Texas Water Development Board

Technical Note 15-07

Summary of Groundwater Conditions in Texas: Recent (2013–2014) and Historical Water-Level Changes in the TWDB Recorder Network

by

Blake Neffendorf and Janie Hopkins, P.G.

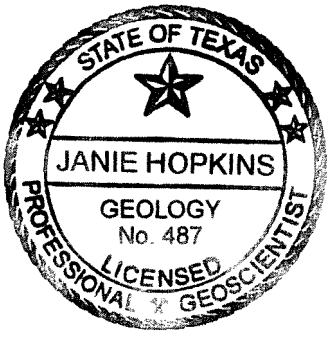
December 2015

Blake Neffendorf, as program specialist for the recorder program, installed, operated, and maintained the recorder network and created the maps, hydrographs, and tables for this report.

Geoscientist Seal

The contents of this report document the work of the following Texas Licensed Geoscientist:

Janie Hopkins, P.G. No. 487
As program manager for groundwater monitoring, Janie Hopkins wrote the report.



The seal appearing on this document was authorized on December 28, 2015.

Janie Hopkins

Janie Hopkins

Summary of Groundwater Conditions in Texas: Recent (2013–2014) and Historical Water-Level Changes in the TWDB Recorder Network

Table of Contents

List of Figures

List of Tables

1.0 Executive summary

The Texas Water Development Board (TWDB), in partnership with its cooperators, continues to install and monitor automatic water-level recorders in observation (recorder) wells throughout the state. The TWDB recorder well network complements 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, but wells in these programs are not included in this report.

Since 2011 the recorder well network has expanded by 28 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 the Trinity Aquifer in Central Texas (41 wells). Of the 143 recorders in major aquifers discussed in this report, 58 percent are completed in the Ogallala or Trinity aquifers. Some groundwater conservation districts have also been able to add more recorders in wells in their counties for a number of reasons. In an effort to install recorders in counties and aquifers where none currently exist, the TWDB's "Recorder Water-Level Data in Every Texas County" initiative has recently been accepted as a Texas Commission on Environmental Quality Supplemental Environmental Project www.tceq.texas.gov/legal/sep/. This program allows funds to be directed to the Recorder Program to fill such gaps as part of settlements of enforcement actions.

This report discusses the water-level changes observed from 2013 to 2014 in 161 recorder wells operating in the network, which includes 143 recorder wells in the state's nine major aquifers, 15 recorder wells in eight minor aquifers, and 3 recorder wells in three undesignated aquifers. The TWDB posts hydrographs and daily water-level measurements from these wells at waterdatafortexas.org/groundwater/. This report does not include water-level data from those recorder wells that were added to the network during 2014.

Groundwater levels throughout the state generally continued to decline in 2014, with slightly more wells experiencing water-level declines at the end of 2014 than at the end of 2013. In the major aquifers, the median water-level change for recorder wells was a decline of 1.2 feet from 2013 to 2014 with 73 percent of wells experiencing water-level declines. The median change from 2012 to 2013 was a decline of 0.5 feet with 68 percent of wells experiencing decline; from 2011 to 2012, a decline of 0.9 feet with 75 percent of wells experiencing decline; and from 2010 to 2011, 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 four years, the amount of yearly decline (expressed as a median value) was 2.0 feet at the end of 2014, 1.7 feet at the end of 2013, 1.9 feet at the end of 2012, and 4.9 feet at the end of 2011. For only those wells that experienced water-level rise, the median value was 1.9 feet at the end of 2014, 2.5 feet at the end of 2013, 1.9 feet at the end of 2012, and 1.5 feet at the end of 2011.

Considering water-level change by region, excluding El Paso with only one recorder well in the Hueco(-Mesilla) Bolson Aquifer, the Trinity Aquifer wells in Central Texas experienced the greatest annual change and also the greatest median water-level decline of 2.4 feet. The 13 Carrizo-Wilcox recorder wells, nine of which are completed in the confined (artesian) portion of the aquifer, experienced the largest median water-level rise of 1.5 feet. Median water-level rises also occurred in the Gulf Coast and Edwards-Trinity (Plateau) wells at 1.0 and 0.5 feet, respectively. Water levels in the

Ogallala wells continued to decline at a relatively consistent rate, with a median decline of 1.2 feet from 2013 to 2014 after three previous yearly declines of 1.0 feet (2012 to 2013), 1.8 feet (2011 to 2012), and 1.9 feet (2010 to 2011). The water level in the 6819806 Bexar County recorder well, in the confined zone of the Trinity Aquifer, again experienced the greatest annual change and decline in water levels of any recorder well (60.3 feet) from 2013 to 2014, after it experienced the greatest decline (43.2 feet) during the previous year. The recorder well in the unconfined portion of the Gulf Coast Aquifer in Duval County experienced the greatest rise (44.8 feet) from 2013 to 2014.

This report addresses water-level changes in 161 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 and regional factors.

2.0 Introduction

An automatic groundwater-level recorder well, or a 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 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. The TWDB (and cooperator) recorders use the Geostationary Operational Environmental Satellite (GOES) system to relay data, although some groundwater conservation district programs use a cell phone network.

In 2014, the TWDB operated 161 recorder wells: 143 in the state's nine major aquifers, 15 in eight minor aquifers, and 3 in three undesignated or local aquifers, all equipped with satellite telemetry that allows publication of near real-time (provisional) data on the TWDB website. Of the 143 recorder wells in major aquifers, 47 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 2014) 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 (Balcones Fault Zone) major aquifers and Woodbine minor aquifer
- East and South Texas: Carrizo-Wilcox and Gulf Coast major aquifers
- 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.

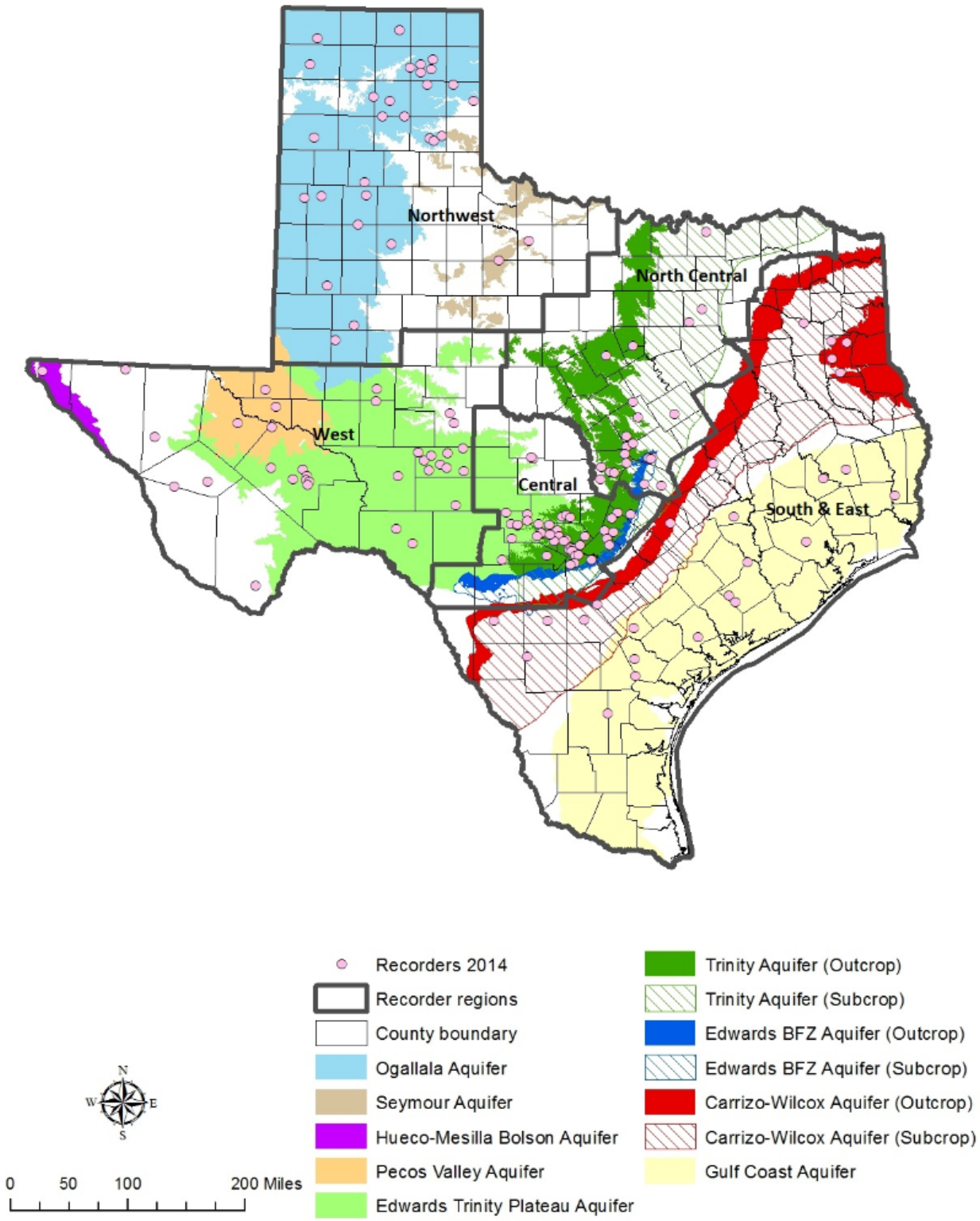


Figure 2-1. Location of 161 recorder wells operated by the TWDB and cooperators and recorder regions discussed in this report. BFZ = Balcones Fault Zone.

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. Three Ogallala Aquifer wells—0260303 in Dallam County, 0653401 in Armstrong County, and 2462601 in Terry County—were equipped with recorders to replace the three wells taken out of service in Armstrong, Carson, and Dawson counties. The 28 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 2013 to 2014 (Table 3-1 and Figure 3-2) at a rate comparable to the change of -1.0 feet from 2012 to 2013. Changes in levels ranged from +0.9 to -12.5 feet with a median of -1.2 feet and an average of -2.1 feet. The Donley County (1202959) well with the anomalously large decline of 12.5 feet, relative to typical declines in Ogallala wells, was also the greatest annual decline measured in any of the Ogallala recorders in the last four years after the 37-foot water-level decline in Roberts County (0510953) from 2010 to 2011.

The Ogallala Aquifer is used primarily for crop irrigation and has experienced water-level declines throughout most of 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. Of the 26 recorder wells in the Ogallala Aquifer, two experienced slight to almost negligible water-level rises from 2013 to 2014 where irrigation decreased during the year. Water levels rose 0.9 feet in the Bailey County well (following the previous year's rise of 0.7 feet) and 0.04 feet in the newly added well in Armstrong County (0653401).

The Seymour Aquifer wells both experienced declines of 1.4 and 0.6 feet in Baylor and Haskell counties from 2012 to 2013 after declines of 0.8 feet in each between 2011 and 2012. Shallow well depths in this aquifer account for greater sensitivity to rainfall and pumpage and subsequently 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 declined by 0.7 feet from 2013 to 2014 after it rose by 0.6 feet from 2012 to 2013 and declined 0.3 feet from 2011 to 2012. The water level continued to decline in the Wheeler County Whitehorse Aquifer recorder well and at a slower rate—1.7 feet—compared to its declines of 1.9 feet from 2012 to 2013, 2.3 feet from 2011 to 2012, and 4.5 feet from 2010 to 2011.

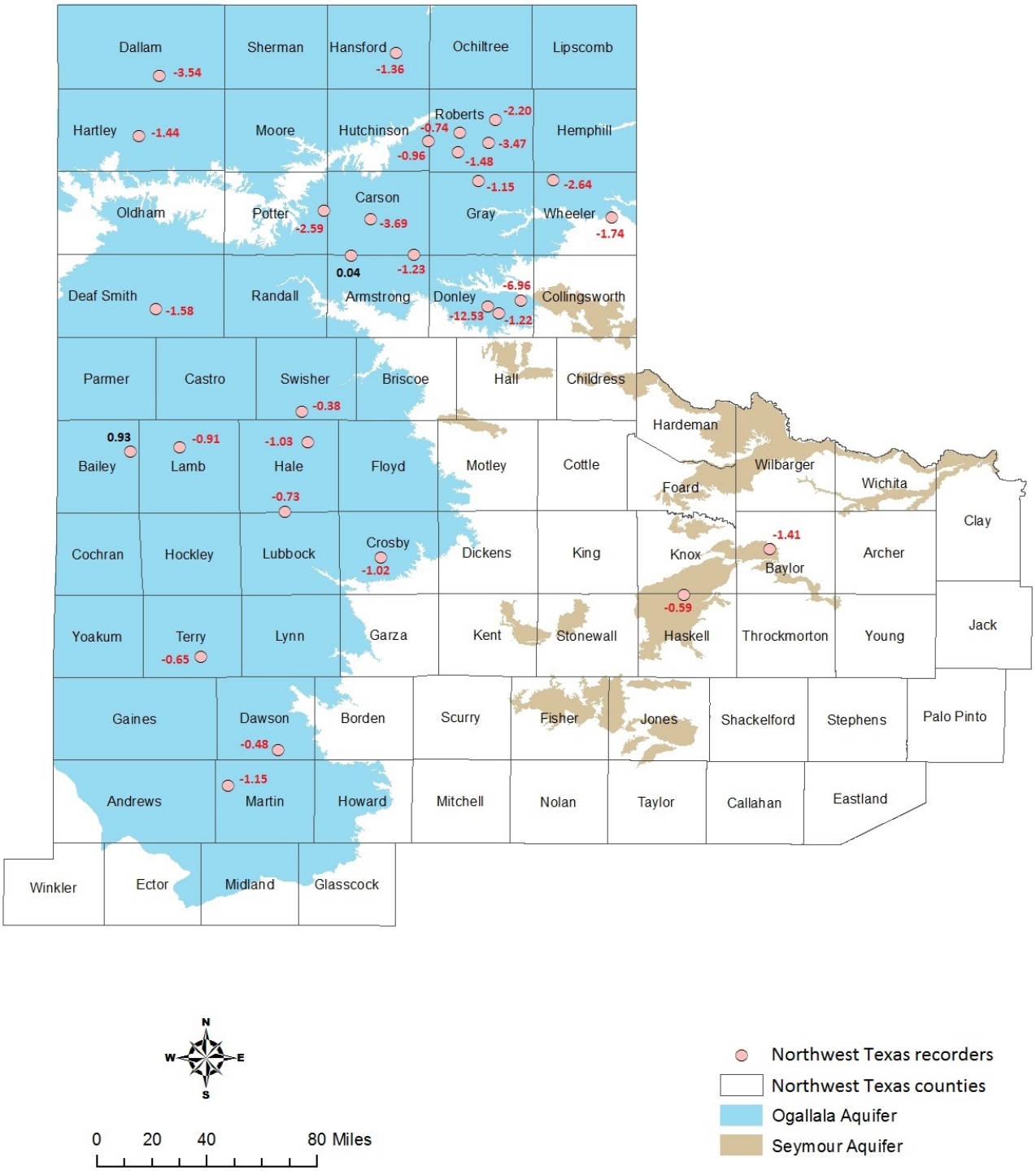


Figure 3-1. Location of wells with TWDB-operated automatic water-level recorders in Northwest Texas. Water-level changes from 2013 to 2014 are shown in feet. Black indicates a rise in water levels, and red indicates a decline.

