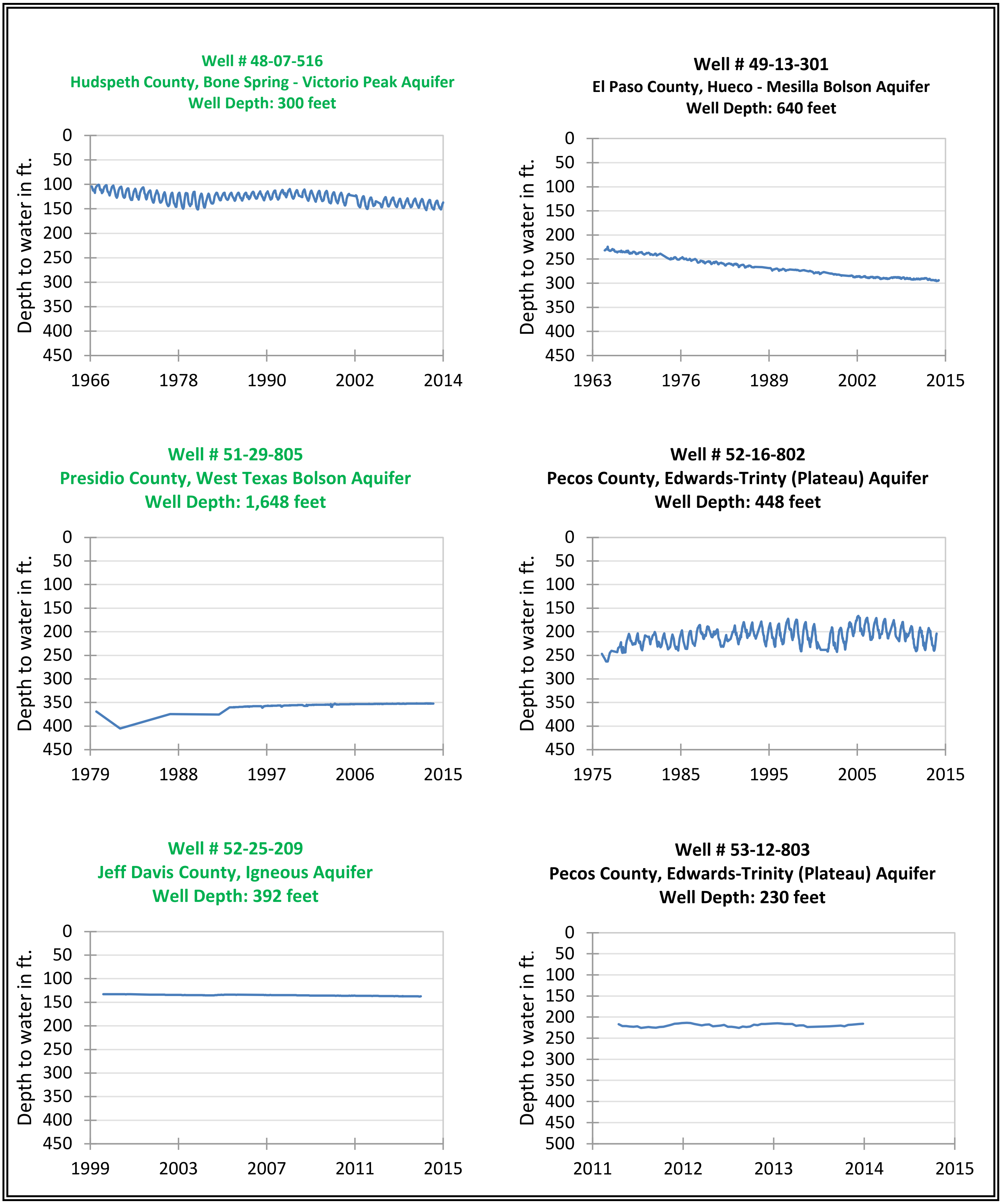

Figure 4-2 (continued). Hydrographs of TWDB recorder wells in West Texas. (Minor aquifers indicated in green text.)

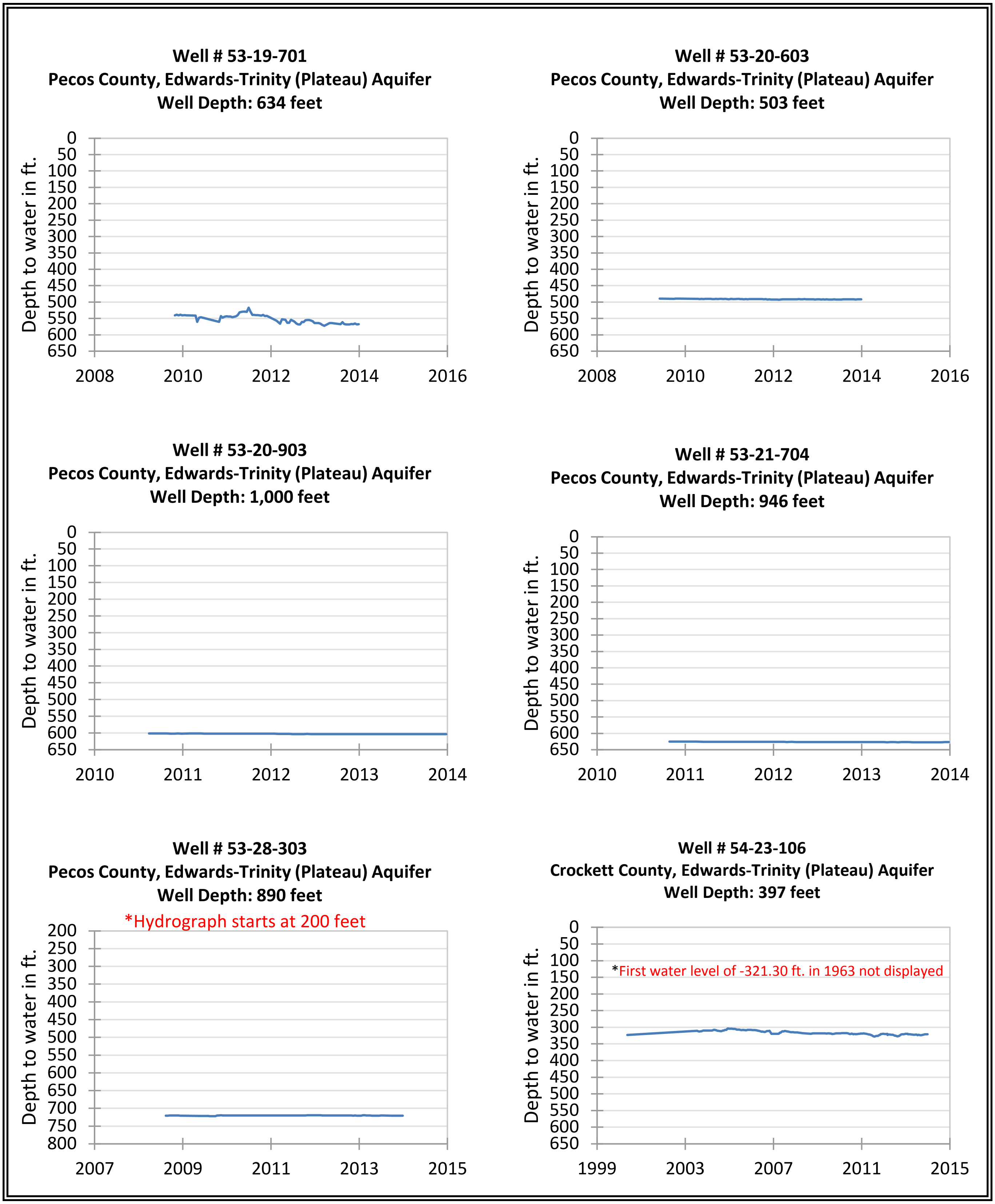

Figure 4-2 (continued). Hydrographs of TWDB recorder wells in West Texas.

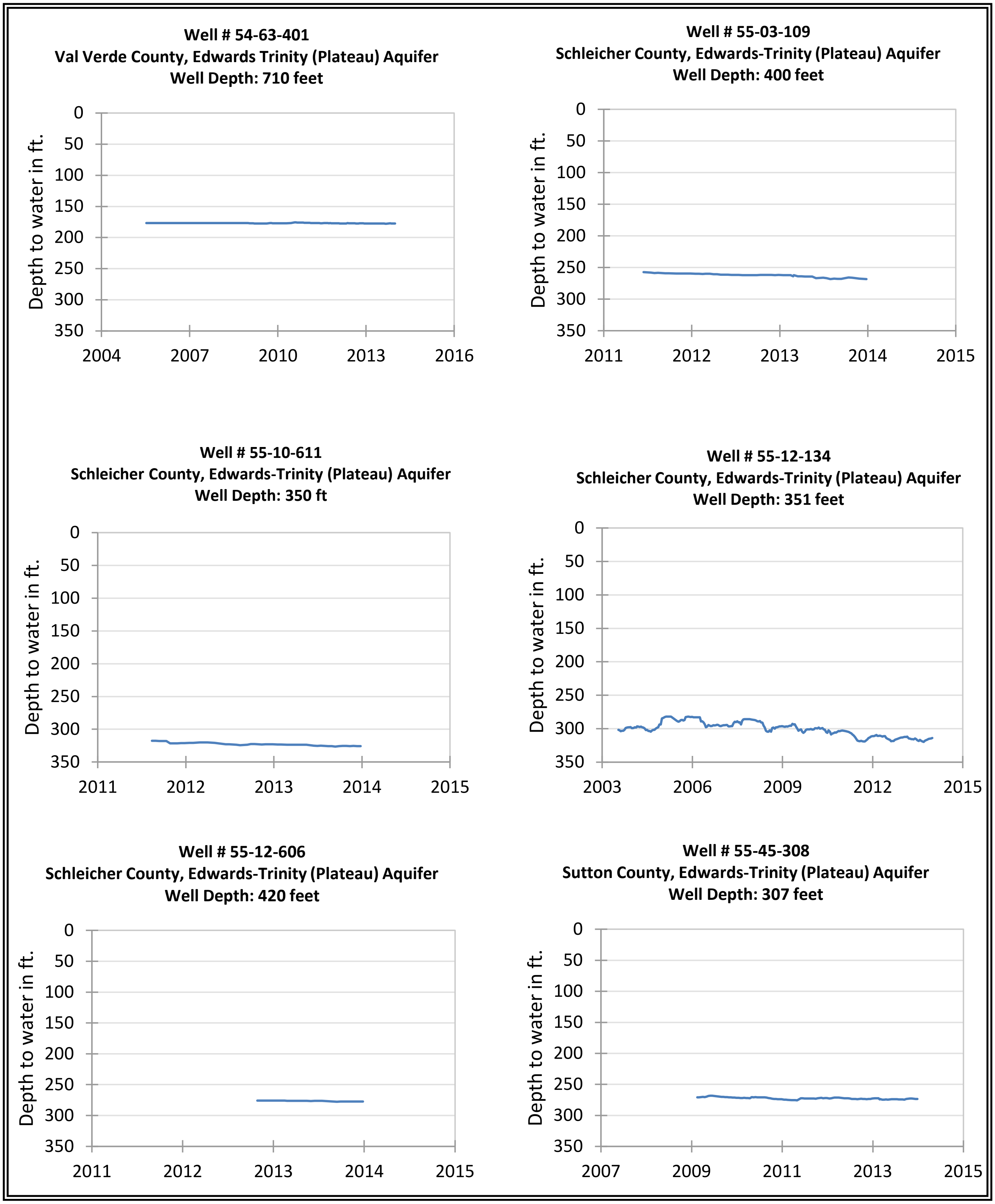

Figure 4-2 (continued). Hydrographs of TWDB recorder wells in West Texas.

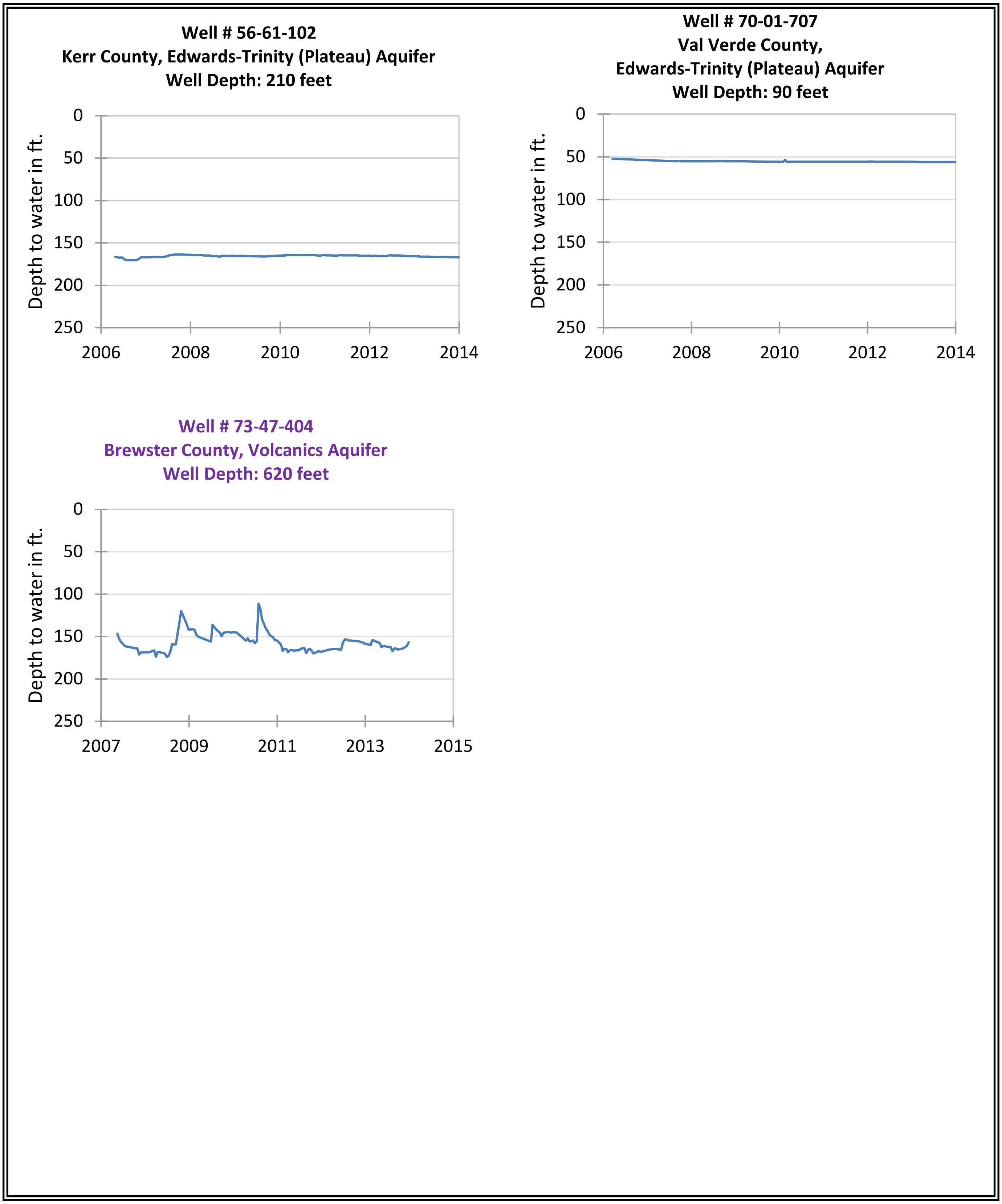

Figure 4-2 (continued). Hydrographs of TWDB recorder wells in West Texas. (Undesignated or local aquifer indicated in purple text.)