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 and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010–2014 change (ft)	2005–2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
*Dallam 0260303	Ogallala	-3.54	-6.72	N/A	N/A	-20.28 (2010)	-5.07 (4)
Hansford 0354301	Ogallala	-1.36	-0.80	-3.79	-9.07	-85.64 (1951)	-1.34 (63)
Roberts 0503709	Ogallala	-0.74	-0.46	-1.69	N/A	-2.73 (2005)	-0.28 (9)
Roberts 0509553	Ogallala	-2.20	-2.48	-9.56	-19.03	-22.97 (2002)	-1.91 (12)
Roberts 0510953	Ogallala	-3.47	-5.21	-74.06	-75.96	-75.96 (2002)	-5.84 (12)
Roberts 0517203	Ogallala	-1.48	-1.16	-4.16	-7.71	-10.11 (2000)	-0.67 (14)
Gray 0526501	Ogallala	-1.15	-0.09	-4.85	-7.39	-26.35 (1958)	-0.46 (56)
Wheeler 0529505	Ogallala	-2.64	1.81	N/A	N/A	3.96 (2012)	1.80 (2)
Wheeler 0539904	Whitehorse	-1.74	-1.94	-12.19	N/A	-21.41 (1966)	-0.44 (46)
Hutchinson 0616702	Ogallala	-0.96	-0.81	-3.86	-6.27	-6.47 (2003)	-0.59 (11)
Potter 0635912	Ogallala	-2.59	-1.79	-8.94	N/A	-11.95 (2006)	-1.41 (8)
Carson 0645305	Ogallala	-3.69	-3.65	-17.54	-20.62	-21.12 (2003)	-1.76 (11)
*Armstrong 0653401	Ogallala	0.04	N/A	N/A	N/A	0.04 (2014)	0.04 (1)
Armstrong 0655504	Ogallala	-1.23	-0.01	-5.79	N/A	-34.84 (1975)	-0.89 (39)
Hartley 0712401	Ogallala	-1.44	-1.72	-8.01	-17.83	-34.02 (1963)	-0.65 (51)
Deaf Smith 1004901	Ogallala	-1.58	-1.57	-9.07	-11.07	-32.92 (1975)	-0.82 (39)
Bailey 1051909	Ogallala	0.93	0.69	-0.52	-8.96	-17.83 (1981)	-0.54 (33)
Lamb 1053602	Ogallala	-0.91	-1.59	-7.75	-19.39	-116.87 (1951)	-1.83 (63)
Swisher 1142315	Ogallala	-0.38	-0.40	-2.02	-4.30	-16.78 (1988)	-0.63 (24)
Hale 1151403	Ogallala	-1.03	-0.15	-9.97	-19.39	-50.52 (1988)	-1.91 (24)
Donley 1202959	Ogallala	-12.53	-2.59	N/A	N/A	-22.89 (2010)	-5.72 (4)
Donley 1204452	Ogallala	-6.96	-3.98	-15.64	N/A	-16.19 (2009)	-2.94 (5)
Donley 1211118	Ogallala	-1.22	-0.73	-3.26	N/A	-4.83 (2008)	-0.72 (4)
Baylor 2122850	Seymour	-1.41	-0.79	-4.32	N/A	-5.53 (2009)	-0.92 (5)
Haskell 2135748	Seymour	-0.59	-0.78	-4.87	-7.16	-7.52 (2002)	-0.61 (12)
Hale 2310401	Edwards-Trinity (High Plains)	-0.73	0.62	-0.26	-4.49	0.19 (2001)	0.01 (13)
Crosby 2330103	Ogallala	-1.02	-0.18	-1.61	-7.53	-8.17 (1965)	-0.17 (49)
*Terry 2462601	Ogallala	-0.65	-1.08	-2.97	-7.59	-19.62 (1969)	-0.44 (45)
Martin 2739903	Ogallala	-1.15	-1.64	-8.97	-11.27	-38.29 (1964)	-0.76 (50)
Dawson 2825604	Ogallala	-0.48	-0.35	-2.29	1.69	-0.02 (2000)	0.00 (14)

* = recorder added for the 2013–2014 report, ft = feet, yr = earliest year measured, N/A = not available, yrs = years over which average determined

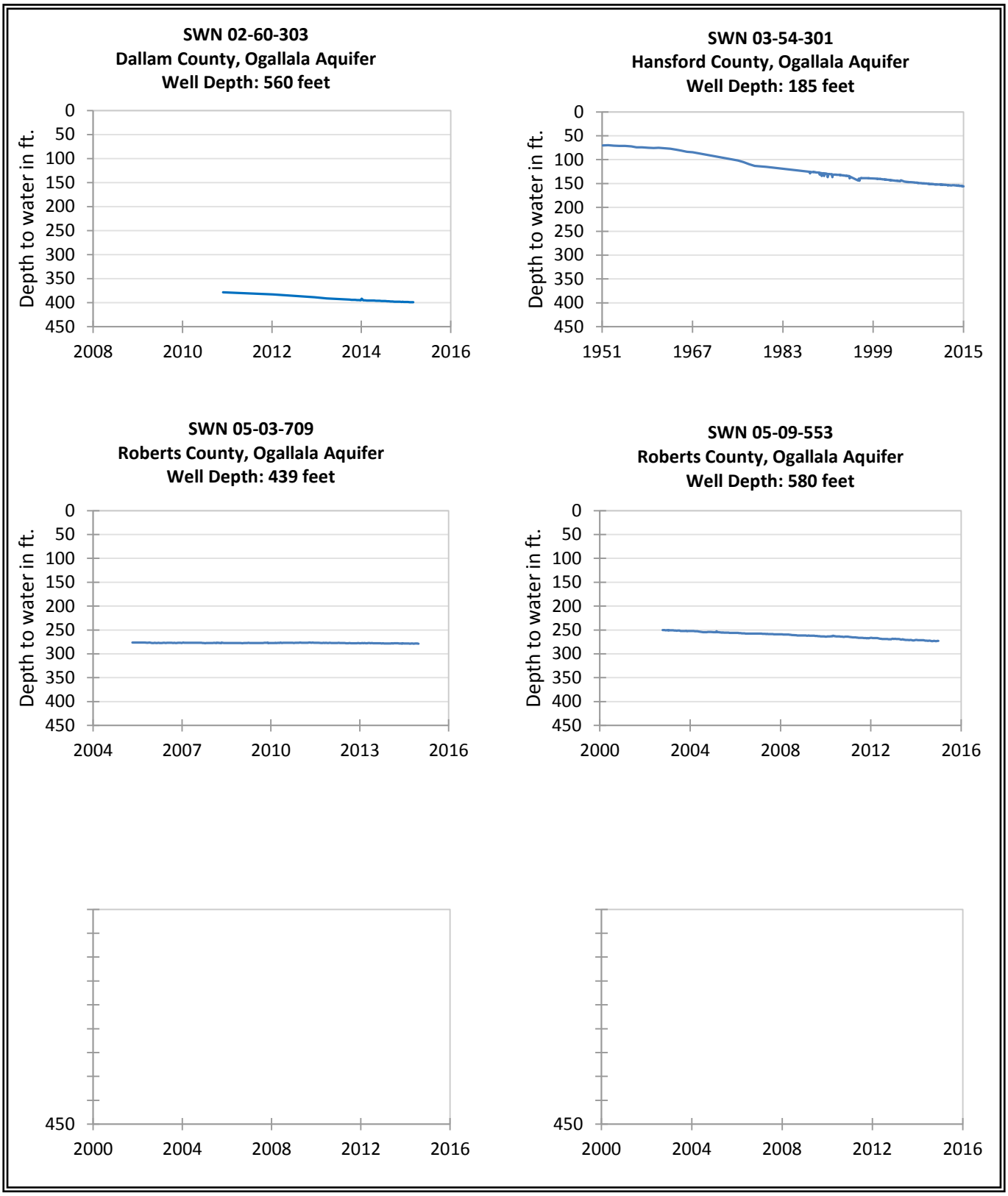


Figure 3-2. Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas. SWN = state well number

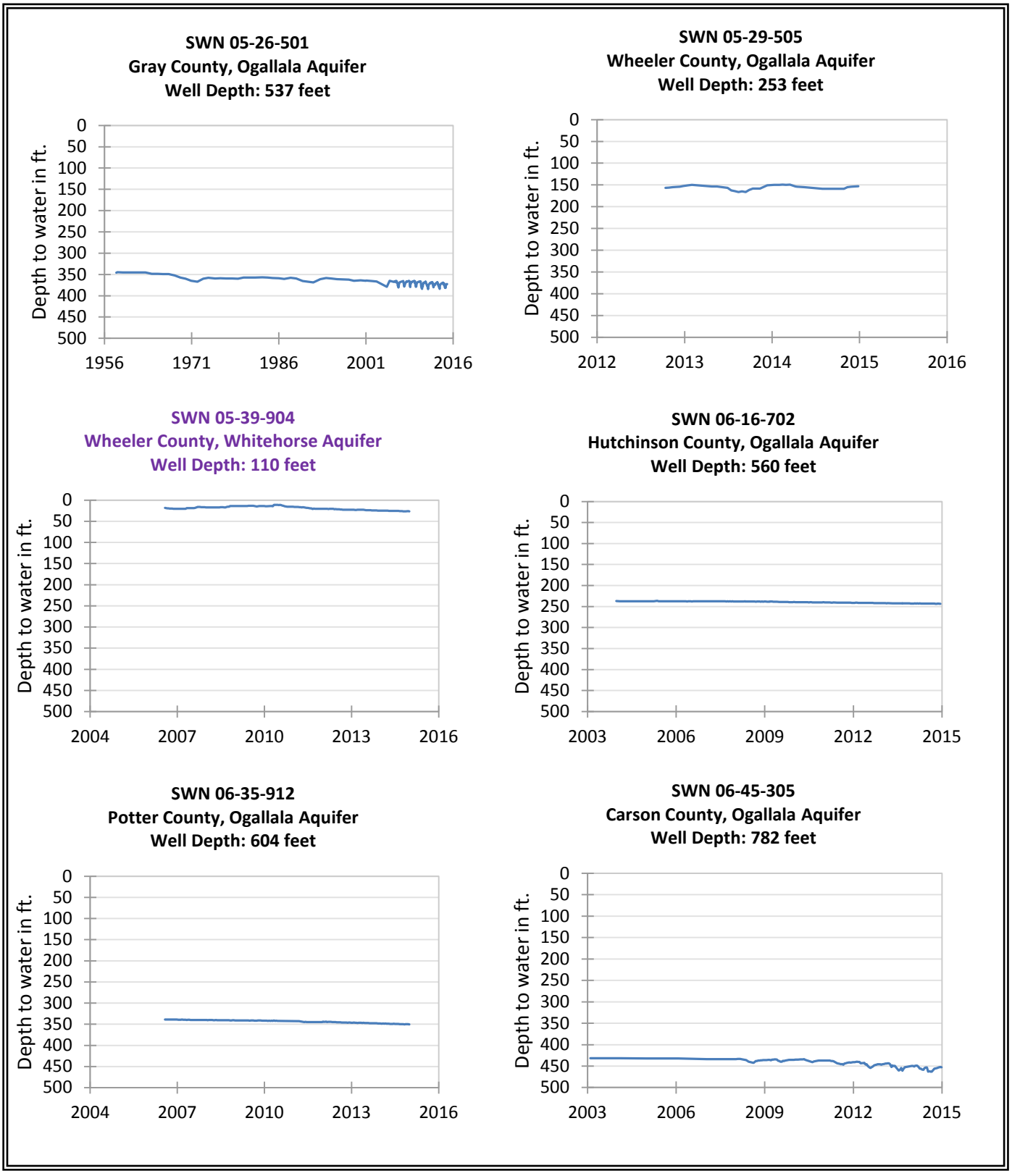


Figure 3-2 (continued) Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas. Undesignated or local aquifer indicated in purple text. SWN = state well number

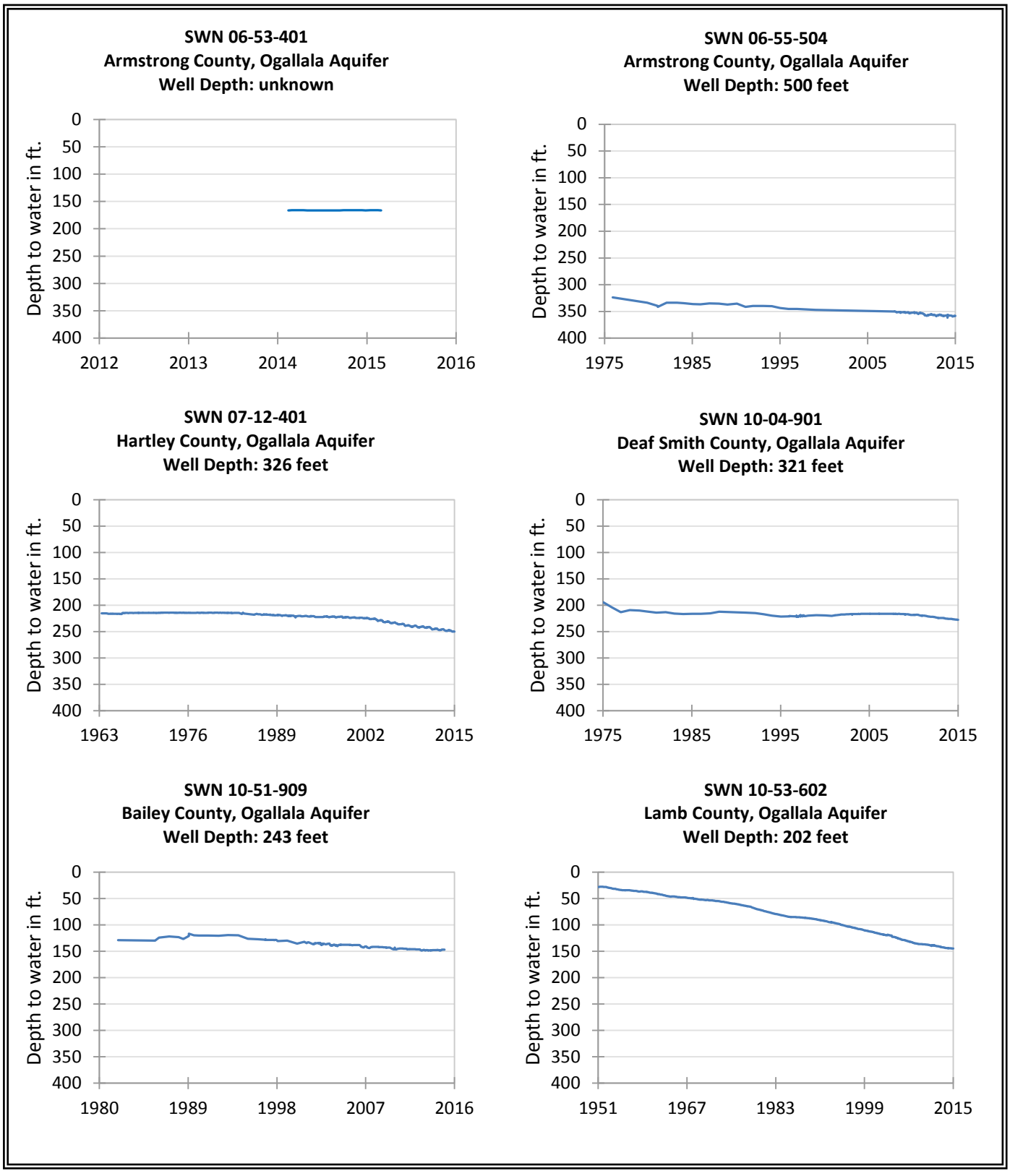


Figure 3-2 (continued) Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas. SWN = state well number

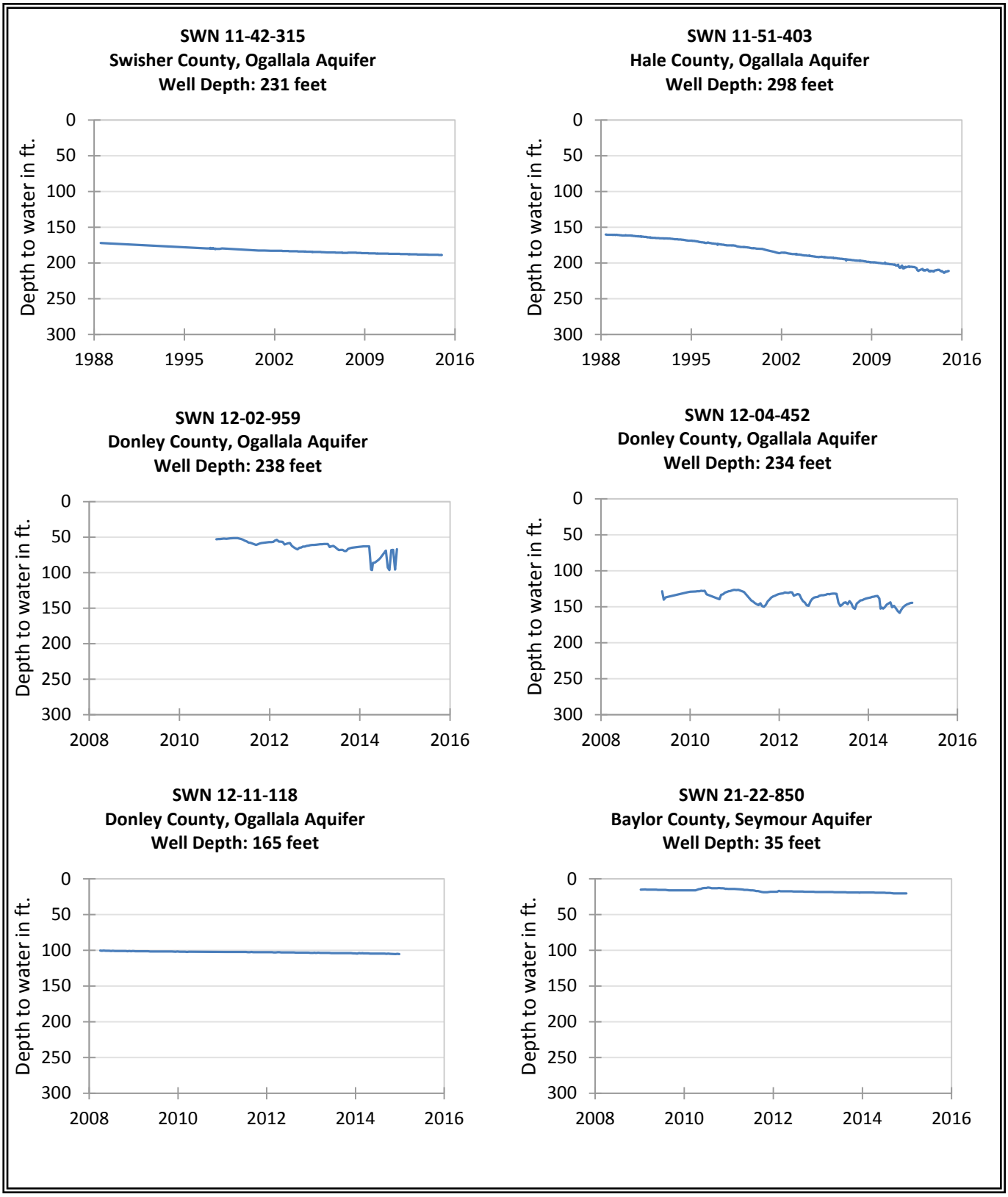


Figure 3-2 (continued) Hydrographs of TWDB recorder wells in the High Plains and Rolling Plains, Texas. SWN = state well number

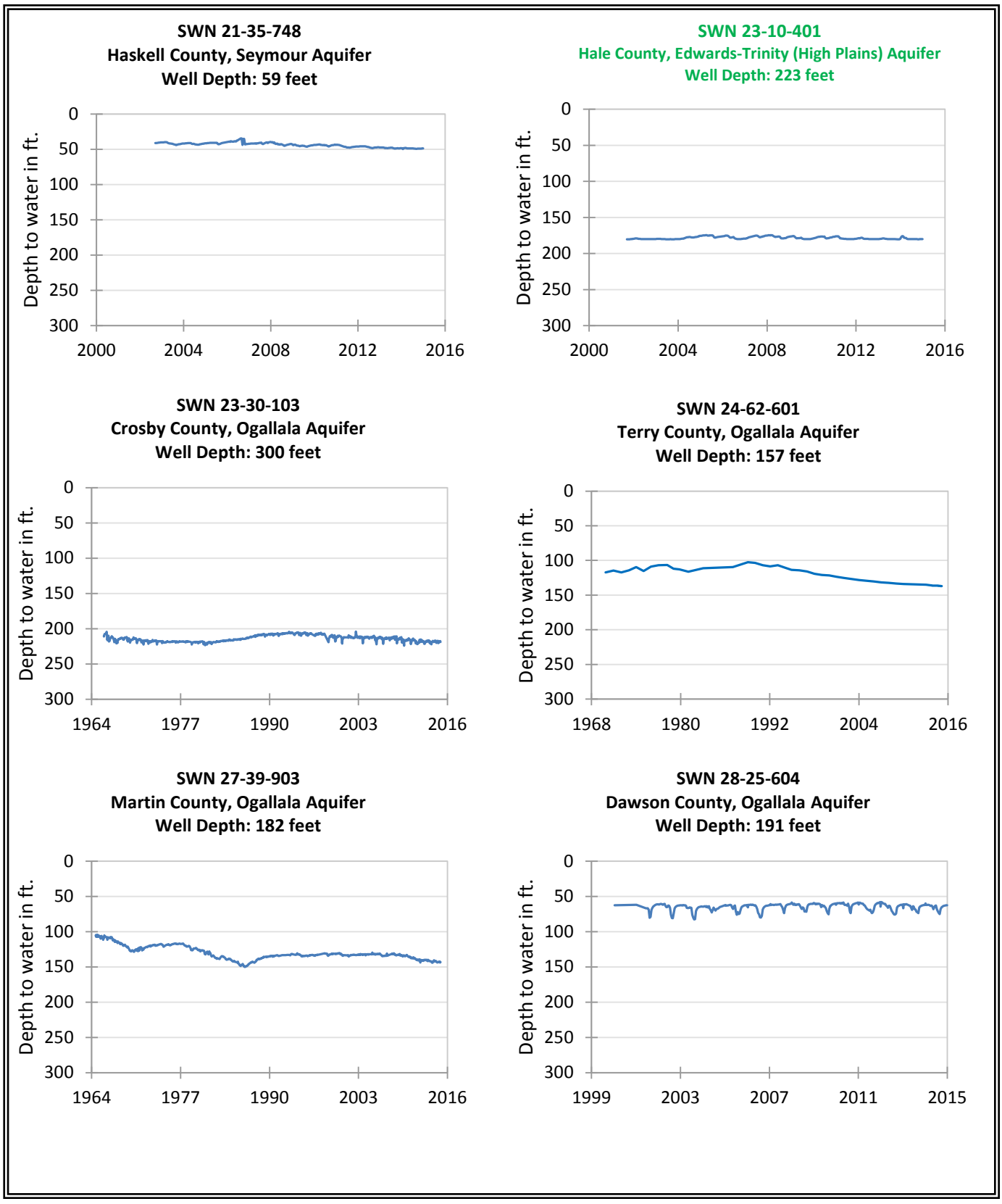


Figure 3-2 (continued) Hydrographs of TWDB recorder wells in Northwest Texas. Minor aquifer indicated in green text. SWN = state well number

4.0 West Texas

The TWDB monitors 36 wells in West Texas (Figure 4-1), 29 of which are completed in major aquifers and seven 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 24 wells in the Edwards-Trinity (Plateau) Aquifer, 4 wells in the Pecos Valley Aquifer, and 1 well in the Hueco-Mesilla Bolson Aquifer. Three wells completed in the Edwards-Trinity (Plateau) Aquifer in Schleicher County were added to the program at the end of 2013. 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 between 2013 and 2014, although mainly declines (Table 4-1 and Figure 4-2), were more moderate than in previous years as reflected in slightly smaller average and median changes. Water-level changes in the 24 Edwards-Trinity (Plateau) Aquifer wells between 2013 and 2014 ranged from +2.3 to -5.3 feet with a median change of -0.5 feet and an average change of -0.6 feet. Water-level changes in the 21 available wells from the preceding year (2012 to 2013) ranged from +0.9 to -4.4 feet with a median change of -0.8 feet and an average change of -1.2 feet. Seven Edwards-Trinity (Plateau) wells exhibited slight rises from 2013 to 2014, whereas only two wells experienced rises from 2012 to 2013.

Water-level changes in the four Pecos Valley Aquifer recorder wells from 2013 to 2014 ranged from +0.2 to -4.3 feet with a median change of -1.5 feet and an average change -1.7 feet. From 2012 to 2013, levels 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 Tthe Pecos Valley (4644501) Aquifer well has averaged nearly a foot of decline for each of its 63-year record. This well continues to experience the greatest change of the four Pecos Valley Aquifer wells, a decline for each of the last four years.