5.0 Northern Central Texas

TWDB staff monitor 21 recorders in northern Central Texas and all but one are in wells completed in major aquifers (Figure 5-1). Sixteen wells are completed in the Trinity Aquifer, of which 12 are also in the confined or artesian portion of the aquifer; four wells are in the northern segment of the Edwards (Balcones Fault Zone) Aquifer in south-central Bell and Williamson counties, of which three are in the confined zone; and one well, also in the confined zone, is in the minor Woodbine Aquifer in Grayson County. Water levels in recorder wells in the confined portions of the aquifer exist under confined, also called artesian, conditions. The water levels in these wells will rise above the top of the aquifer formation due to the pressure in the aquifer. In some cases, the pressure is great enough to cause the water to flow above ground.

5.1 Major Aquifers

The Trinity Aquifer covers a large area with diverse hydrologic conditions. Monitoring wells with recorders operated by TWDB staff extend from Dallas County in the north to Williamson County in the south and are completed in both the outcrop and downdip (artesian) portions of the aquifer. Water levels in the recorder wells in the Trinity Aquifer between 2012 and 2013, as between 2011 and 2012, experienced moderate changes compared to the wider fluctuations they experienced between 2010 and 2011. Declines were not as great, and water levels rose in half the wells (Table 5-1 and Figure 5-2). Between 2012 and 2013, water-level changes ranged from +77.5 feet in the McLennan County recorder south of Waco to -3.7 feet in the Williamson County Trinity well, with a median change of essentially 0 feet (+0.01 feet) and an average change of +6.0 feet. By contrast, between 2011 and 2012, changes ranged from +7.4 feet in the Hood County well to -12.4 foot in the McLennan County recorder, with a median change of -1.6 feet and an average change of -1.8 feet in the 15 available Trinity wells. Between 2010 and 2011, the median water-level change was -8.5 feet with an average change of -12.0 feet in the 13 available Trinity recorder wells; water levels in all 13 wells experienced decline.

Although the McLennan County well experienced the greatest water-level rise of 77.5 feet during 2013, it continues to have experienced the largest historical water-level decline (654 feet) in the Trinity recorder wells in this region. The Williamson County 5829603 well, in which the water level declined the most during 2013 (3.7 feet), is also the well with the longest history of measurements in this region. The water level, at 196 feet below land surface at the end of 2013, has dropped nearly 247 feet since it was initially measured as a flowing artesian well in 1946. Both wells are in the artesian zone of the aquifer.

In the four Edwards (Balcones Fault Zone) Aquifer recorder wells, changes between 2012 and 2013 ranged from -0.1 feet to +33.9 feet with a median and average change of +12.1 feet, in comparison to the median changes of -1.9 feet from 2011 to 2012 and -3.5 feet from 2010 to 2011. The water levels in the Bell County 5804628 well continued to fluctuate the most, rising 33.9 feet by the end of 2013, following a decline of 10.7 feet at the end of 2012 and preceded by a rise of 10.4 feet at the end of 2011. The historical or period of record changes in the Edwards-(Balcones Fault Zone) wells are similar to changes experienced in other Edwards (Balcones Fault Zone) wells farther to the south. Recorders in the Barton Springs and San Antonio segments of the aquifer, operated by other entities, are not discussed in this report.

5.2 Minor Aquifer

TWDB staff monitor an unused public-supply well for the City of Denison in the confined zone of the Woodbine Aquifer. The water level rose by 37.2 feet from 2012 to 2013 following its rise of 8.9 feet the previous year, but was preceded by a decline of 33 feet in the previous year. Currently, the total historical change is at -2.3 feet since its first measurement in 1969.

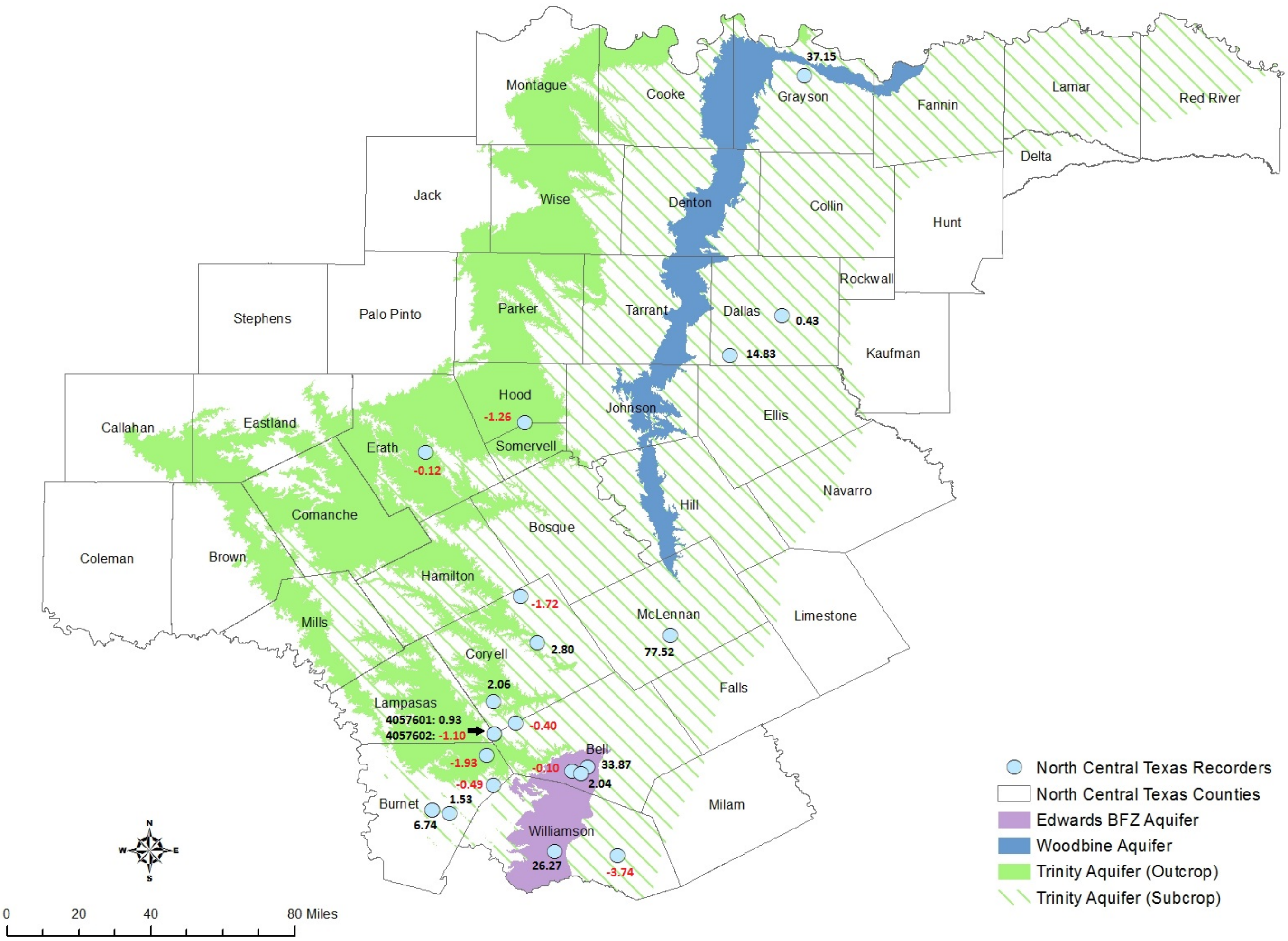

Figure 5-1. Location of wells with TWDB-operated automatic water-level recorders in northern Central Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water levels, and red indicates decline. BFZ = Balcones Fault Zone

Table 5-1. Water-level changes in TWDB recorder wells in northern Central Texas counties for various time periods. Blue indicates a rise in water levels, and red indicates decline. (Minor aquifer indicated in green text.)

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
^Grayson 1819301	Woodbine	37.15	8.85	39.09	4.22	-2.27 (1969)	-0.05
Erath 3155504	Trinity	-0.12	-0.52	-8.23	-7.72	-6.58 (2000)	-0.47
Hood 3242604	Trinity	-1.26	7.39	5.70	-10.53	-19.95 (1997)	-1.21
^Dallas 3319101	Trinity	0.43	-0.77	-13.11	-31.34	-269.13 (1954)	-4.52
^Dallas 3325202	Trinity	14.83	5.13	24.14	-49.18	-16.09 (2000)	-1.21
^Coryell 4026201	Trinity	-1.72	-5.06	-17.22	-31.81	-63.27 (1990)	-2.72
^Coryell 4035404	Trinity	2.80	-12.22	-28.03	-48.22	-209.65 (1955)	-3.58
^McLennan 4039204	Trinity	77.52	-12.36	19.83	-86.16	-653.62 (1964)	-13.34
Coryell 4049601	Trinity	2.06	-1.73	-0.21	-14.07	-17.48 (1993)	-0.83
^Bell 4057601	Trinity	0.93	-1.55	N/A	N/A	-6.50 (2009)	-1.63
^Bell 4057602	Trinity	-1.10	-2.08	N/A	N/A	-7.14 (2009)	-1.68
^Bell 4058201	Trinity	-0.40	-1.72	N/A	N/A	-4.05 (2010)	-1.08
^Burnet 5715901	Trinity	6.74	0.48	N/A	N/A	6.86 (2009)	1.52
^Burnet 5724101	Trinity	1.53	0.07	-2.32	-0.69	-32.44 (1961)	-0.61
Burnet 5801202	Trinity	-1.93	0.23	N/A	N/A	-8.31 (2009)	-1.78
^Bell 5804628	Edwards (BFZ)	33.87	-10.67	27.68	N/A	27.20 (2008)	5.44
Bell 5804702	Edwards (BFZ)	-0.10	2.48	-0.55	-0.70	-2.42 (1980)	-0.07
^Bell 5804816	Edwards (BFZ)	2.04	-0.65	1.67	N/A	-0.62 (2008)	-0.11
^Burnet 5809303	Trinity	-0.49	-3.16	N/A	N/A	-10.96 (2009)	-2.44
^Williamson 5827305	Edwards (BFZ)	26.27	-4.40	33.96	30.61	14.63 (1980)	0.44
^Williamson 5829603	Trinity	-3.74	1.44	-26.84	-23.21	-246.78 (1946)	-3.66

^ = well in the confined portion of the aquifer
ft = feet
yr = earliest year measured
N/A = not available
BFZ = Balcones Fault Zone

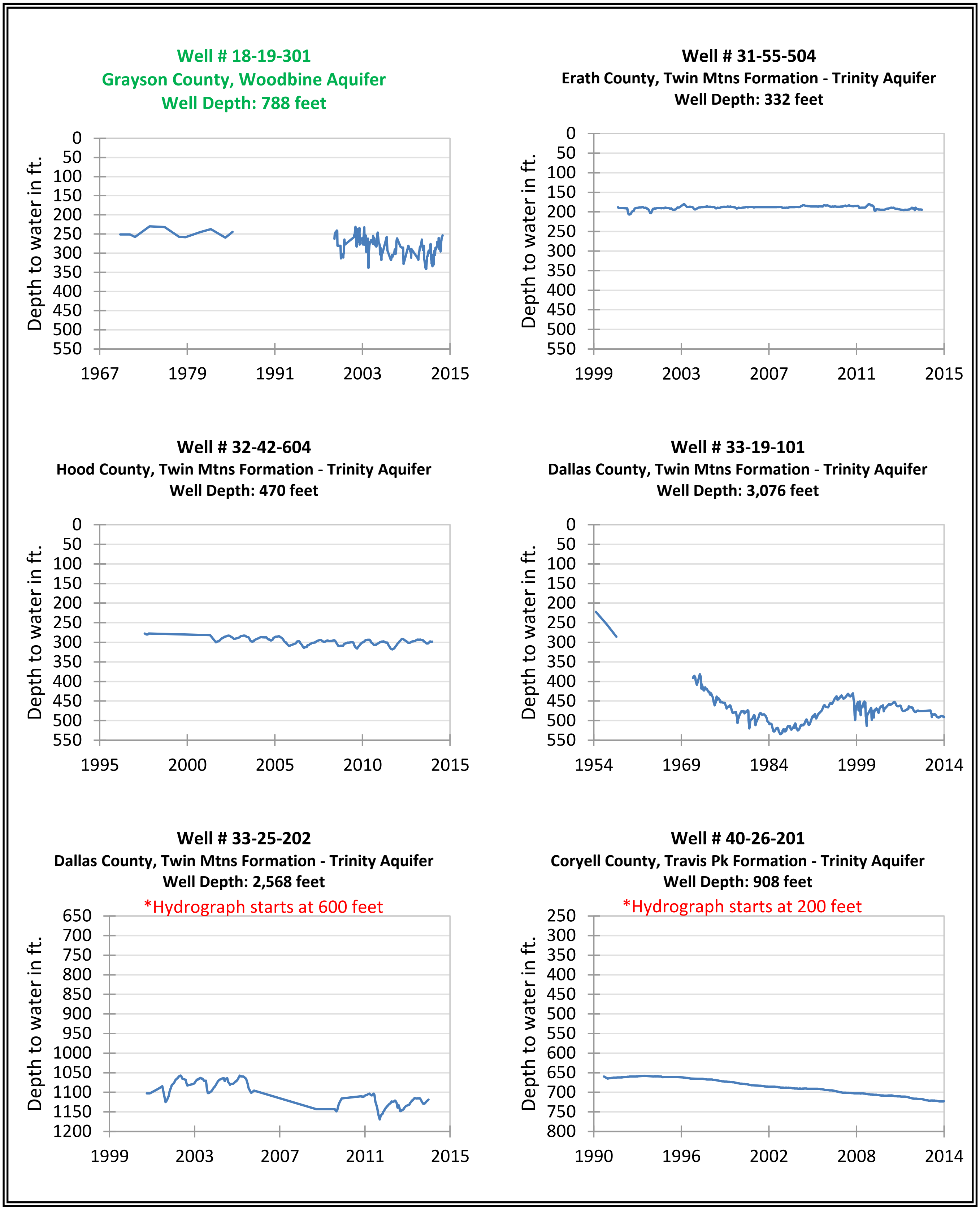

Figure 5-2 (continued). Hydrographs of TWDB recorder wells in northern Central Texas. Mtns = Mountains, Pk = Peak (Minor aquifer indicated in green text.)

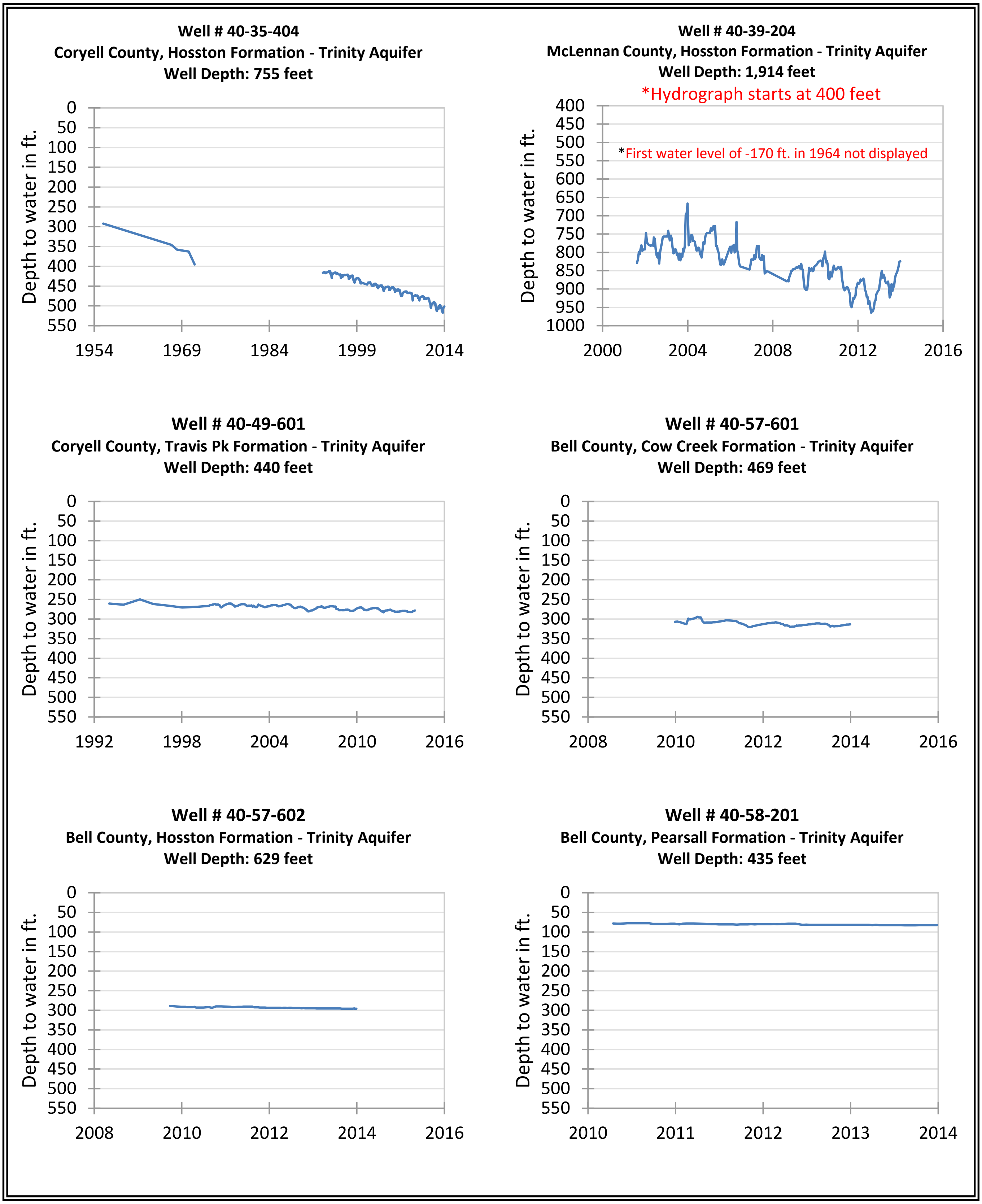

Figure 5-2 (continued). Hydrographs of TWDB recorder wells in northern Central Texas. Pk = Peak, Mtns = Mountains

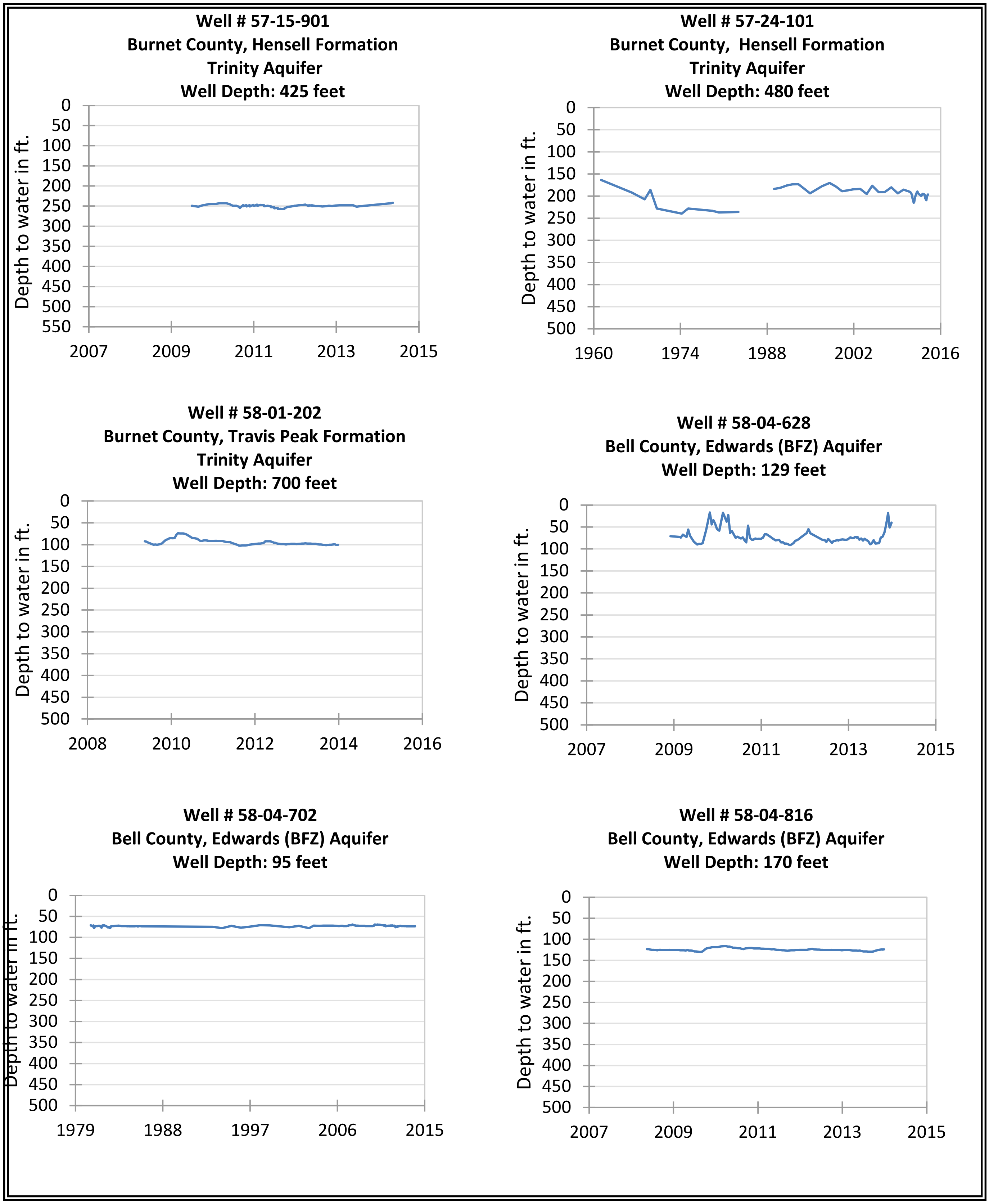

Figure 5-2 (continued). Hydrographs of TWDB recorder wells in northern Central Texas. BFZ = Balcones Fault Zone

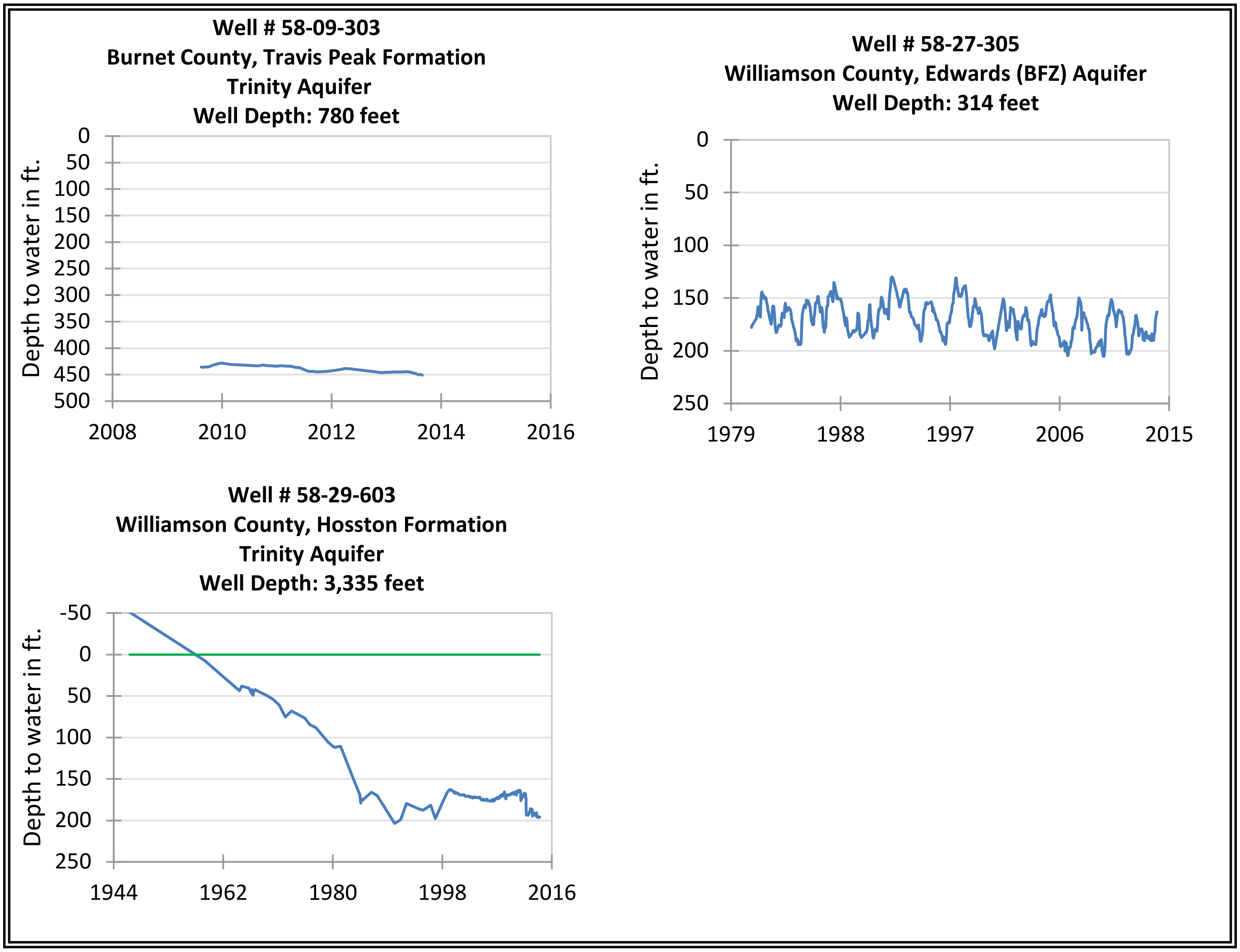

Figure 5-2 (continued). Hydrographs of TWDB recorder wells in northern Central Texas. BFZ = Balcones Fault Zone

6.0 South and East Texas

TWDB staff monitor 23 wells in South and East Texas (Figure 6-1) that are completed in either the Carrizo-Wilcox or Gulf Coast major aquifers. One Wilcox well was added in 2013. Four Wilcox wells mainly in the northeast and five Carrizo wells in the southwest are in the confined zone of the aquifer. Wells in the Gulf Coast Aquifer in Harris and Wharton counties have initial measurements from 1947, and wells in Jasper, Karnes, Victoria, and Duval counties have initial measurements from 1956 through 1964. Two recorders in the Carrizo-Wilcox Aquifer in Smith and Milam counties have initial measurements in 1977 and 1981, respectively. Currently, the TWDB is operating 11 recorders in wells completed in the Gulf Coast Aquifer and 12 recorders in wells completed in the Carrizo-Wilcox Aquifer.

6.1 Major Aquifers

Water-level changes in the 12 Carrizo-Wilcox Aquifer recorder wells ranged from +19.1 feet in the Wilson County well to -26.3 feet in the LaSalle County well during the 2012 to 2013 period (Table 6-1 and Figure 6-2). The median water-level change was -0.2 feet and the average change was -2.7 feet. Median and average changes from 2011 to 2012 and 2010 to 2011 were greater at -0.9 and -4.4 feet and -9.0 and -17.1 feet, respectively.

The greatest water-level decline in recorder wells completed in the Carrizo-Wilcox Aquifer for the year, at 26.3 feet, and historically, at 234.4 feet since its initial measurement in 2003, again occurred in the LaSalle County well, completed in the confined zone of the aquifer. Irrigation pumpage during the drought has increased substantially in the Wintergarden area of southwest Texas and use of groundwater has also increased to support oil and gas exploration and production activities related to the Eagle Ford Shale.

Between 2012 and 2013, water-level changes in the 11 Gulf Coast Aquifer recorder wells ranged from +4.6 feet in the Harris County well to -16.7 feet in the Duval County well with a median change of -0.9 feet and an average change of -1.5 feet. These slight declines compare to slight median and average water-level rises of 0.5 and 0.9 feet, respectively, from 2011 to 2012, within that period's comparable overall range of just over 21 feet from +6.9 to -11.3 feet.