The water level in the Hueco-Mesilla Bolson well declined 2.2 feet from 2013 to 2014, compared to its decline of 0.4 feet from 2012 to 2013 and its preceding year's decline of 3.6 feet. The water level in this well has also experienced more than 60 feet of decline since originally measured in 1964, with a yearly average decline of 1.3 feet.

4.2 Minor and undesignated aquifers

The northernmost of the two minor (Lipan) aquifer wells (4337101) experienced a decline of 0.4 feet from 2013 to 2014; while the 43453016 well, just over nine miles south of 4337101, experienced a rise of 13.1 feet. The water-level changes from 2012 to 2013 were declines of 3.5 and 11.7 feet, respectively; and from 2011 to 2012, these recorder wells experienced rises of 10.5 and 14.9 feet. Swings of this magnitude are characteristic of highly transmissive shallow aquifers that are sensitive to recharge from rainfall and fluctuations in pumping demands.

Water-level changes in the three other minor aquifer wells were small. The water level in the Bone Spring-Victorio Peak well in Hudspeth County declined 0.5 feet from 2013 to 2014, following a slight rise of 0.2 feet from 2012 to 2013 and slightly larger declines of 2.2 and 2.9 feet in the previous two years. 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 change, or rises of 0.3 and 0.2 feet, respectively, compared to their changes of -0.4 and -0.01 feet, respectively, from 2012 to 2013.

The water level from 2013 to 2014 in the Cretaceous Aquifer recorder well in Culberson County declined by 1.9 feet, following a 2012 to 2013 change of -0.4 feet and a 2011 to 2012 change of -1.1 feet. The rise of 28.3 feet from 2013 to 2014 in the Volcanics Aquifer recorder in Brewster County was the greatest water-level change experienced in any of all

West Texas area recorder wells, following a rise of 0.9 feet from 2012 to 2013. This unused well in Big Bend National Park is within 150 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.

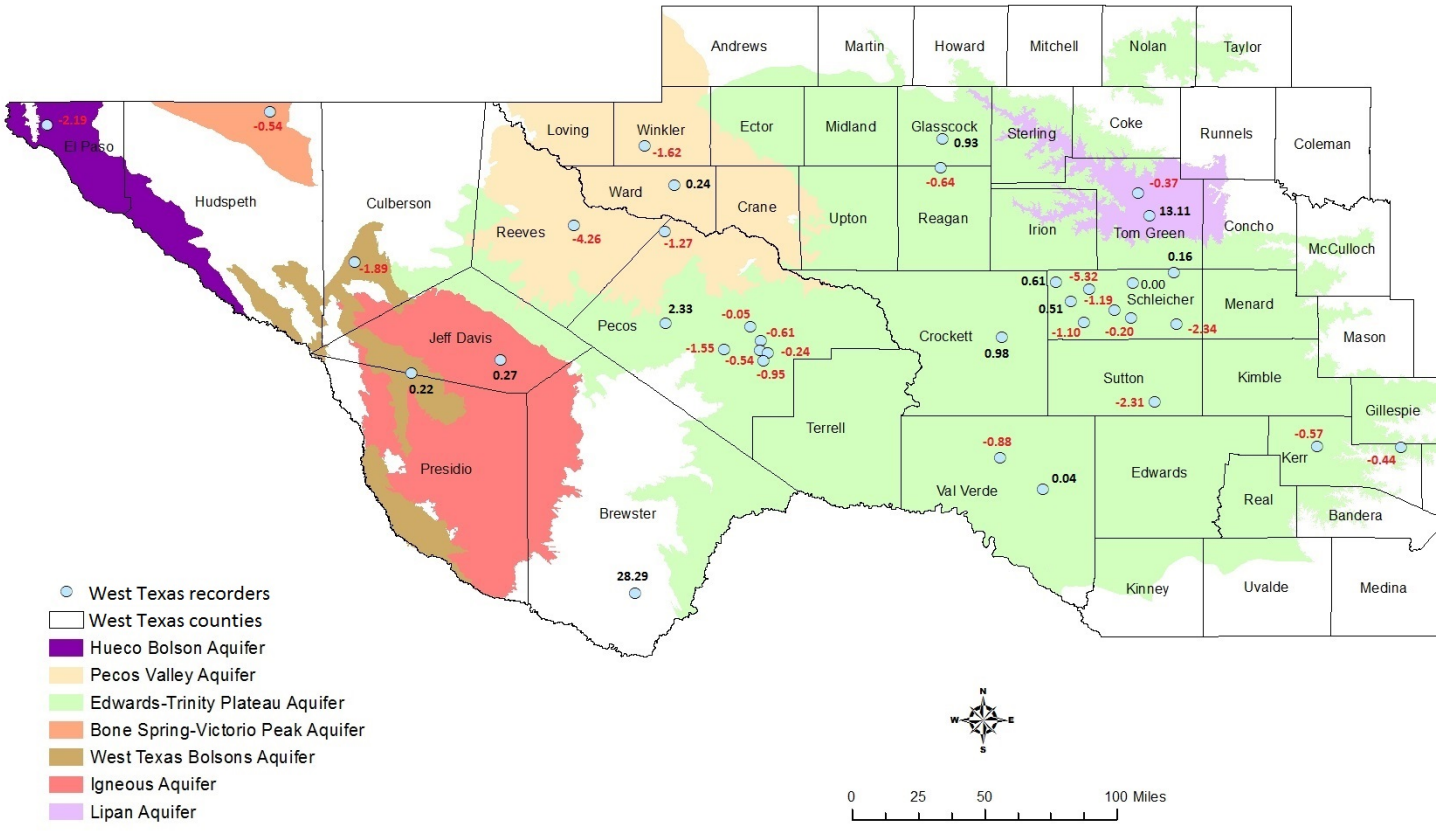


Figure 4-1. Location of wells with TWDB-operated automatic water-level recorders in West Texas. Water-level changes from 2013 to 2014 are shown in feet. Black indicates a rise in water levels, and red indicates decline.

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 and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010–2014 change (ft)	2005–2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
Tom Green 4337101	Lipan	-0.37	-3.52	-6.44	N/A	-6.88 (2005)	-0.72 (9)
Tom Green 4345306	Lipan	13.11	-11.73	6.24	7.44	-7.90 (1991)	-0.34 (23)
Schleicher 4357905	ET (P)	0.61	-2.64	N/A	N/A	-1.15 (2012)	-0.48 (2)
Schleicher 4361706	ET (P)	0.00	-0.35	N/A	N/A	-1.64 (1957)	-0.03 (57)
Schleicher 4362607	ET (P)	0.16	-0.15	N/A	N/A	0.94 (2011)	0.31 (3)
Glasscock 4412611	ET (P)	0.93	-4.40	-7.51	14.17	-19.35 (2001)	-1.41 (13)
Reagan 4420854	ET (P)	-0.64	-0.80	-2.58	-5.15	-17.05 (1990)	-0.68 (24)
Ward 4525715	Pecos Valley	0.24	-0.53	N/A	N/A	-3.60 (2012)	-1.38 (2)
Winkler 4615924	Pecos Valley	-1.62	-1.18	N/A	N/A	-2.80 (2012)	-1.40 (2)
Reeves 4644501	Pecos Valley	-4.26	-2.24	-12.58	-14.27	-61.90 (1952)	-0.98 (62)
Pecos 4648806	Pecos Valley	-1.27	0.81	N/A	N/A	-0.20 (2011)	-0.06 (3)
Culberson 4759123	Cretaceous	-1.89	-0.42	-3.87	-7.32	-15.29 (1995)	-0.80 (19)
Hudspeth 4807516	Bone Spring-Victorio Peak	-0.54	0.19	-3.82	-9.40	-33.12 (1966)	-0.68 (48)
El Paso 4913301	Hueco Bolson	-2.19	-0.39	-3.73	-8.31	-63.92 (1964)	-1.28 (50)
Presidio 5129805	West Texas Bolson	0.22	-0.01	1.01	1.89	17.04 (1979)	0.48 (35)
Pecos 5216802	ET (P)	2.33	-2.06	-13.49	-32.29	45.98 (1976)	1.18 (38)
Jeff Davis 5225209	Igneous	0.27	-0.41	-1.01	-3.04	-4.23 (1999)	-0.27 (15)
Pecos 5312803	ET (P)	-0.05	-1.07	N/A	N/A	-1.90 (2011)	-0.51 (3)
Pecos 5319701	ET (P)	-1.55	-1.49	-28.58	N/A	-27.84 (2009)	-5.57 (5)
Pecos 5320603	ET (P)	-0.61	0.60	-2.48	N/A	-2.68 (2009)	-0.49 (5)
Pecos 5320903	ET (P)	-0.54	-0.12	N/A	N/A	-2.91 (2010)	-0.65 (4)
Pecos 5321704	ET (P)	-0.24	-0.20	N/A	N/A	-1.69 (2010)	-0.40 (4)
Pecos 5328303	ET (P)	-0.95	0.01	-1.43	N/A	-0.98 (2008)	-0.15 (6)
Crockett 5423106	ET (P)	0.98	-0.79	-1.92	-15.93	1.39 (1963)	0.03 (51)
Val Verde 5463401	ET (P)	-0.88	-0.08	-1.14	N/A	-1.67 (2005)	-0.18 (9)
***Schleicher 5502807**	ET (P)	0.51	N/A	-19.16	N/A	4.64 (1958)	0.08 (56)
Schleicher 5503109	ET (P)	-5.32	-6.15	N/A	N/A	-16.38 (2011)	-4.74 (3)
Schleicher 5510611	ET (P)	-1.10	-2.72	N/A	N/A	-9.28 (2011)	-2.65 (3)
Schleicher 5512134	ET (P)	-1.19	-0.91	-13.66	-30.39	-13.12 (2003)	-1.14 (10)
Schleicher 5512606	ET (P)	-0.20	-1.47	N/A	N/A	-1.59 (2012)	-0.72 (2)
***Schleicher 5514909**	ET (P)	-2.34	N/A	N/A	N/A	-0.20 (2013)	-0.13 (1)
Sutton 5545308	ET (P)	-2.31	0.22	-3.82	N/A	-5.10 (2009)	-0.85 (5)
Kerr 5661102	ET (P)	-0.57	-1.37	-2.53	N/A	-1.37 (2006)	-0.16 (8)
***Kerr 5664302**	ET (P)	-0.44	-1.16	N/A	N/A	-1.50 (2012)	-0.52 (2)
Val Verde 7001707	ET (P)	0.04	-0.04	-0.13	N/A	-3.73 (2006)	-0.43 (8)
Brewster 7347404	Volcanics	28.29	0.88	15.88	N/A	17.55 (2007)	2.34 (7)

* = recorder added for the 2013–2014 report, ft = feet, yr = earliest year measured, N/A = not available, yrs = years over which average determined, ET (P) = Edwards-Trinity (Plateau)

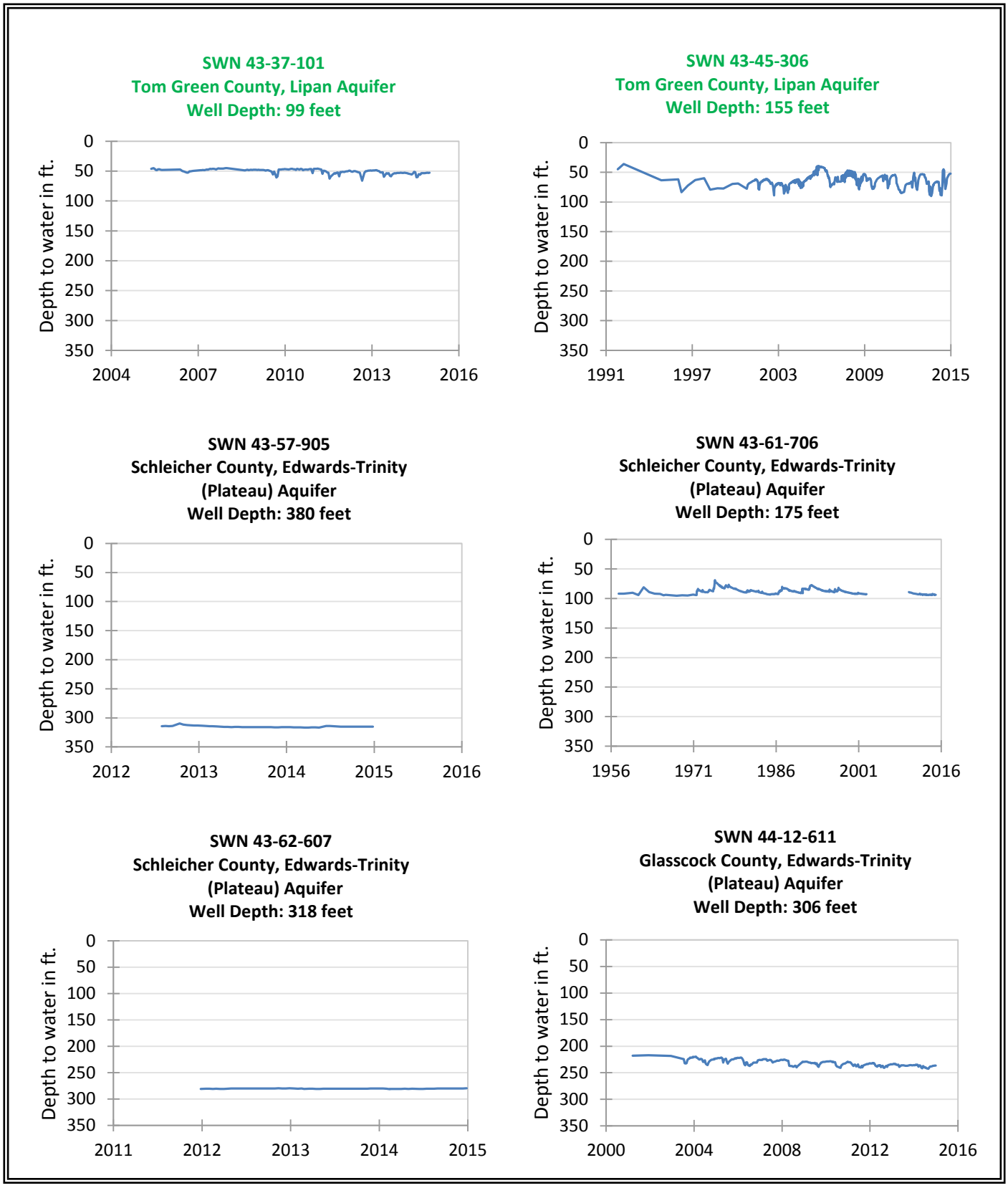


Figure 4-2. Hydrographs of TWDB recorder wells in West Texas. Minor aquifers indicated in green text. SWN = state well number