The municipal groundwater pumping that occurs in the vicinity of the Duval County well may have contributed to its decline of 16.7 feet, the largest in the Gulf Coast recorders from 2012 to 2013. The Jasper County recorder, located near a high-pumping area for timber production has experienced the greatest water-level decline of the Gulf Coast Aquifer recorders (125 feet since 1956).

The Harris County well hydrograph illustrates a decline and rebound pattern typical in several monitored wells in southern Harris County and northern Fort Bend, Brazoria, and Galveston counties. Municipal pumpage from the 1950s to the late 1970s/early 1980s was great enough to cause subsidence in many areas in these counties. With a switch from groundwater to surface water for municipal supply in the early 1980s, groundwater levels began to rise, in some areas, to levels higher than earliest measurements. In the case of this well, however, water levels appear to have stabilized since 2008 at a level approximately 45 feet lower than the original measurement in 1947.

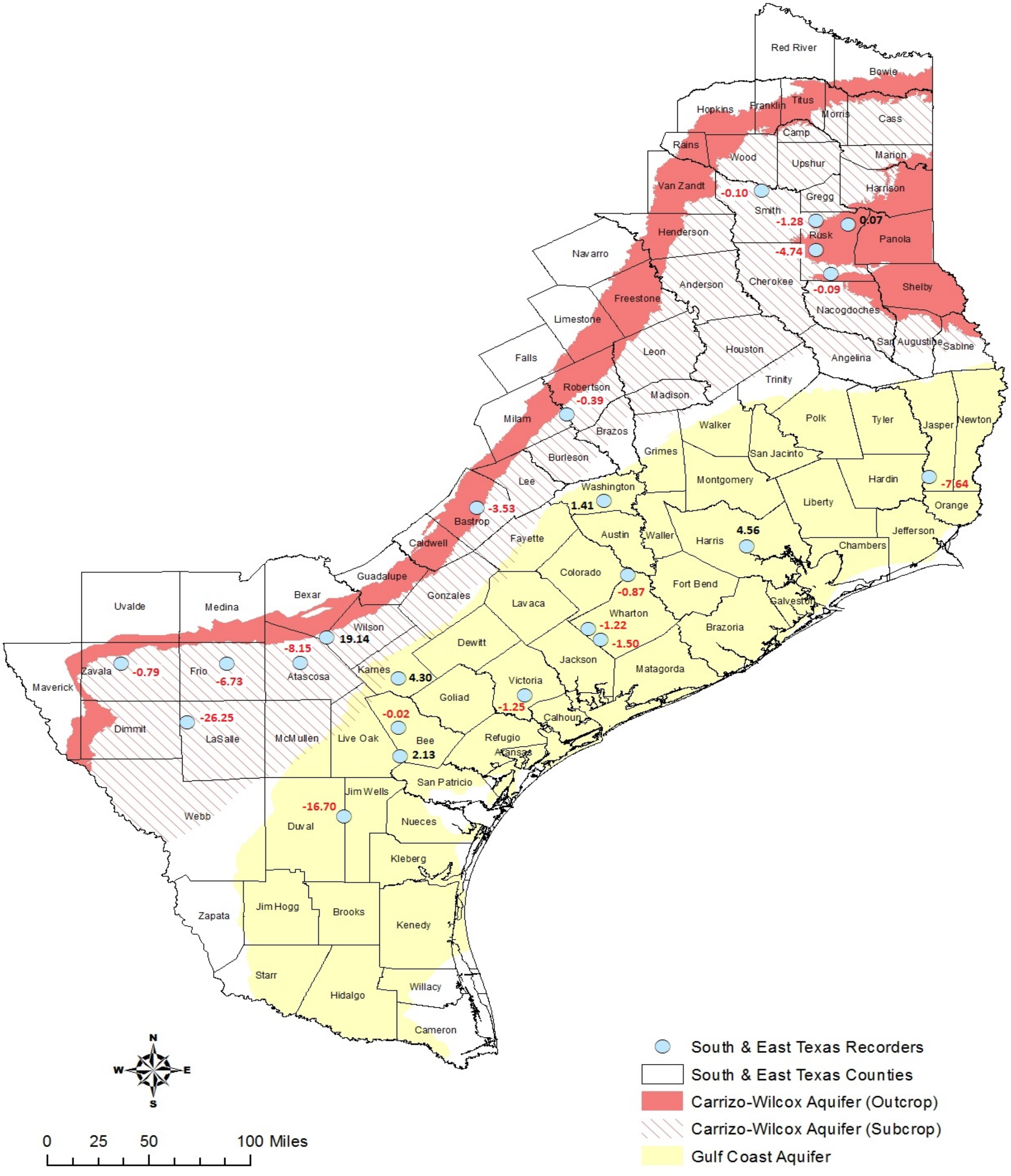

Figure 6-1. Location of wells with TWDB-operated automatic water-level recorders in South and East Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water levels, and red indicates decline.

Table 6-1. Water-level changes in TWDB recorder wells in South and East Texas counties for various time periods. Blue indicates a rise in water levels, and red indicates decline.

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
^3430907 Smith	Wilcox	-0.10	-3.49	-6.07	-22.19	-73.77 (1977)	-2.73
^3541604 Rusk	Wilcox	-1.28	0.31	N/A	N/A	-2.93 (2010)	-0.90
3543906 Rusk	Wilcox	0.07	-0.90	N/A	N/A	-2.39 (2011)	-1.03
***3558405 Rusk**	Wilcox	-4.74	N/A	N/A	N/A	-11.41 (2012)	-7.61
^3702905 Rusk	Wilcox	-0.09	-2.45	N/A	N/A	-1.63 (2011)	-0.61
5862208 Bastrop	Wilcox	-3.53	8.59	10.85	-1.42	-1.84 (2003)	-0.18
^5911621 Milam	Wilcox	-0.39	1.70	-2.64	-1.58	-3.83 (1981)	-0.12
5953915 Washington	Gulf Coast	1.41	0.45	-2.53	-2.09	-3.87 (2002)	-0.33
6148209 Jasper	Gulf Coast	-7.64	9.58	0.95	N/A	-125.01 (1956)	-2.16
6514409 Harris	Gulf Coast	4.56	6.87	5.12	27.17	-60.50 (1947)	-0.91
6631107 Wharton	Gulf Coast	-0.87	-16.71	N/A	N/A	-6.66 (2010)	-2.05
6653406 Wharton	Gulf Coast	-1.22	-0.38	N/A	N/A	-31.87 (1947)	-0.48
6661302 Wharton	Gulf Coast	-1.50	5.51	-6.01	N/A	15.79 (2005)	1.86
^6862104 Wilson	Carrizo	19.14	-24.82	2.26	8.55	-7.80 (1994)	-0.39
^7702509 Zavala	Carrizo	-0.79	-4.77	-22.32	-29.56	-28.53 (2002)	-2.52
^7708511 Frio	Carrizo	-6.73	-0.82	N/A	N/A	-16.38 (2011)	-6.55
^7738103 LaSalle	Carrizo	-26.25	-72.21	N/A	-240.39	-234.42 (2003)	-23.44
^7804508 Atascosa	Carrizo	-8.15	-0.47	-28.96	N/A	-25.08 (2008)	-4.56
7910406 Karnes	Gulf Coast	4.30	19.72	N/A	N/A	-119.71 (1956)	-2.06
7934409 Bee	Gulf Coast	-0.02	-1.05	N/A	N/A	-2.93 (2011)	-1.17
7950106 Live Oak	Gulf Coast	2.13	-4.98	N/A	N/A	18.61 (2011)	7.44
8017502 Victoria	Gulf Coast	-1.25	2.26	-12.69	-0.82	-3.94 (1958)	-0.07
8415702 Duval	Gulf Coast	-16.70	-11.27	-4.29	-33.69	-49.68 (1964)	-1.00

^ = well in the confined portion of the aquifer
* = recorder added for the 2012–2013 report
ft = feet
yr = earliest year measured
N/A = not available

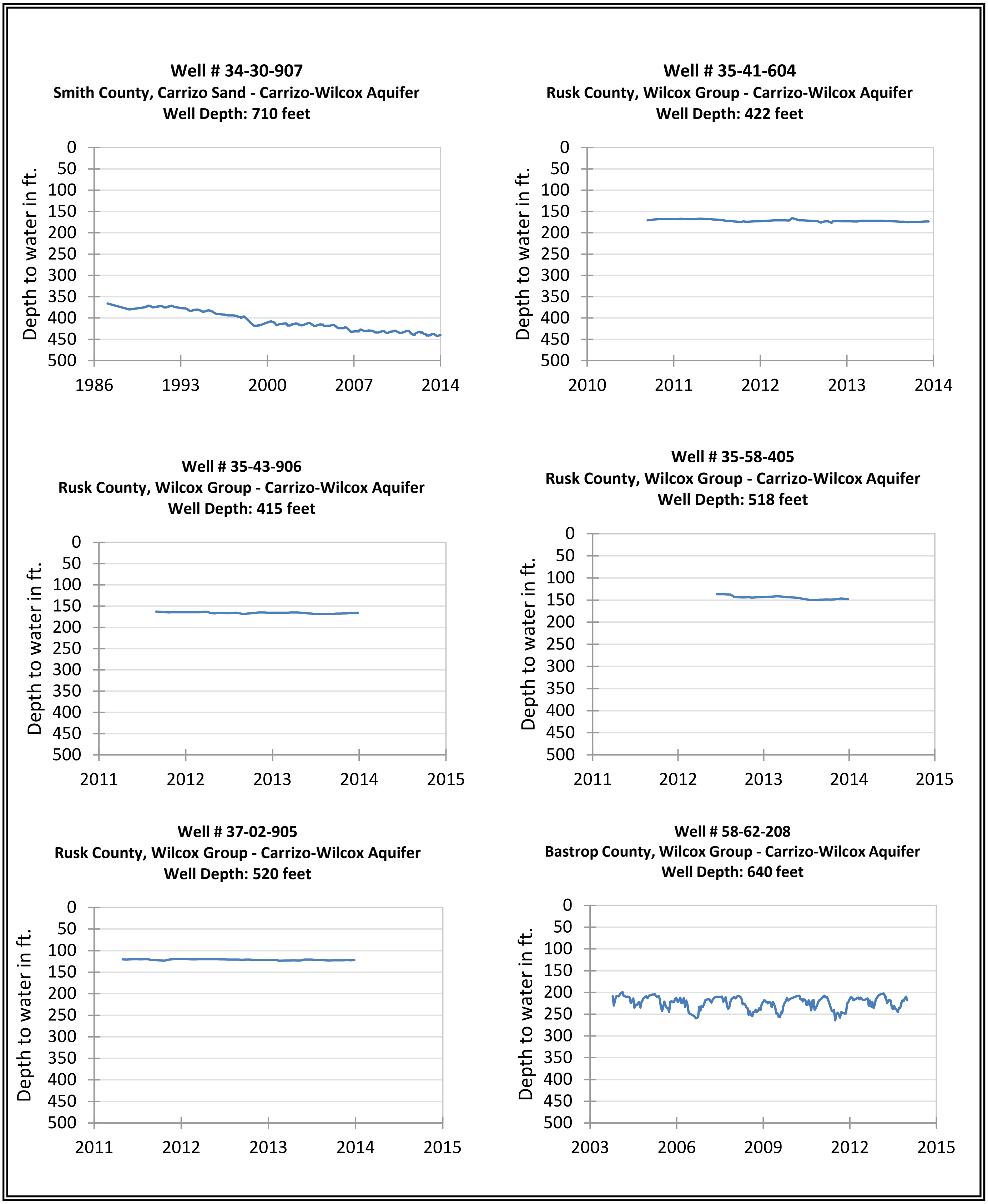

Figure 6-2. Hydrographs of TWDB recorder wells in South and East Texas.

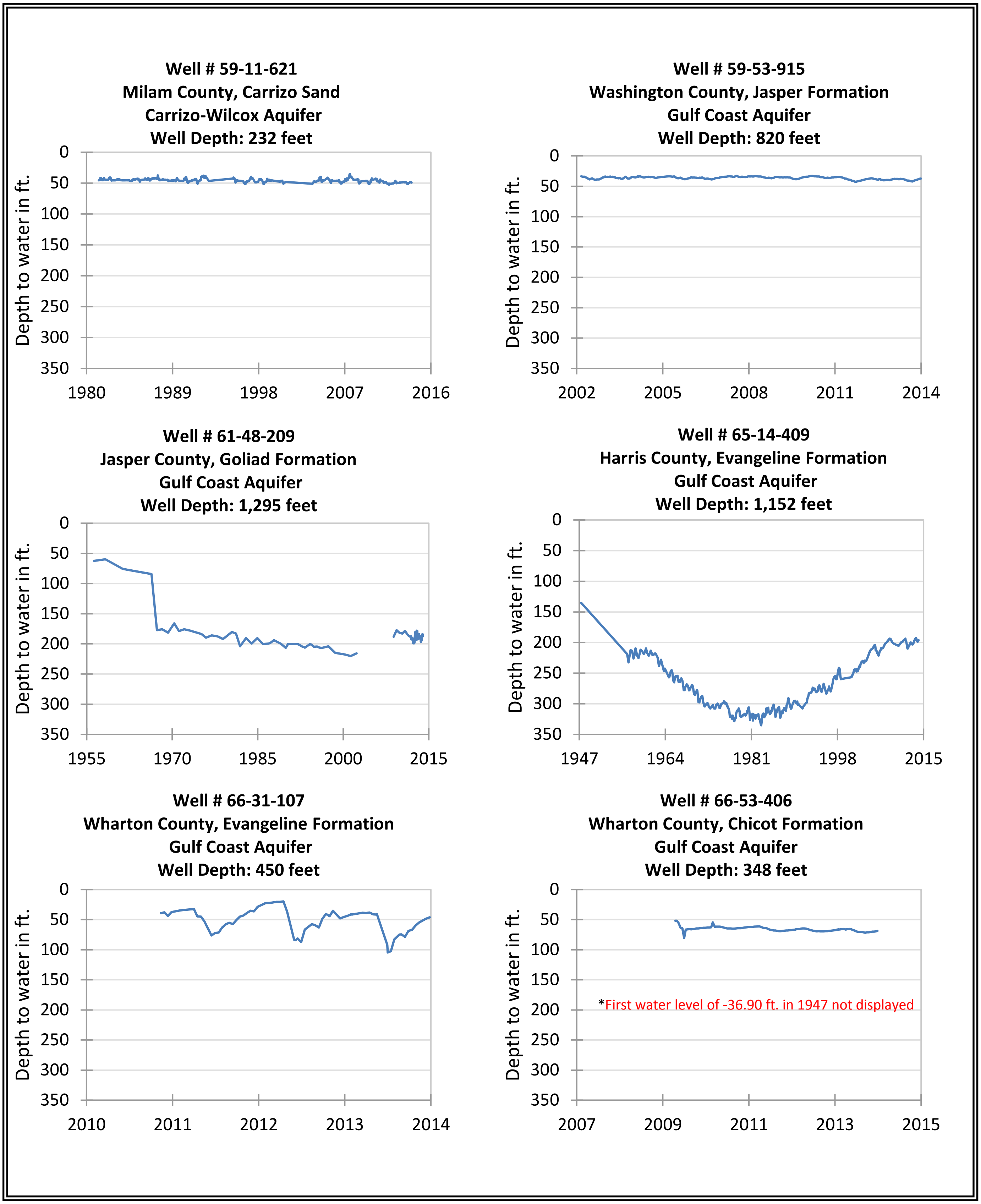

Figure 6-2 (continued). Hydrographs of TWDB recorder wells in South and East Texas.

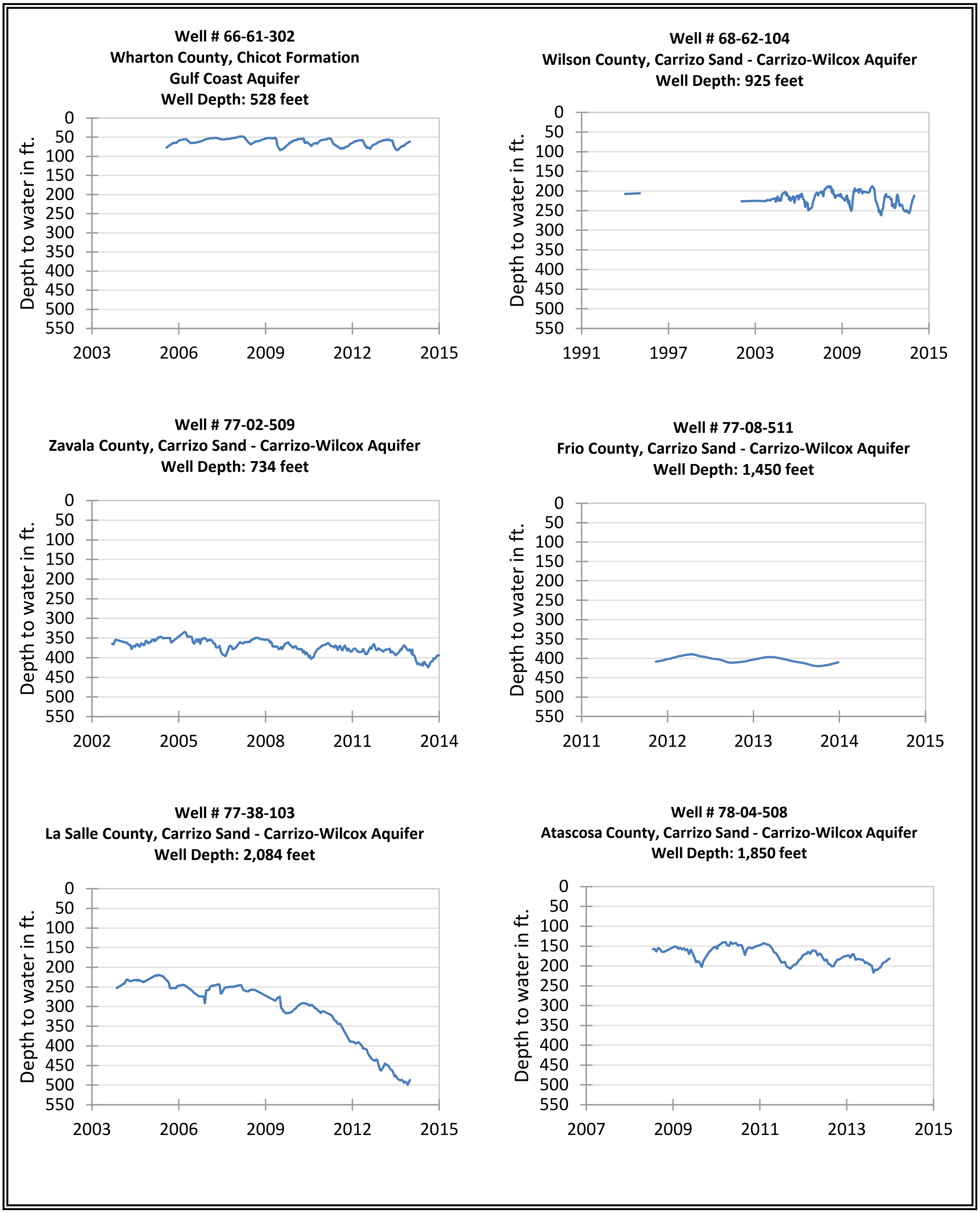

Figure 6-2 (continued). Hydrographs of TWDB recorder wells in South and East Texas.

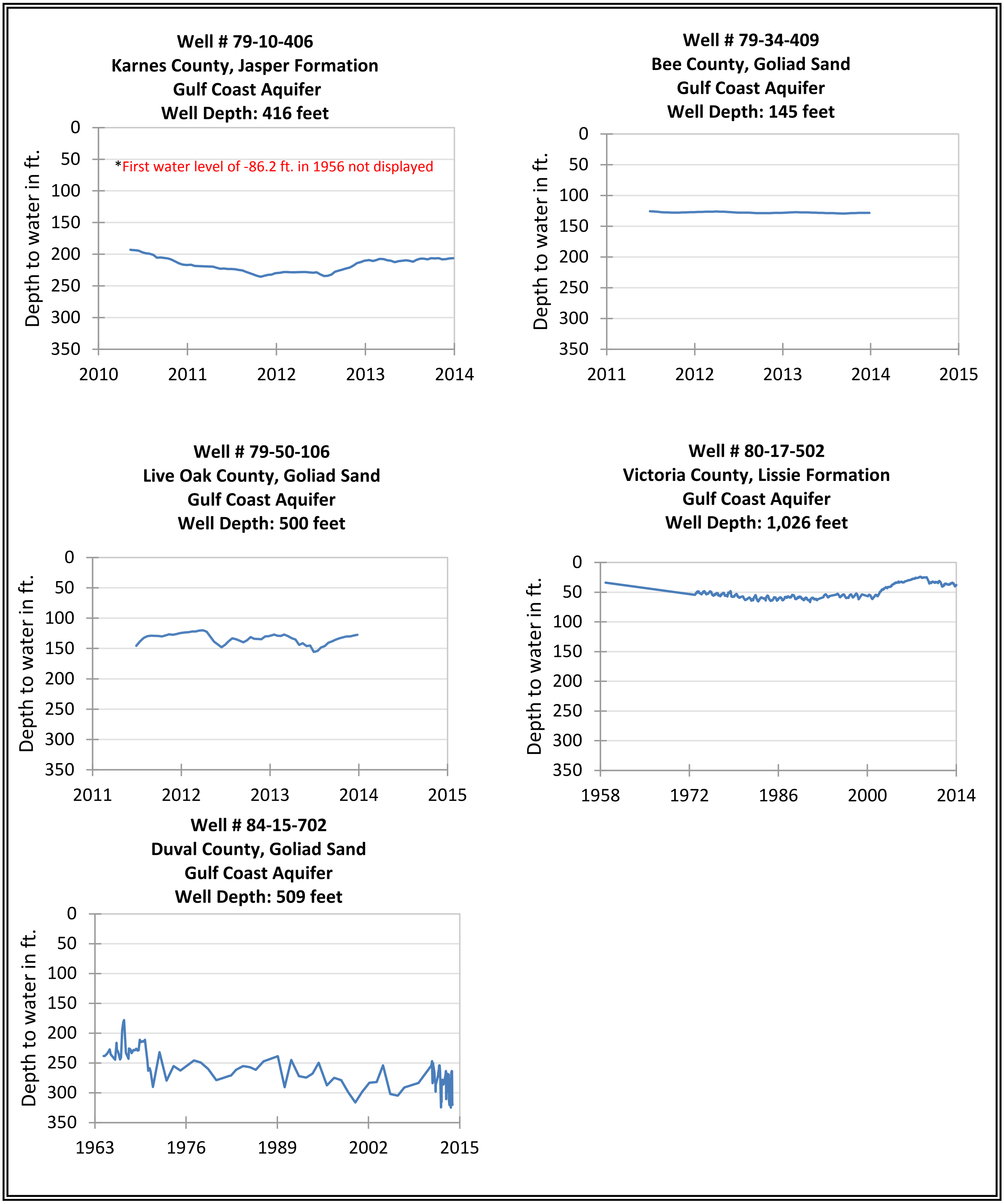

Figure 6-2 (continued). Hydrographs of TWDB recorder wells in South and East Texas.

7.0 Central Texas (including the Hill Country)

Eight wells in the Hill Country have been added to the program in the past year bringing the total to 49 sites (Figure 7-1). TWDB staff have added six wells completed in the Trinity Aquifer in Kerr County for a total of 41 Trinity recorders in the region. Five recorders are in the Ellenburger-San Saba Aquifer after a well was added in Burnet County, and three recorders are in the Hickory Aquifer after a recorder was installed in Burnet County. Twelve of the Trinity, three of the Edwards (Balcones Fault Zone), all five of the Ellenburger-San Saba, and one of the Hickory aquifer wells are in the confined zones of the aquifers. Groundwater conservation districts in four counties co-sponsor 35 of these recorders, which has resulted in the installation of a relatively larger number of recorders in these counties. The Headwaters Groundwater Conservation District in Kerr County has now facilitated the installation of 18 recorders in the Trinity Aquifer with most installed since 2005.

7.1 Major Aquifers

Water levels from 2012 to 2013 in the 41 Trinity Aquifer recorder wells experienced a median change of +0.7 feet and an average change of +0.3 feet, compared to the previous year's median change of -0.9 feet and average change of -3.0 feet (Table 7-1 and Figure 7-2). The water-level changes ranged from +20.3 feet in the 5663924 Kerr County well, completed in the confined zone of the aquifer, to -43.3 feet in the 6819806 Bexar County well, completed in the unconfined zone. Slightly over 50 percent (21) of the Trinity wells experienced water-level rises compared to rises in approximately 29 percent (10 of 35) Trinity wells from 2011 to 2012. The water-level change experienced in the lower portion of the dual-completed Kerr County recorder (5663924), a confined aquifer well, in the 2012 to 2013 period was +20.3 feet, compared to its changes of -2.0 feet from 2011 to 2012 and -88.6 feet from 2010 to 2011. Relatively large fluctuations in water levels, whether on a daily, seasonal, or longer time scale, are characteristic of groundwater movement in the Trinity and Edwards (Balcones Fault Zone) aquifers and are frequently accentuated in the confined portions of the aquifers.

7.2 Minor Aquifers

Water levels from 2012 to 2013 in the five Ellenburger-San Saba Aquifer recorder wells, all in the confined zone of the aquifer, experienced changes ranging from +22.6 to -1.2 feet with a median change of +0.9 feet and an average change of +5.6 feet. Water-level changes from 2011 to 2012 in the four available Ellenburger-San Saba wells ranged from just below 0.0 feet to -6.9 feet with a median change of -0.8 feet and an average change of -1.6 feet.

The three recorder wells in the Hickory Aquifer experienced water-level changes of +1.4, 0.0, and -2.1 feet in wells in Burnet, Mason and McCulloch counties from 2012 to 2013. The previous year's changes in the Mason and McCulloch wells were +1.4 and +1.7 feet.

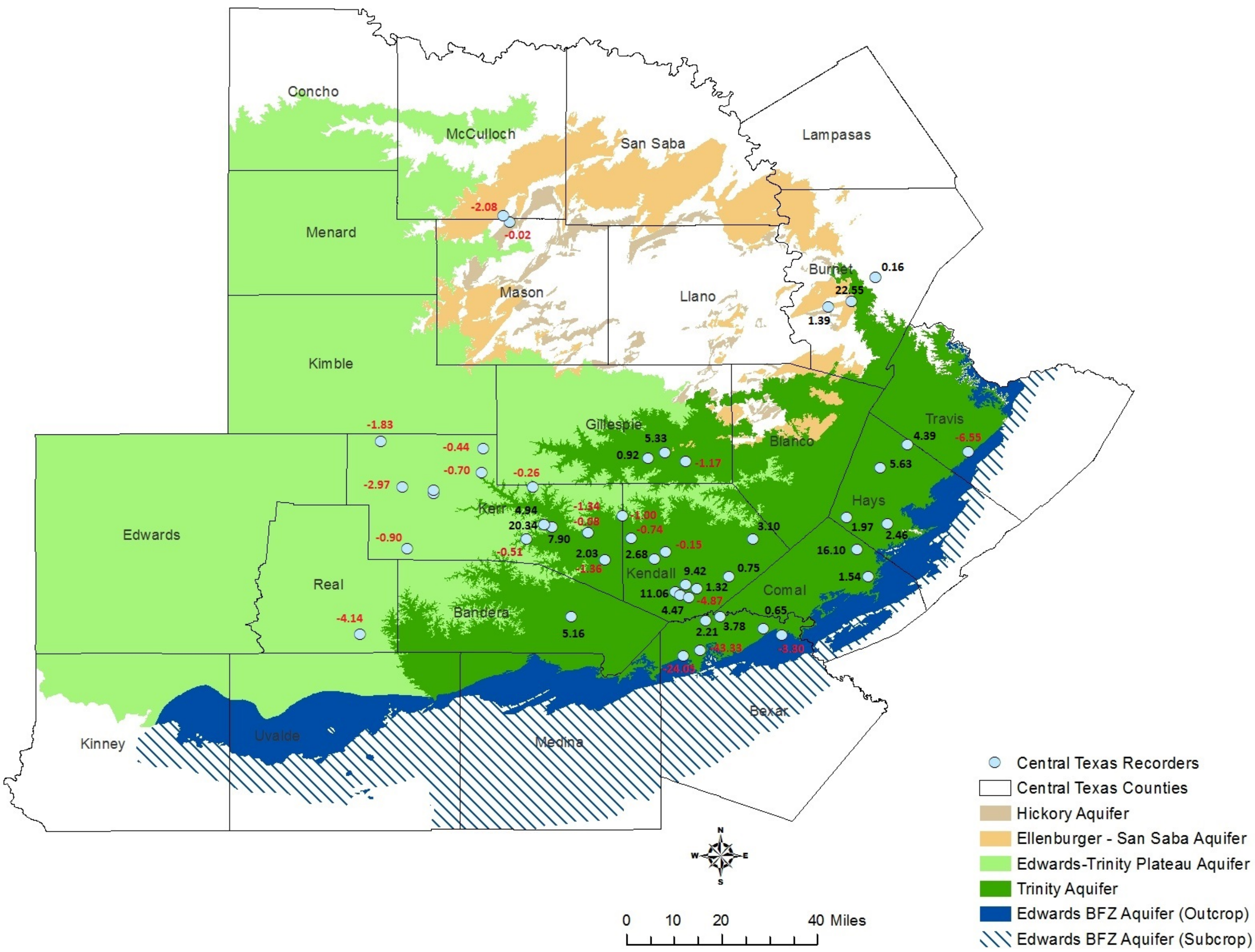

Figure 7.1. Location of wells with TWDB-operated automatic water-level recorders in Central Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water level and red indicates decline. BFZ = Balcones Fault Zone.