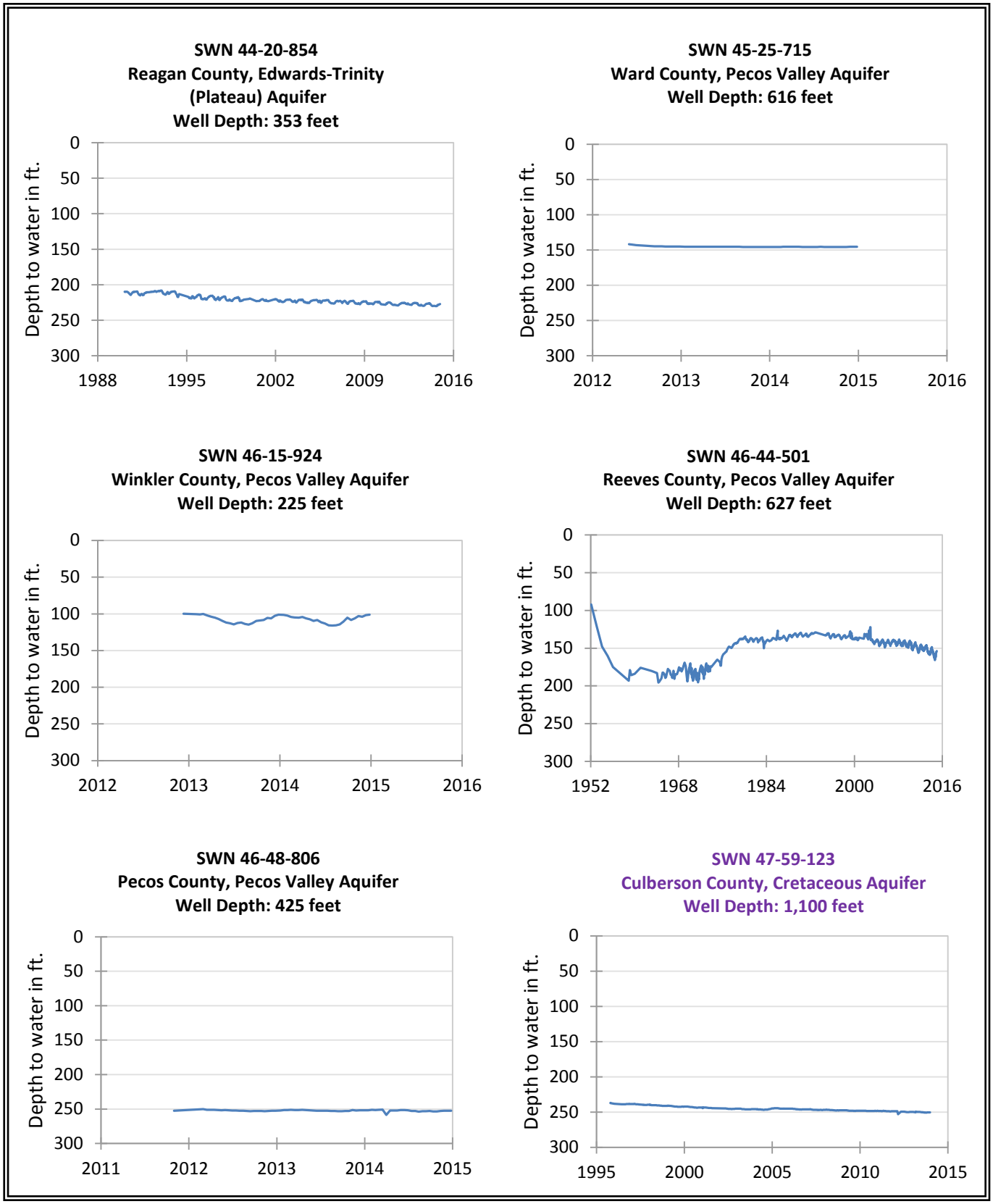


Figure 4-2 (continued) Hydrographs of TWDB recorder wells in West Texas. Undesignated or local aquifer indicated in purple text. SWN = state well number

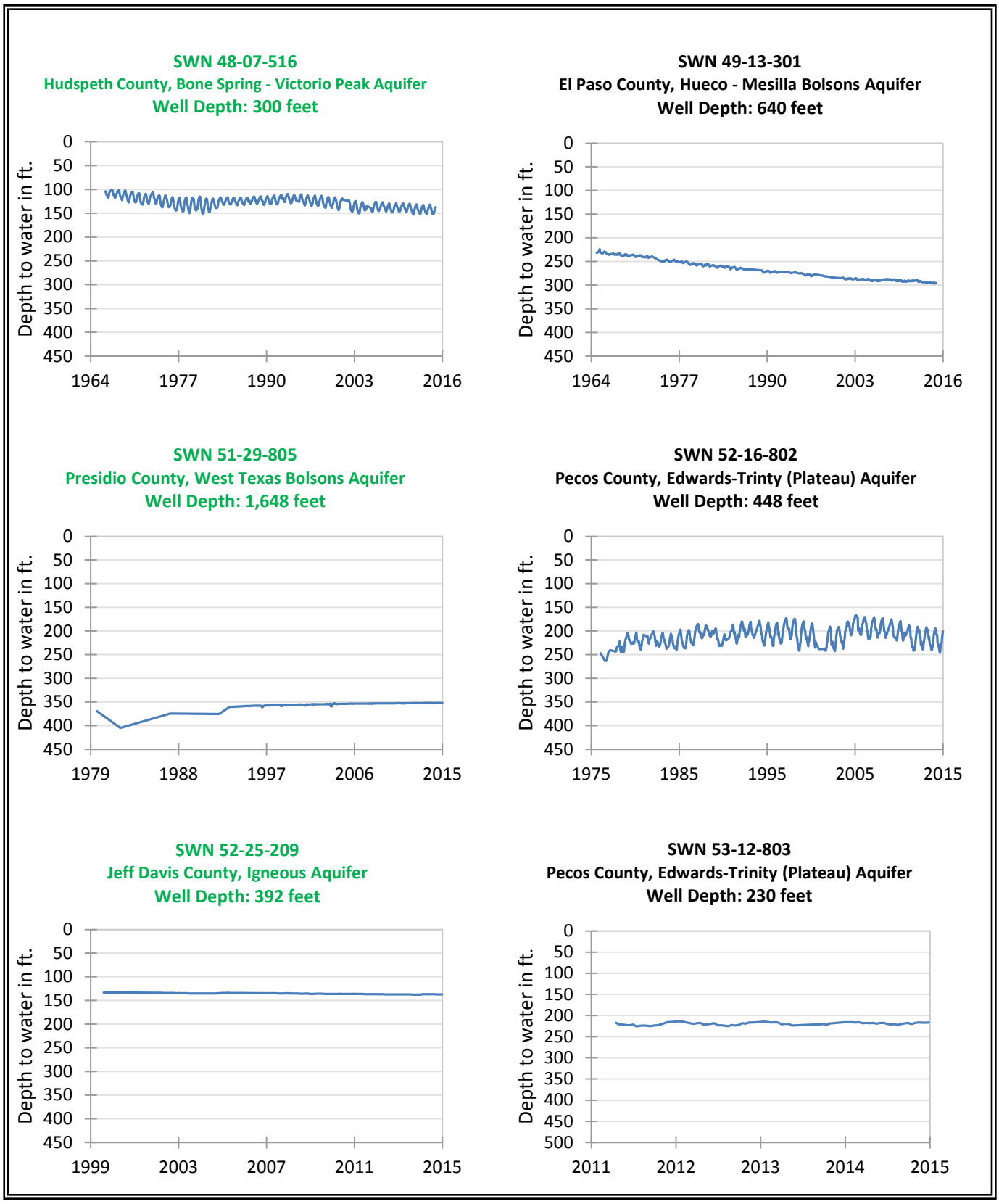


Figure 4-2 (continued) Hydrographs of TWDB recorder wells in West Texas. Minor aquifers indicated in green text. SWN = state well number

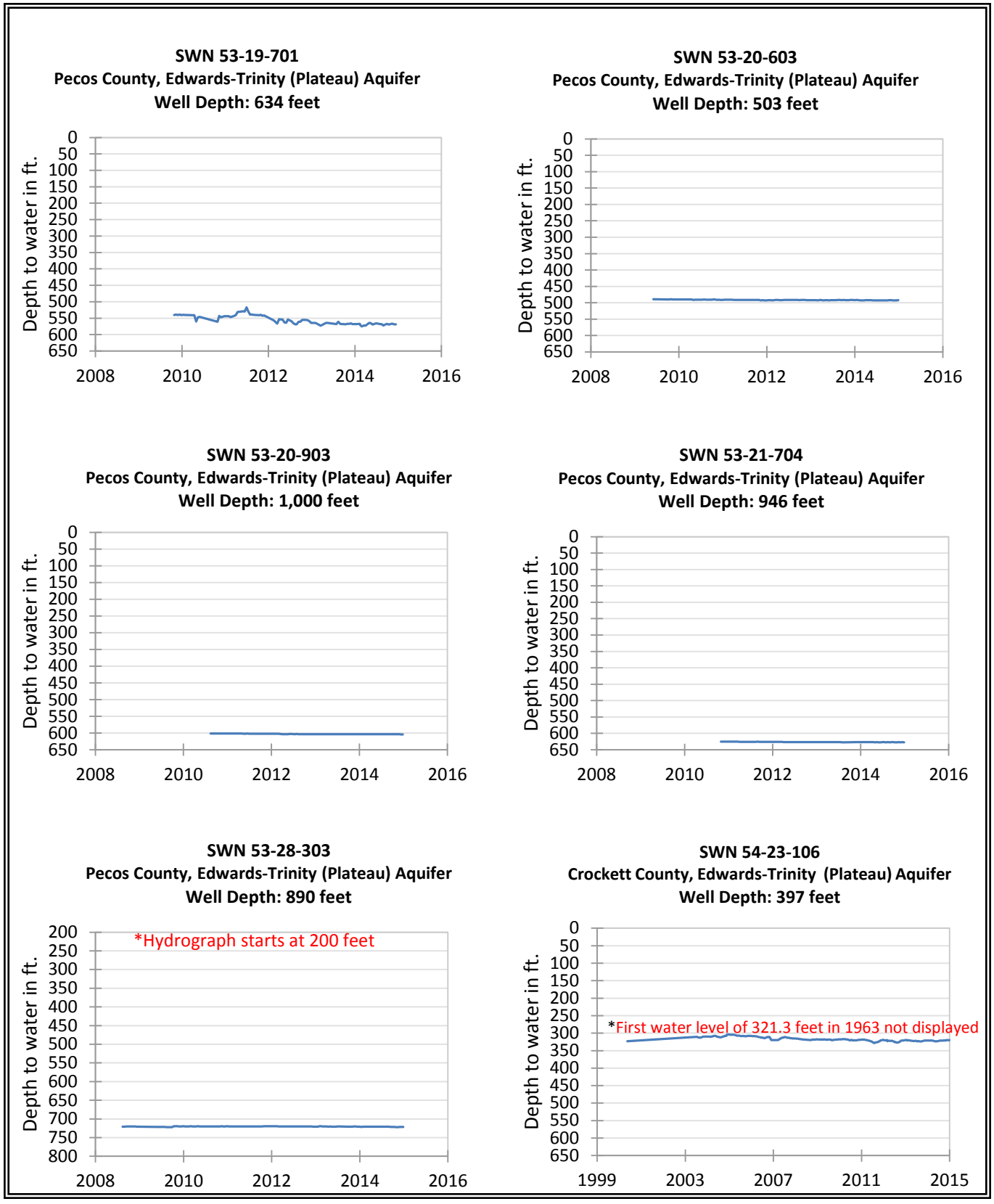


Figure 4-2 (continued) Hydrographs of TWDB recorder wells in West Texas. SWN = state well number