Table 7-1. Water-level changes in TWDB recorders in Central Texas counties for various time periods. Blue indicates a rise in water levels, and red indicates decline. (Minor aquifers indicated in green text.)

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
5606613 Mason	Hickory	-0.02	1.43	-0.01	7.30	-3.89 (1974)	-0.10
^5606614 McCulloch	Hickory	-2.08	1.71	-1.49	5.13	-20.27 (1974)	-0.52
^5643901 Kerr	Trinity	-1.83	-1.35	-9.09	N/A	-11.34 (2007)	-1.89
^5652704 Kerr	Trinity	-2.97	-6.62	-17.01	N/A	-22.61 (2008)	-4.31
^5654106 Kerr	Trinity	-0.44	-0.85	N/A	N/A	-2.43 (2010)	-0.63
^5654405 Kerr	Trinity	-0.70	-1.71	-8.10	N/A	-14.01 (2004)	-1.44
^5655805 Kerr	Trinity	-0.26	-0.15	0.72	N/A	-1.20 (2005)	-0.15
^5661101 Kerr	Trinity	-1.52	-3.85	-18.03	N/A	-22.12 (2005)	-2.73
^5663922 Kerr	Trinity	7.90	0.80	-18.11	-66.55	-79.42 (1998)	-5.04
^5663923 Kerr	Trinity	4.94	-0.07	-14.32	N/A	-79.32 (2007)	-13.22
^5663924 Kerr	Trinity	20.34	-1.96	-16.69	N/A	-81.99 (2007)	-13.67
*^5715902 Burnet	Ellenburger – San Saba	0.16	0.12	N/A	N/A	-0.02 (2010)	0.00
*5722505 Burnet	Hickory	1.39	-1.16	N/A	N/A	-4.87 (2010)	-1.52
^5723406 Burnet	Ellenburger – San Saba	22.55	-1.64	0.69	N/A	6.95 (2008)	1.31
^5748811 Hays	Trinity	4.39	-16.11	N/A	N/A	9.02 (2011)	4.10
^5750108 Gillespie	Ellenburger – San Saba	0.92	0.32	11.47	-14.02	-21.67 (1987)	-0.82
^5750324 Gillespie	Ellenburger – San Saba	5.33	-6.87	3.39	0.21	-20.46 (1995)	-1.11
^5751407 Gillespie	Ellenburger – San Saba	-1.17	0.03	-4.22	N/A	-15.25 (2008)	-2.54
5755607 Hays	Trinity	5.63	-0.25	10.23	N/A	-14.27 (2006)	-1.84
^5757805 Kerr	Trinity	-1.00	-0.47	-2.68	-31.28	-32.98 (2003)	-3.14
^5763705 Hays	Trinity	1.97	-0.20	-4.37	-13.01	-7.18 (2002)	-0.61
5764705 Hays	Trinity	2.46	7.25	1.41	N/A	-14.93 (1997)	-0.98
^5850120 Travis	Trinity	-6.55	0.65	-18.32	-71.31	-94.09 (1987)	-3.58
6801314 Kendall	Trinity	-0.74	-18.09	-34.84	-50.35	-66.99 (1984)	-2.23
^6801703 Kerr	Trinity	2.03	4.54	-22.70	-63.05	-45.05 (2001)	-3.70
^6801704 Kerr	Trinity	-1.36	-3.12	-31.38	-53.58	-54.28 (2001)	-4.46
6802609 Kendall	Trinity	-0.15	2.77	-3.66	-19.71	-73.39 (1975)	-1.91
*^6802807 Kendall	Trinity	2.68	1.35	-8.92	-46.21	-74.72 (1978)	-2.09
6804312 Kendall	Trinity	3.10	1.45	-3.60	N/A	-16.33 (1999)	-1.09
6807407 Comal	Trinity	16.10	-16.54	-15.74	-40.69	-21.68 (1997)	-1.28
*6810616 Kendall	Trinity	11.06	57.71	17.52	N/A	-111.48 (1985)	-3.91
6811417 Kendall	Trinity	4.47	6.78	7.21	N/A	-29.10 (1999)	-1.32
*6811418 Kendall	Trinity	9.42	4.61	12.18	N/A	31.75 (2005)	3.74
*6811509 Kendall	Trinity	1.32	-2.31	-5.85	N/A	-1.23 (2005)	-0.14
*6811708 Kendall	Trinity	-4.87	18.75	-22.12	N/A	-29.02 (1962)	-0.56

* = recorder added for the 2012–2013 report
^ = well in the confined portion of the aquifer (none in this region)
ft = feet
yr = earliest year measured
N/A = not available

Table 7-1 (continued). Water-level changes in TWDB recorders in Central Texas counties for various time periods. Blue denotes a rise in water levels, and red denotes decline.

County & well #	Aquifer	2013 Change (ft)	2012 Change (ft)	2009 - 2013 Change (ft)	2004 - 2013 Change (ft)	Historical Change (ft, yr)	Historical Yearly Average (ft)
***6812106 Kendall**	Trinity	0.75	-0.62	-0.92	N/A	-1.87 (2005)	-0.22
6815211 Comal	Trinity	1.54	4.09	N/A	N/A	-2.32 (2010)	-0.66
6819208 Bexar	Trinity	2.21	-0.90	-2.09	3.36	-59.89 (1977)	-1.66
6819806 Bexar	Trinity	-43.33	-6.93	-74.76	-118.07	-102.88 (1990)	-4.42
6820110 Bexar	Trinity	3.78	-6.70	4.99	-3.28	-26.48 (1987)	-1.01
6821410 Bexar	Trinity	0.65	-0.22	N/A	N/A	-13.78 (1985)	-0.48
6821519 Bexar	Trinity	-3.30	-6.64	N/A	N/A	-57.30 (2011)	-19.62
6827112 Bexar	Trinity	-24.05	-31.23	N/A	N/A	-42.30 (2009)	-9.40
^6904503 Kerr	Trinity	-0.90	-5.20	-20.10	N/A	-24.00 (2007)	-3.93
^6907107 Kerr	Trinity	-0.51	1.93	-20.93	-59.49	-54.79 (2003)	-5.05
^6908304 Kerr	Trinity	-1.34	-9.53	-39.70	N/A	-50.75 (2006)	-7.05
^6908305 Kerr	Trinity	-0.08	-7.38	-30.73	N/A	-45.03 (2006)	-6.25
^6919401 Real	Trinity	-4.14	-1.10	-40.73	-57.86	-76.72 (1974)	-1.94
^6924225 Bandera	Trinity	5.16	5.40	10.88	N/A	13.16 (2008)	2.39

* = recorder added for the 2012–2013 report
^ = well in the confined portion of the aquifer (none in this region)
ft = feet
yr = earliest year measured
N/A = not available

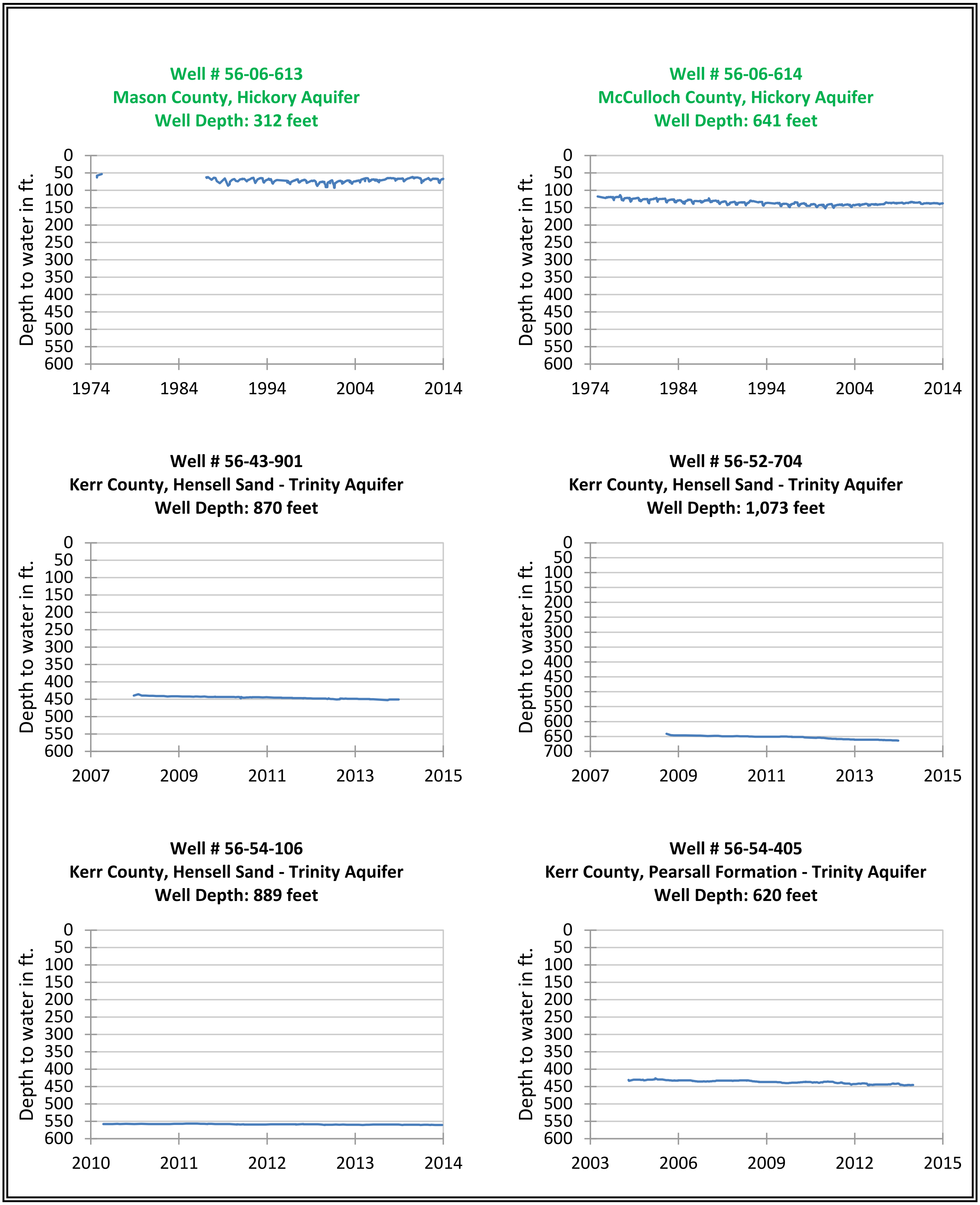

Figure 7-2. Hydrographs of TWDB recorder wells in Central Texas. (Minor aquifers indicated in green text.)

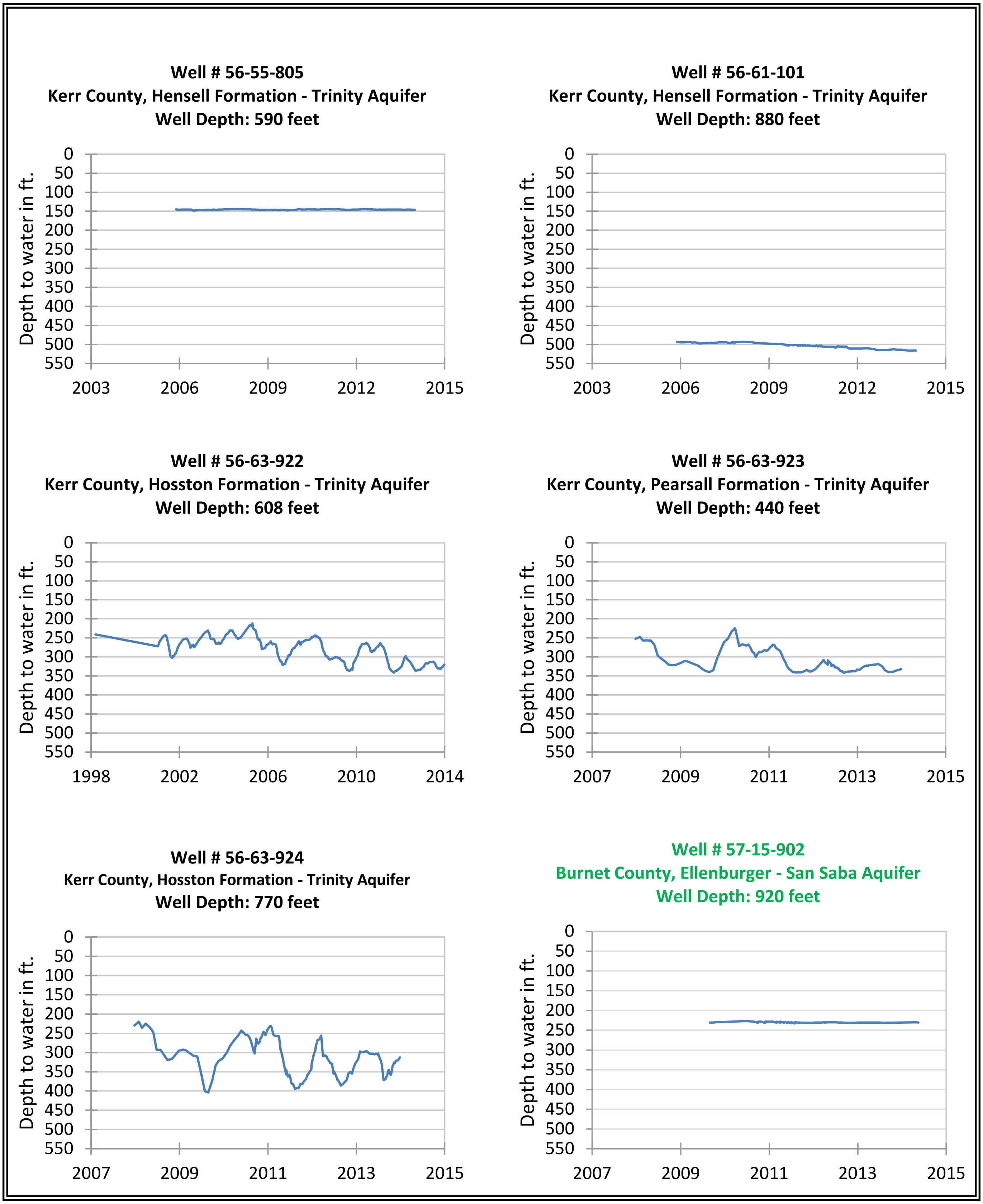

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas. (Minor aquifer indicated in green text.)