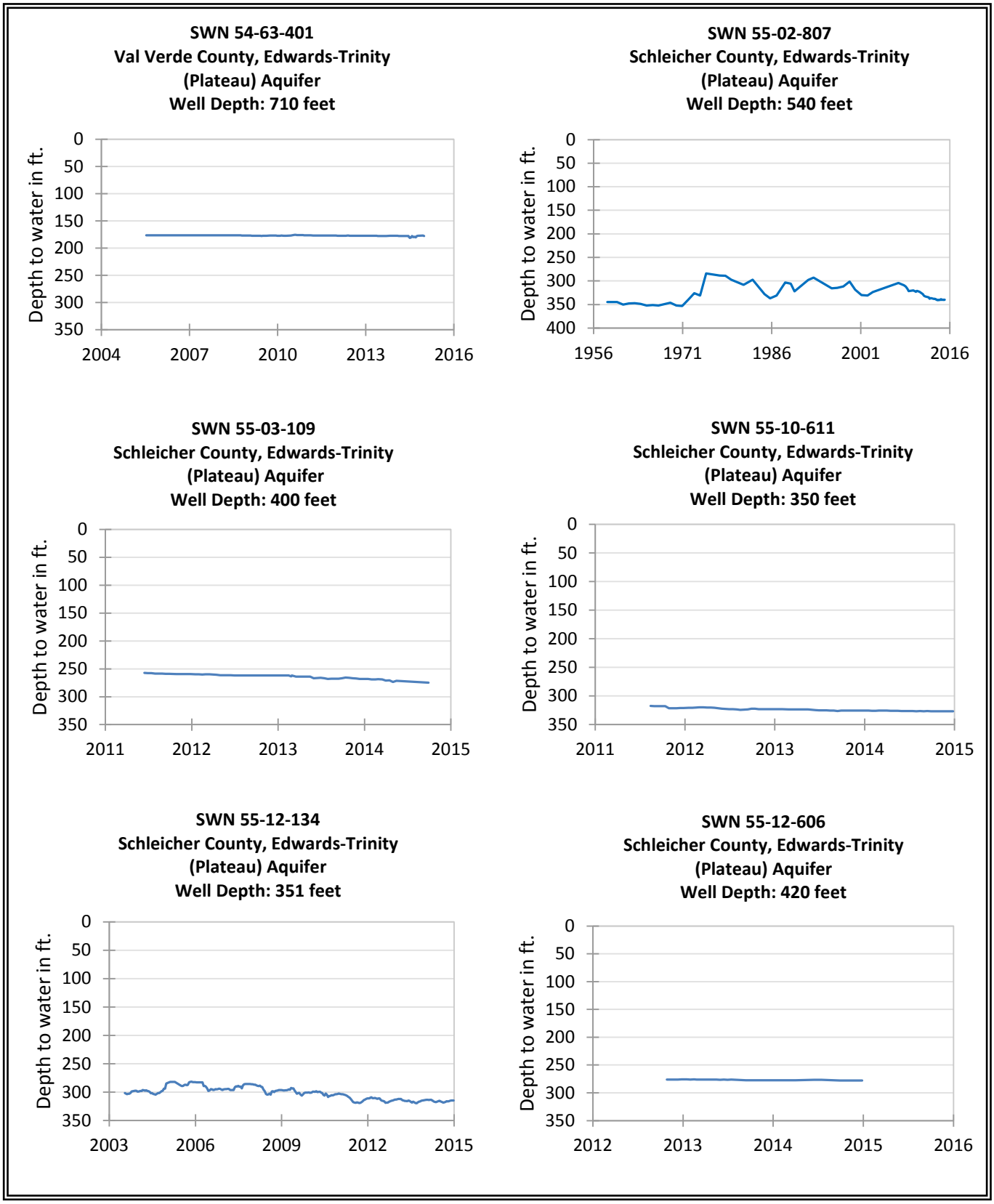


Figure 4-2 (continued) Hydrographs of TWDB recorder wells in West Texas. SWN = state well number

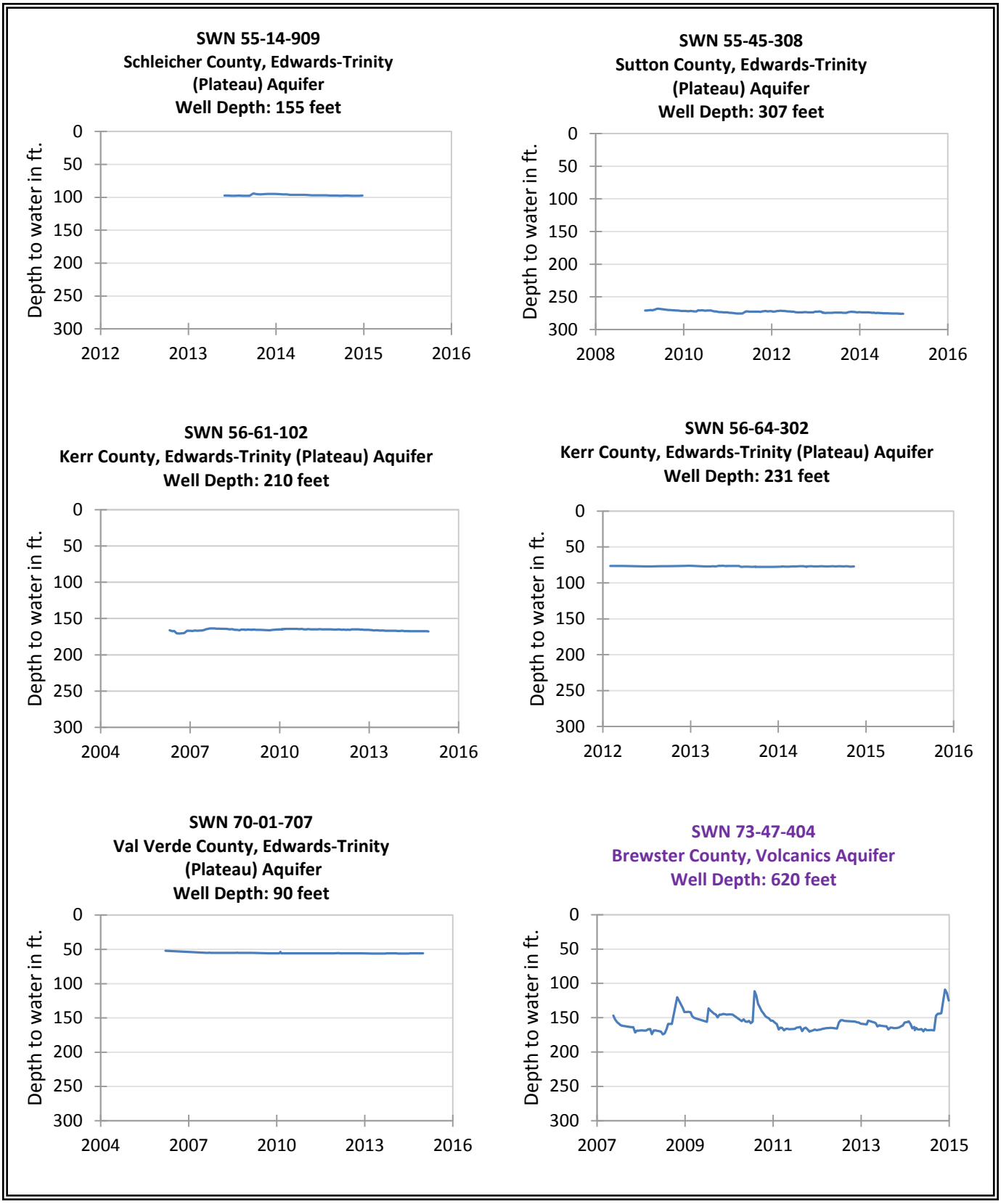


Figure 4-2 (continued) Hydrographs of TWDB recorder wells in West Texas. Undesignated or local aquifer indicated in purple text. SWN = state well number

5.0 Northern Central Texas

The TWDB monitors 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, 12 of which 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, three of which are in the confined zone; and one well is in the minor Woodbine Aquifer in Grayson County and is also in the confined zone. This year, well 5715901, completed in the confined portion of the Trinity Aquifer in Burnet County, was added to the network. 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 the TWDB 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 2013 and 2014, as in the two previous one-year periods, experienced slight to moderate changes compared to the wider fluctuations they experienced between 2010 and 2011. Between 2013 and 2014, water-level changes ranged from +9.7 feet in the Dallas County recorder in the southwest corner of the county to -11.0 feet in the McLennan County well, with median and average changes each a decline of 0.9 feet. Between 2012 and 2013, the median and average changes, respectively, were 0.0 and +6.0 feet, with eight wells experiencing decline in contrast to 12 wells experiencing decline between 2013 and 2014. Between 2011 and 2012, the median and average changes, respectively, were declines of 1.6 feet and 1.8 feet in the 15 available Trinity wells; and between 2010 and 2011, the median and average changes, respectively, were declines of 8.5 feet and 12.0 feet in the 13 available Trinity recorder wells.

The water level in the McLennan County recorder well again experienced the greatest water-level change of any Trinity recorder well. However, between 2013 and 2014, the change was a decline of 11.0 feet in contrast to a rise of 77.5 feet from 2012 to 2013. This well has experienced large (greater than 100 feet) annual water-level fluctuations and the largest measured historical water-level decline (664.7 feet) of all the Trinity recorder wells in this region. The average yearly historical change in the well's water level, a decline of 13.3 feet, is more than three times greater than the average yearly change, a decline of 4.5 feet, experienced by the water level in the Dallas 3319101 well, initially measured in 1954.

In the four Edwards (Balcones Fault Zone) Aquifer recorder wells, changes between 2013 and 2014 ranged from -0.7 to -25.5 feet with a median change of -1.4 feet and an average change of -9.7 feet. In comparison, median changes of +12.1 feet occurred in these wells from 2012 to 2013, -1.9 feet from 2011 to 2012, and -3.5 feet from 2010 to 2011. The water level in the Bell County 5804628 well continued to fluctuate the most, with this year's change a decline of 25.5 feet in contrast to a rise of 33.9 at the end of 2013. 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. This report does not include discussion of water-level changes in recorders in the Barton Springs and San Antonio segments of the aquifer, operated by other entities.

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 was again higher at the end of 2014, or 3.5 feet above the 2013 year-end measurement, following its rise of 37.2 feet from 2012 to 2013, a rise of 8.9 feet from 2011 to 2012, and a decline of 33 feet from 2010 to 2011.

Water levels in this well have had annual fluctuations of tens of feet per year. Currently, the total historical change is a rise of 1.2 feet since its first measurement in 1969.

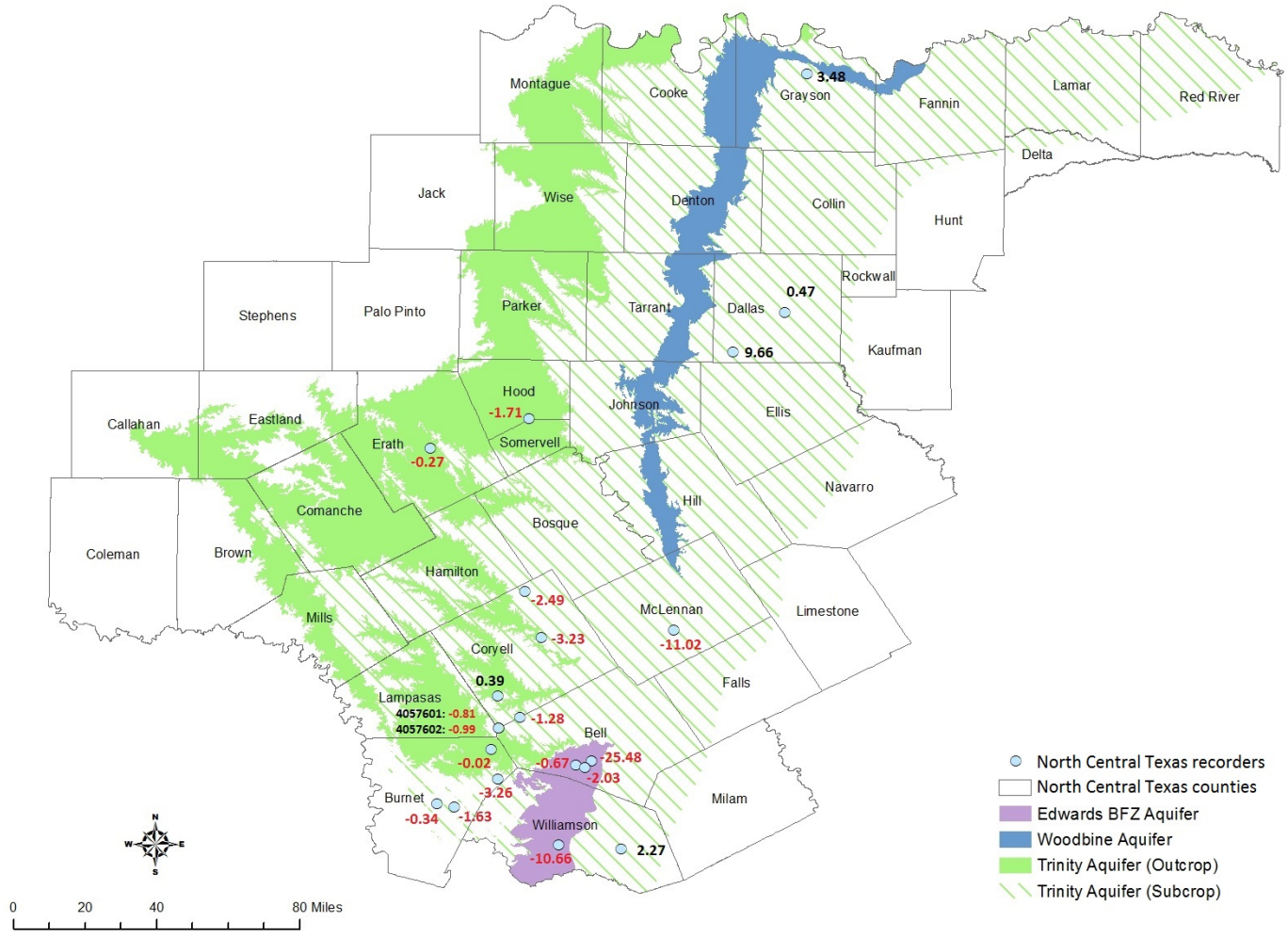


Figure 5-1. Location of wells with TWDB-operated automatic water-level recorders in northern Central Texas. Water-level changes from 2013 to 2014 are shown in feet. Black indicates a rise in water levels, and red indicates decline. BFZ = Balcones Fault Zone.