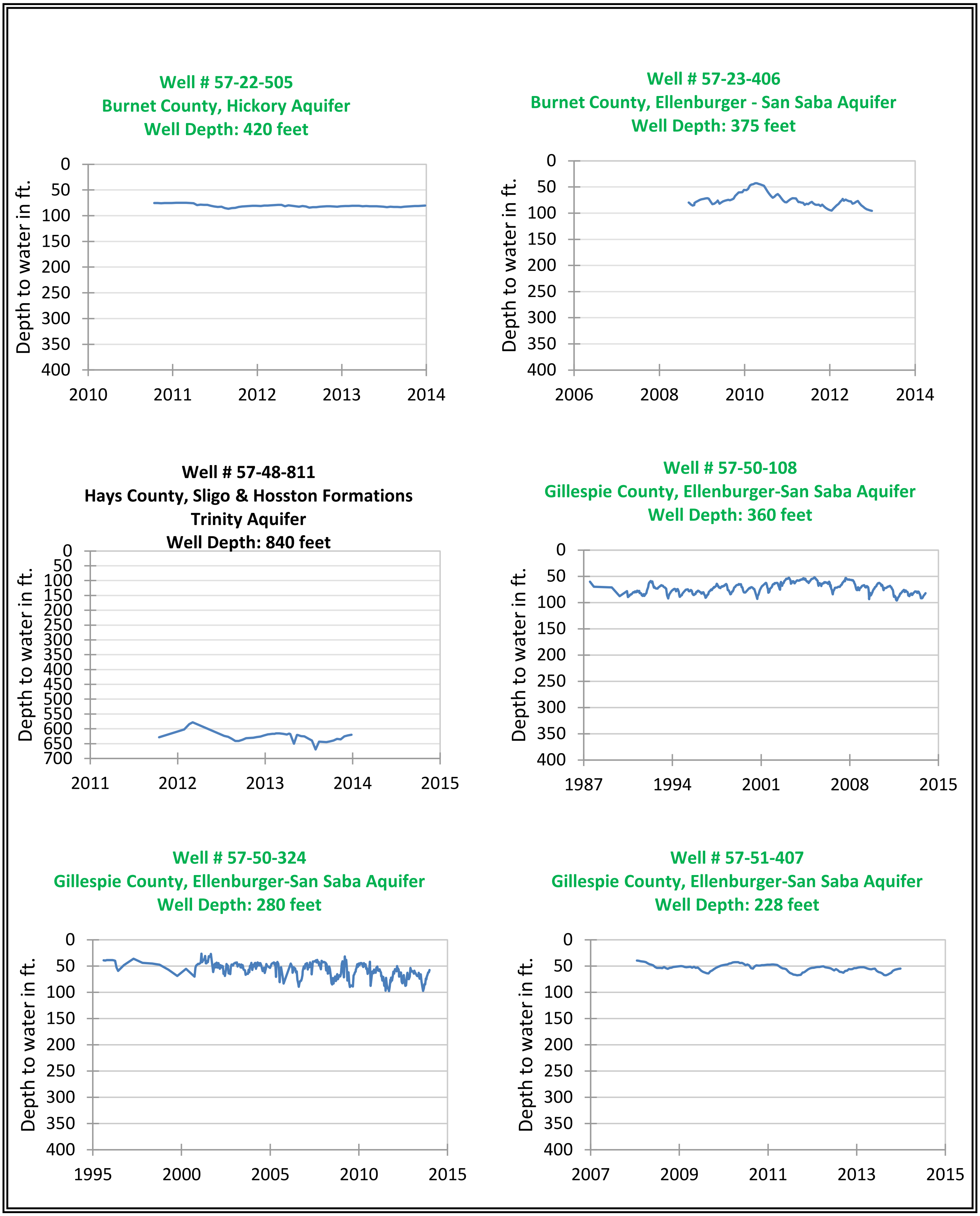

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas. (Minor aquifers indicated in green text.)