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 and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010–2014 Change (ft)	2005–2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
^Grayson 1819301	Woodbine	3.48	37.15	16.99	7.70	1.21 (1969)	0.03 (45)
Erath 3155504	Trinity	-0.27	-0.12	-8.54	-7.99	-6.85 (2000)	-0.46 (14)
Hood 3242604	Trinity	-1.71	-1.26	0.99	-12.24	-21.66 (1997)	-1.24 (17)
^Dallas 3319101	Trinity	0.47	0.43	N/A	-30.87	-268.66 (1954)	-4.44 (60)
^Dallas 3325202	Trinity	9.66	14.83	0.45	-39.52	-6.43 (2000)	-0.45 (14)
^Coryell 4026201	Trinity	-2.49	-1.72	-16.75	-34.30	-65.76 (1990)	-2.71 (24)
^Coryell 4035404	Trinity	-3.23	2.80	-27.2	-51.45	-212.88 (1955)	-3.58 (59)
^McLennan 4039204	Trinity	-11.02	77.52	2.24	-97.18	-664.64 (1964)	-13.29 (50)
Coryell 4049601	Trinity	0.39	2.06	-4.37	-13.68	-17.09 (1993)	-0.78 (21)
^Bell 4057601	Trinity	-0.81	0.93	-7.48	N/A	-7.31 (2009)	-1.46 (5)
^Bell 4057602	Trinity	-0.99	-1.10	-5.88	N/A	-8.13 (2009)	-1.55 (5)
^Bell 4058201	Trinity	-1.28	-0.40	N/A	N/A	-5.33 (2010)	-1.12 (4)
***^Burnet 5715901**	Trinity	-0.34	6.74	2.99	N/A	6.52 (2009)	1.19 (5)
^Burnet 5724101	Trinity	-1.63	1.53	-11.89	-21.37	-34.07 (1961)	-0.63 (53)
Burnet 5801202	Trinity	-0.02	-1.93	-15.31	N/A	-8.33 (2009)	-1.47 (5)
^Bell 5804628	Edwards (BFZ)	-25.49	33.87	-14.75	N/A	1.71 (2008)	0.29 (6)
Bell 5804702	Edwards (BFZ)	-0.67	-0.10	-3.65	-1.89	-3.09 (1980)	-0.09 (34)
^Bell 5804816	Edwards (BFZ)	-2.03	2.04	-7.53	N/A	-2.65 (2008)	-0.41 (6)
^Burnet 5809303	Trinity	-3.26	-0.49	-21.55	N/A	-14.22 (2009)	-2.59 (5)
^Williamson 5827305	Edwards (BFZ)	-10.66	26.27	-7.56	-20.62	3.97 (1980)	0.12 (34)
^Williamson 5829603	Trinity	2.27	-3.74	-27.14	-18.03	-244.51 (1946)	-3.57 (68)

* = recorder added for the 2013–2014 report, ^ = well in the confined portion of the aquifer, ft = feet, yr = earliest year measured, N/A = not available, yrs = years over which average determined, BFZ = Balcones Fault Zone

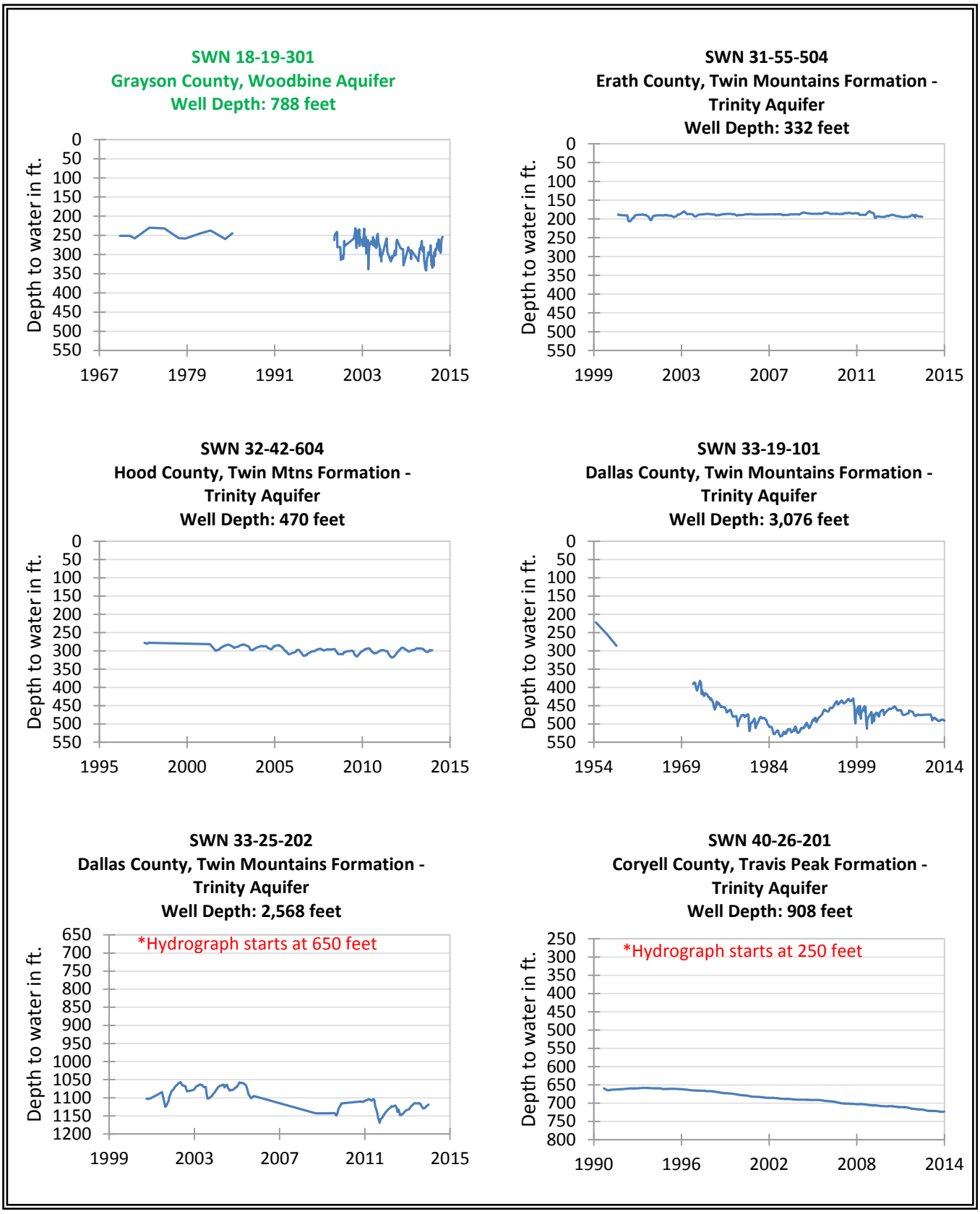


Figure 5-2 Hydrographs of TWDB recorder wells in northern Central Texas. Minor aquifer indicated in green text. SWN = state well number

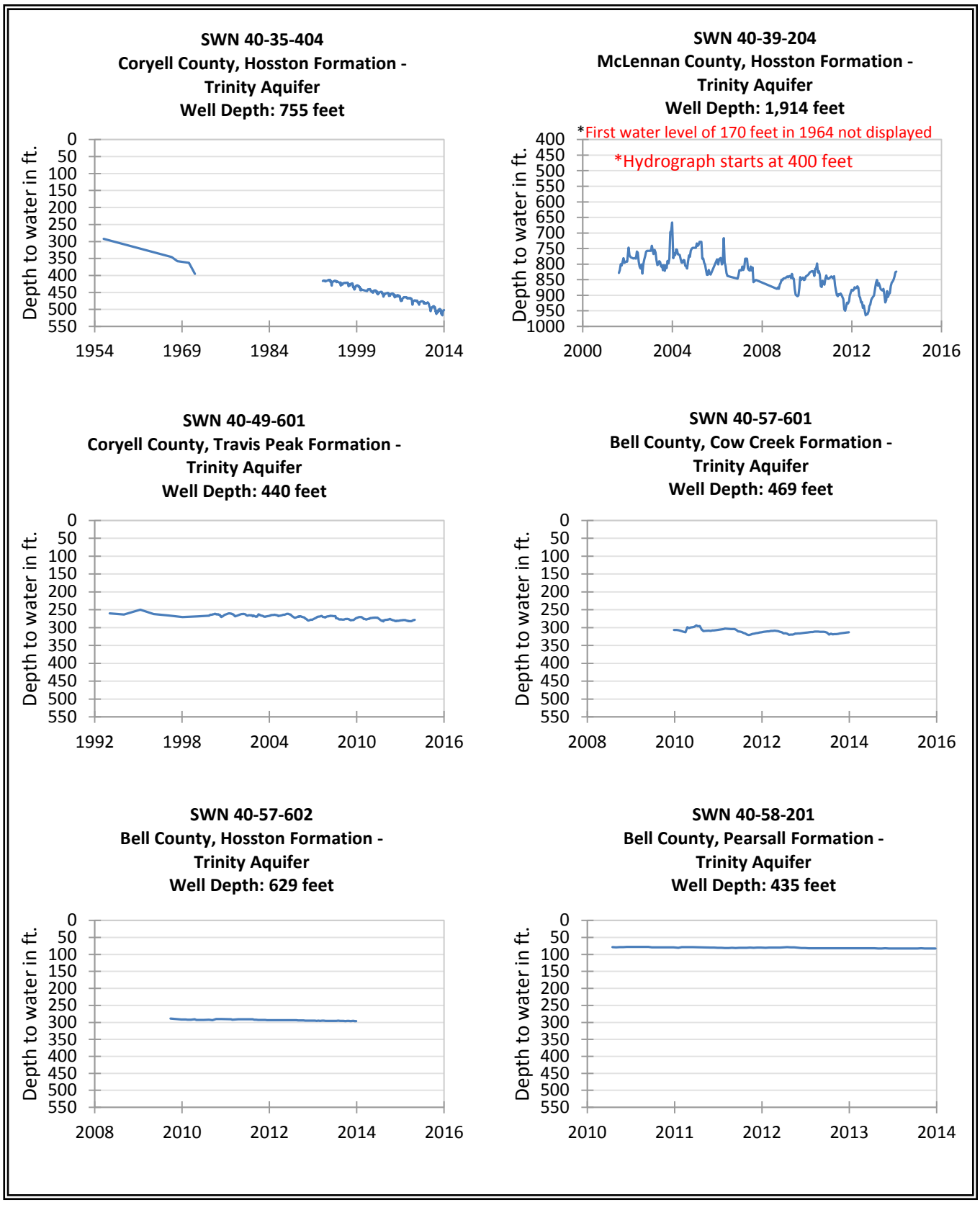


Figure 5-2 (continued) Hydrographs of TWDB recorder wells in northern Central Texas. SWN = state well number