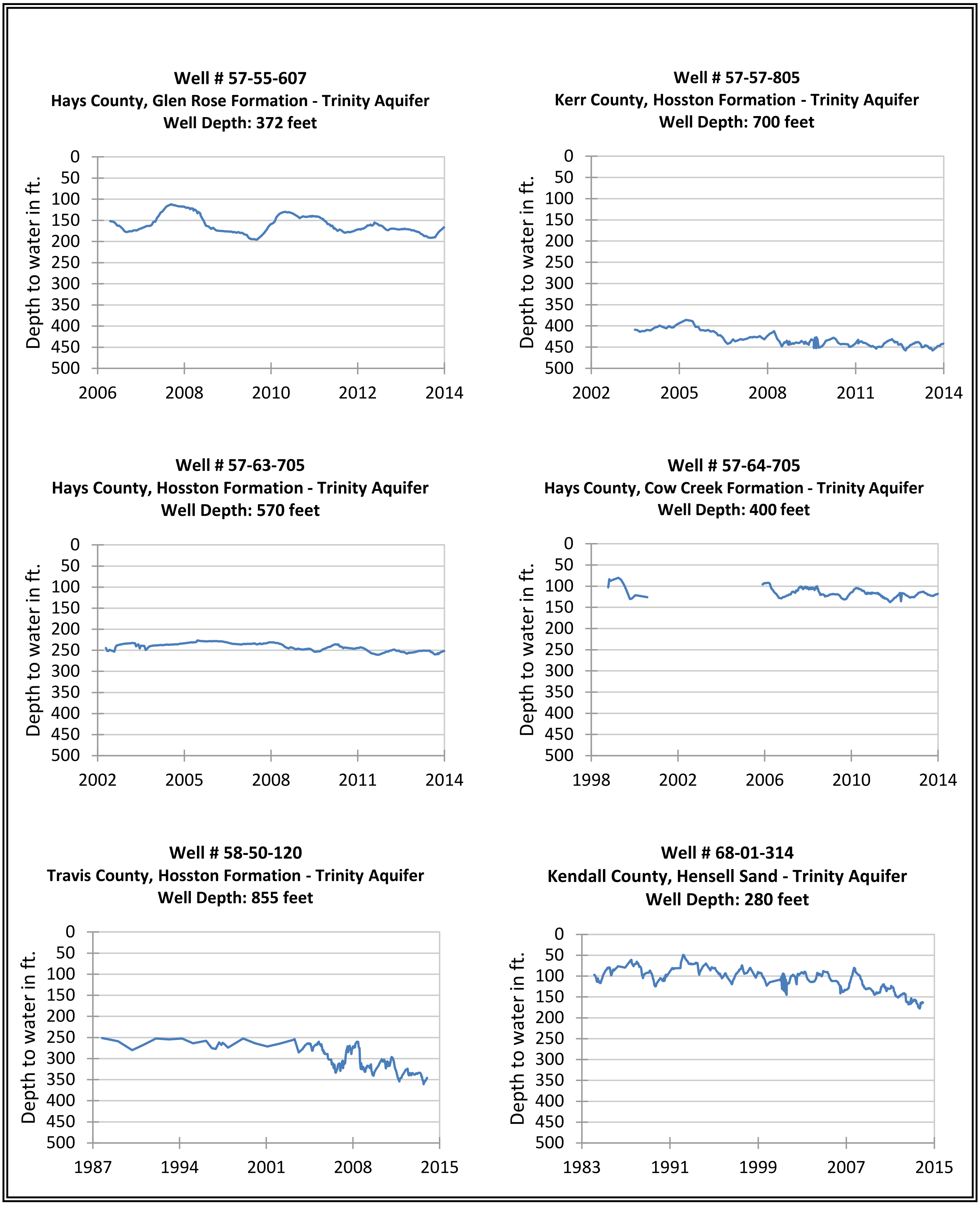

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

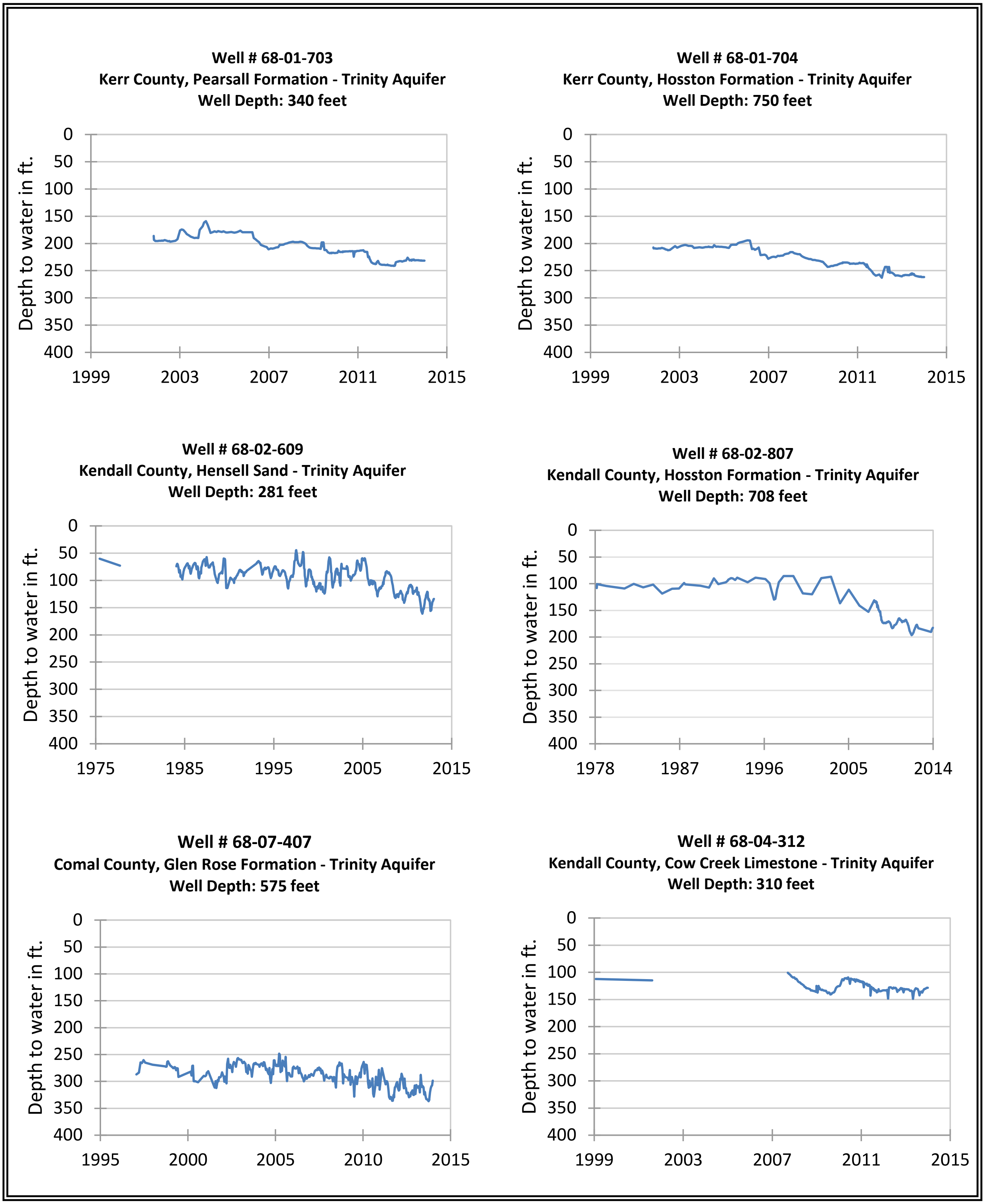

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

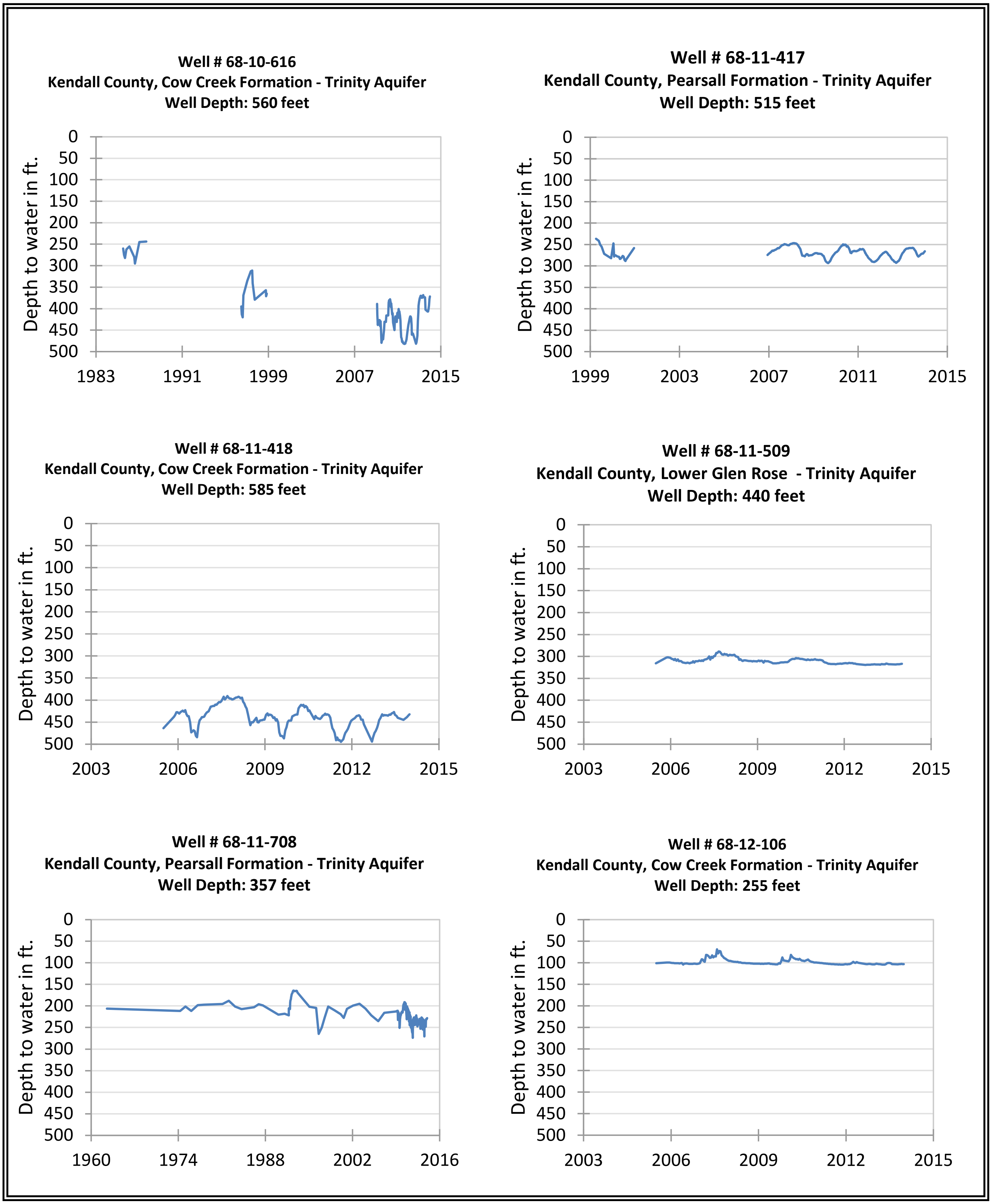

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

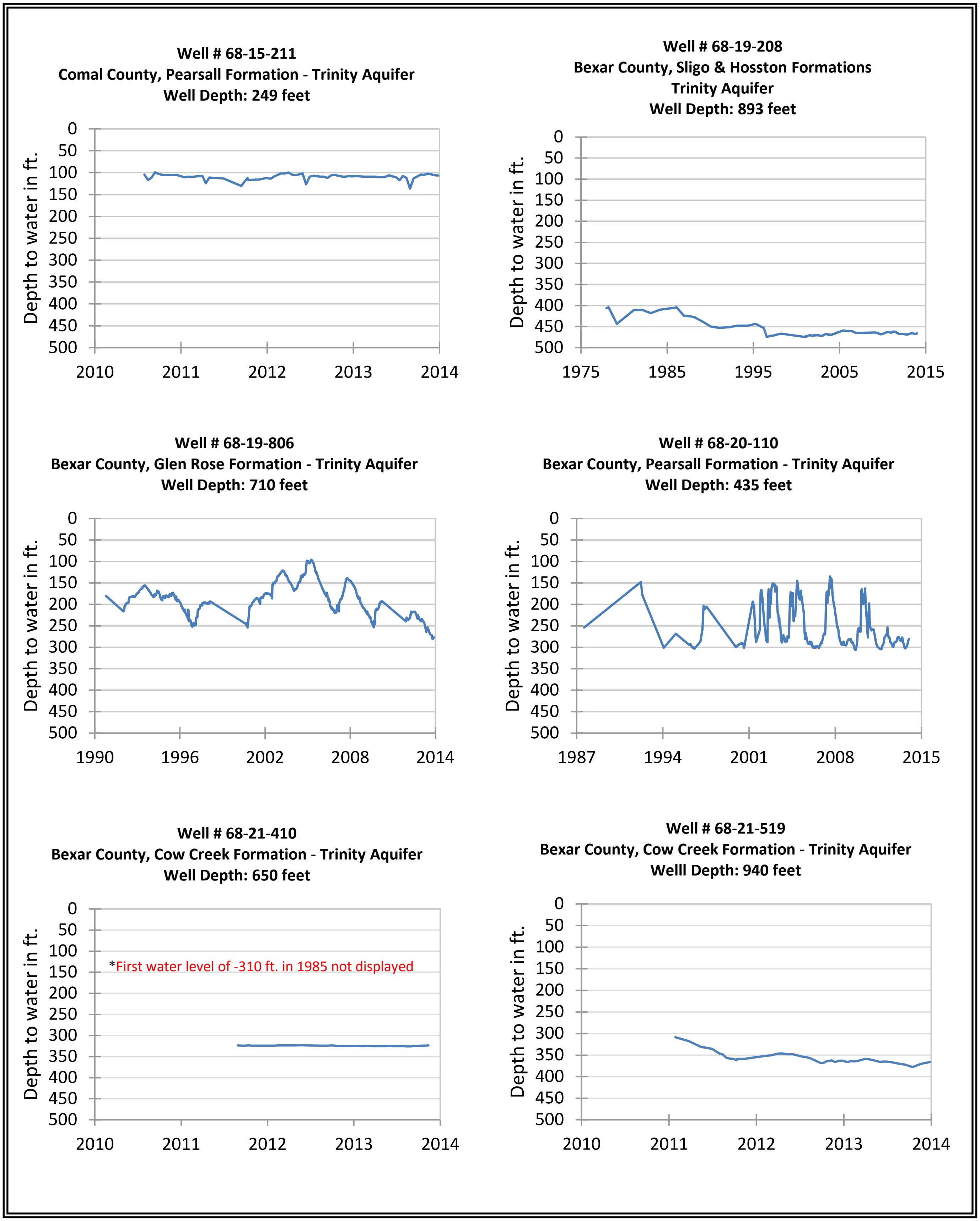

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

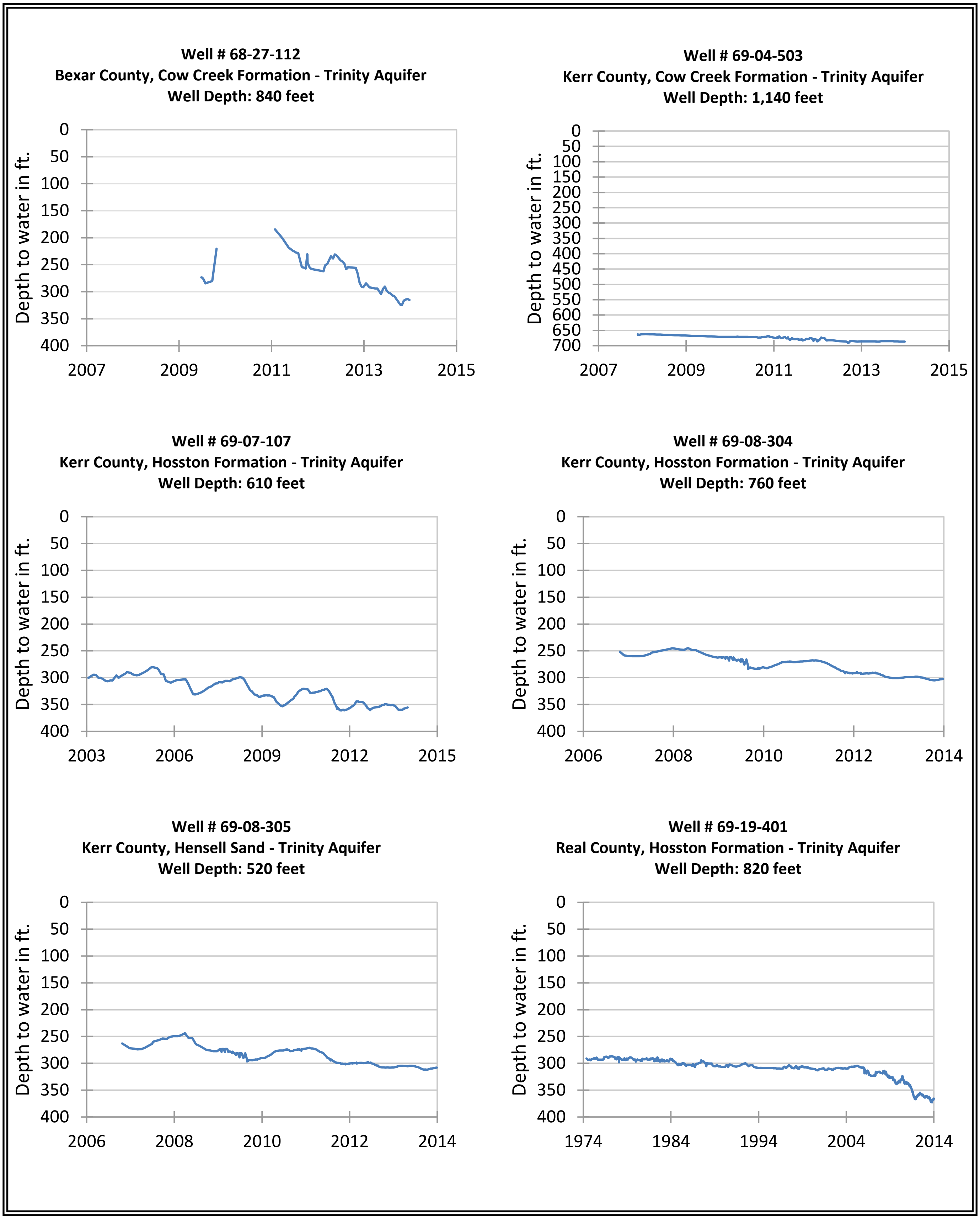

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

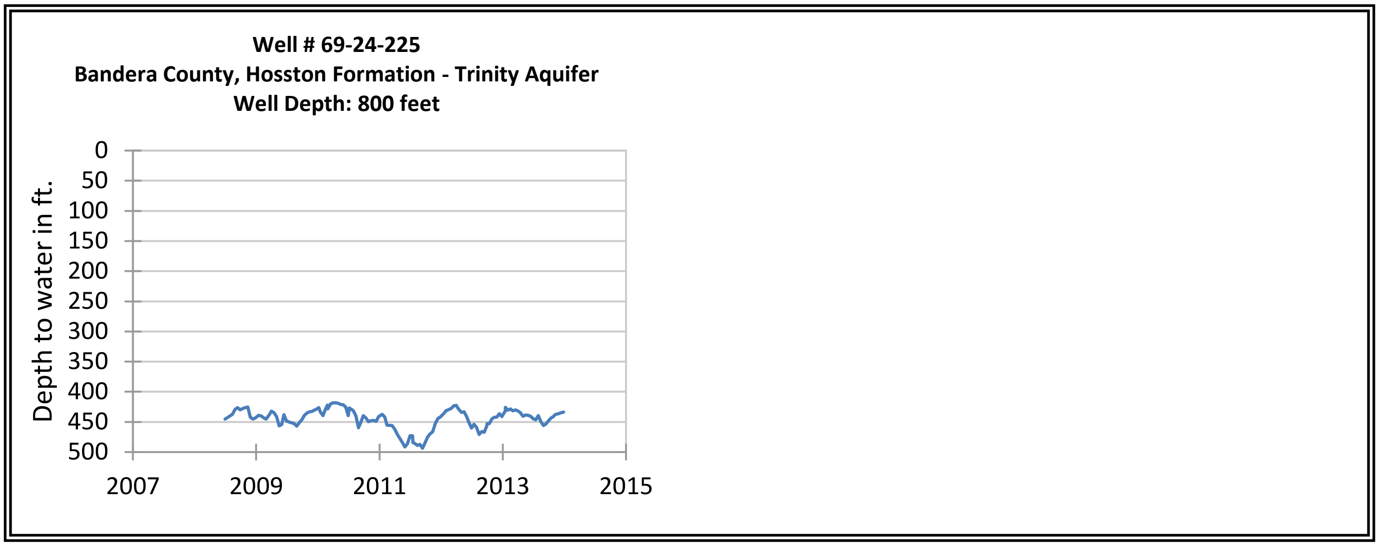

Figure 7-2 (continued). Hydrographs of TWDB recorder wells in Central Texas.

8.0 Conclusions

- In 2013 TWDB staff maintained and monitored a statewide network of 156 wells equipped with automatic groundwater-level recording instruments and dataloggers. The number of recorder wells has increased by nearly 25 percent since 2011. These wells monitor water-level conditions in major and minor aquifers defined by the TWDB and in undesignated or local aquifers.
- The Central Texas region continues to contain the largest number of recorder wells (41), reflecting interest in groundwater availability in an area with high population growth and variable patterns of rainfall. More than half the recorder wells in this region are completed in the Trinity Aquifer.
- The Trinity aquifer, also present in northern Central Texas, contains the most recorder wells in the state (57).
- Groundwater levels throughout the state generally declined in 2013, but the decline is less than observed in each of the previous two years and a smaller percentage of wells experienced decline. In major aquifers, 44 recorders experienced water-level rises and 94 experienced water-level declines.
- Total statewide median water-level change from 2012 to 2013 determined in the 138 recorders in major aquifers was -0.5 feet. This compares to the median water-level change in major aquifers of -0.9 feet from 2011 to 2012 in 125 wells and the median water-level change of -4.8 feet from 2010 to 2011 in 110 wells.
- Total statewide median water-level decline in major aquifers from 2012 to 2013 as determined from declines occurring in 68 percent (94 of 138) of recorder wells was 1.2 feet, compared to the median water-level declines of 1.7 feet from 2011 to 2012 in 75 percent (94 of 125) and 4.9 feet from 2010 to 2011 in 92 percent (101 of 110) of recorder wells.
- Total statewide median water-level rise in major aquifers from 2012 to 2013 as determined from rises occurring in 32 percent (44 of 138) of the recorder wells was 2.5 feet, compared to the median water-level rises of 1.9 feet from 2011 to 2012 in 25 percent (31 of 125) and 1.5 feet from 2010 to 2011 in eight percent (9 of 110) of the recorder wells.
- Table 8-1 shows a comparison of water levels in recorders in major aquifer by region. The median water-level change from 2012 to 2013 was greatest in wells in the Northern segment of the Edwards (Balcones Fault Zone) Aquifer, a rise of 12.1 feet, and least in wells in the Trinity Aquifer of Central Texas, a decline of 0.1 feet. The decline of 0.4 feet in the one Hueco-Mesilla Bolson Aquifer recorder well was not included in this comparison.
- By region, the Ogallala Aquifer wells experienced the greatest median water-level decline from 2012 to 2013, or a decline of 1.0 feet. This median change (decline) from 2012 to 2013 is less than its median changes (declines) in the previous two years of 1.8 and 1.9 feet and is less than changes in other aquifers in previous years.

Table 8-1. Summary Table of median water-level changes, by major aquifer and region. Blue denotes a rise in water level, and red denotes decline.

Median change (feet) 2012 – 2013	Median change (feet) 2011 – 2012	Median change (feet) 2010 – 2011	Number of Wells	Region	Major Aquifer
-1	-1.8	-1.9	26*	High Plains	Ogallala
-0.9	-0.6	-7.6	4*	West	Pecos Valley
-0.9	0.5	-6.3	11	South and East	Gulf Coast
-0.8	-1.6	-8.5	16	Northern Central	Trinity
-0.8	-0.9	-3.2	2	Rolling Plains	Seymour
-0.8	-0.9	-0.7	21*	West	Edwards-Trinity (Plateau)
-0.4	-3.5	1.5	1	West	Hueco(-Mesilla) Bolson
-0.2	-0.9	-4.4	12*	South and East	Carrizo-Wilcox
-0.1	-0.9	-16.7	41*	Central	Trinity
12.1	0.9	-3.5	4	Northern Central	Edwards (Balcones Fault Zone), Northern segment

*Indicates change in number of wells considered in this report from the previous (2011 to 2012) year's report.