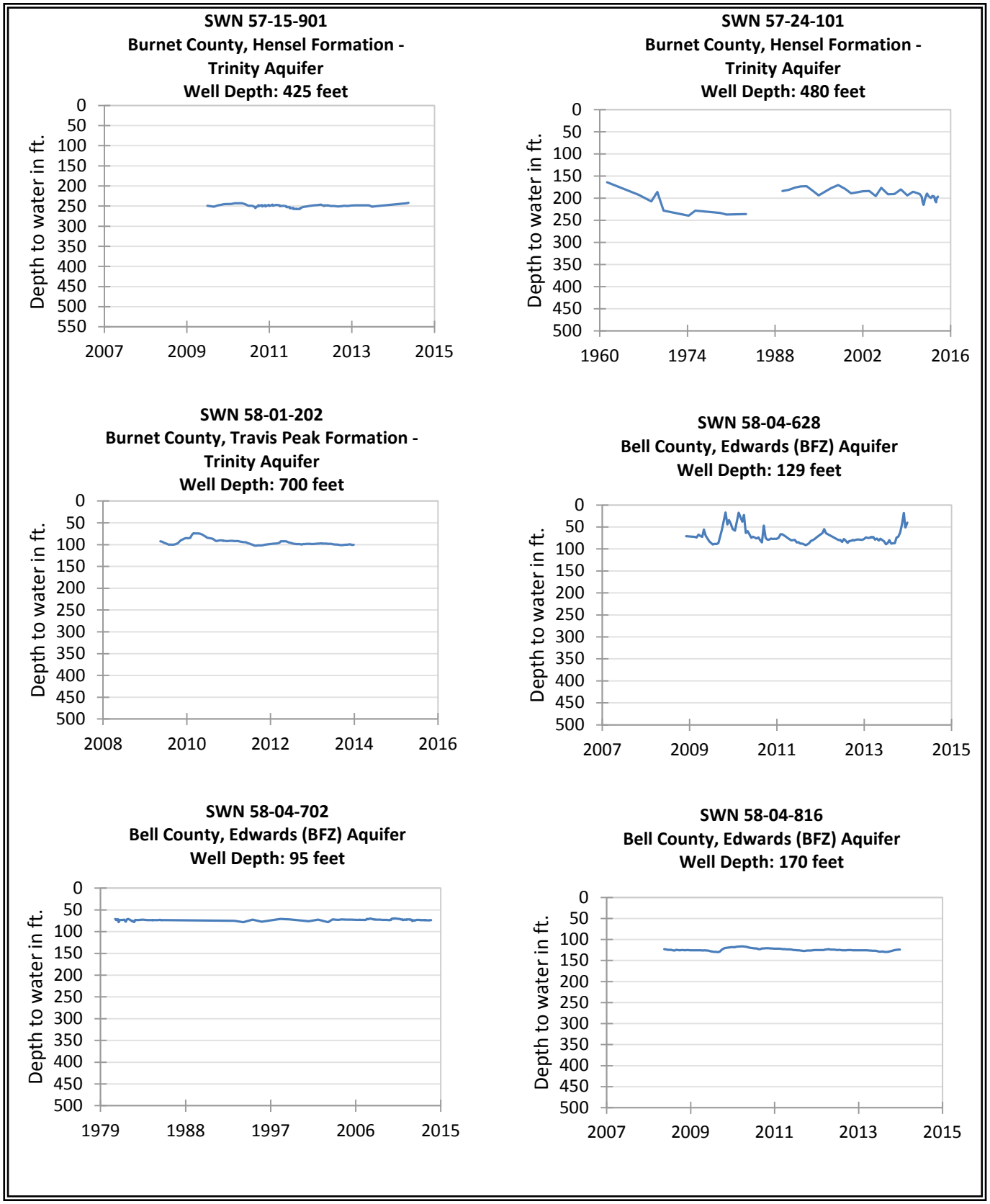


Figure 5-2 (continued) Hydrographs of TWDB recorder wells in northern Central Texas. SWN = state well number, BFZ = Balcones Fault Zone

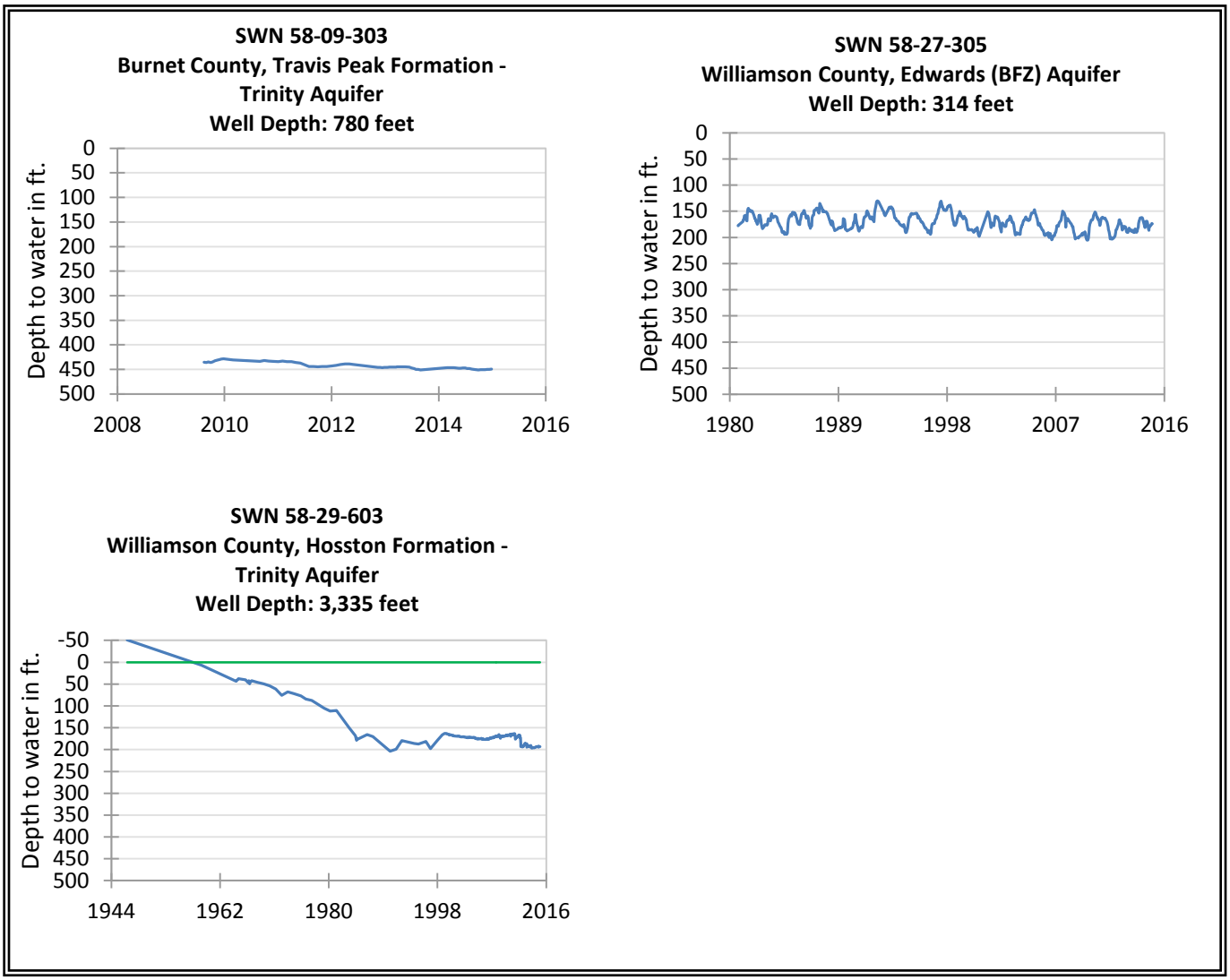


Figure 5-2 (continued) Hydrographs of TWDB recorder wells in northern Central Texas. SWN = state well number, BFZ = Balcones Fault Zone

6.0 South and East Texas

The TWDB monitors 25 wells in South and East Texas (Figure 6-1) that are completed in either the Gulf Coast or Carrizo-Wilcox major aquifers. Currently, the TWDB is operating 12 recorders in wells completed in the Carrizo-Wilcox Aquifer. Four Wilcox Aquifer wells—in Smith, Rusk, and Robertson counties—and five Carrizo Aquifer wells in the Southwest are in the confined zone of the aquifer. Two recorders in the Wilcox Aquifer in Smith and Milam counties have the longest historical records with initial measurements in 1977 and 1981, respectively.

Two Gulf Coast wells were added in 2014, one each in San Jacinto and Polk counties, bringing the total number of Gulf Coast recorders to 13. Some Gulf Coast Aquifer sites have long periods of record. Initial measurements were taken in 1947 in the Harris and Wharton county wells and in 1956 through 1964 in the Jasper, Karnes, Victoria, and Duval county wells.

6.1 Major aquifers

Water-level changes in the 12 Carrizo-Wilcox Aquifer recorder wells ranged from +25.9 feet in the Atascosa County well to -23.1 feet in the LaSalle County well from 2013 to 2014 (Table 6-1 and Figure 6-2), in comparison to the range of +19.1 feet in the Wilson County well to -26.3 in the LaSalle County well from 2012 to 2013. From 2013 to 2014 the median water-level change was +1.5 feet and the average change was -0.3 feet. Median and average changes from 2012 to 2013 were -0.2 and -2.7 feet, respectively, and -0.9 and -4.4 feet from 2011 to 2012.

The greatest water-level decline in recorder wells completed in the Carrizo-Wilcox Aquifer from 2013 to 2014, at 23.1 feet, and historically, at 257.5 feet since its initial measurement in 2003, again occurred in the LaSalle County well, completed in the confined zone of the aquifer. Although irrigation pumping during the drought increased substantially in the Wintergarden area of Southwest Texas concurrent with increased use of groundwater to support oil and gas activities, pumpage in this area has recently diminished. Of the 12 Carrizo-Wilcox wells throughout the entire aquifer, 7 have experienced a water-level rise from 2013 to 2014 compared to only 2 that experienced a rise from 2012 to 2013.

Between 2012 and 2013, water-level changes in the 11 Gulf Coast Aquifer recorder wells ranged from +44.8 in the Duval County well to-32.5 feet in the Karnes County well with a median change of +0.7 feet and an average change of +1.0 feet. From 2012 to 2013, water-level changes 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, or slight declines that followed slight median and average water-level rises of 0.5 and 0.9 feet, respectively, from 2011 to 2012.

The municipal groundwater pumping that occurs in the vicinity of the Duval County well contributing to its decline of 16.7 feet between 2012 and 2013 may have attenuated from 2013 to 2014 to account for the recovery of 44.8 feet. The hydrograph of this well shows high amplitude water-level fluctuations extending back at least 50 years. The Karnes County well, with a total historical decline of 152.2 feet as of the end of December 2014, is currently the Gulf Coast recorder well with the greatest water-level decline for the period of record.

The Harris County well experienced no water-level change from 2013 to 2014. Its 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.

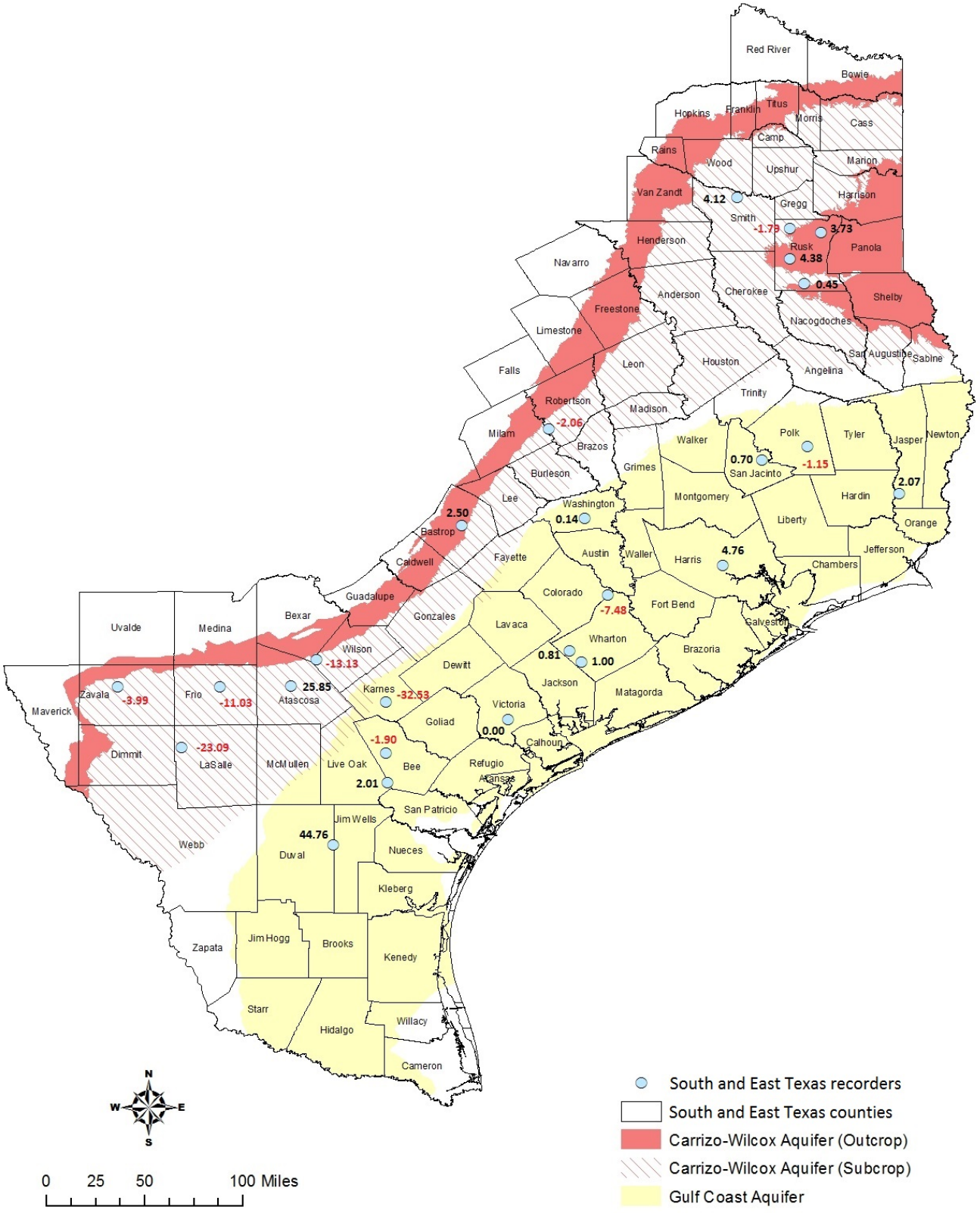


Figure 6-1. Location of wells with TWDB-operated automatic water-level recorders in South and East Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water levels, and red indicates decline.

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 and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010-2014 change (ft)	2005-2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
^Smith 3430907	Wilcox	4.12	-0.1	-3.75	-17.65	-69.65 (1977)	-2.49 (37)
^Rusk 3541604	Wilcox	-1.79	-1.28	N/A	N/A	-4.72 (2010)	-1.11 (4)
Rusk 3543906	Wilcox	3.73	0.07	N/A	N/A	1.34 (2011)	0.4 (3)
Rusk 3558405	Wilcox	4.38	-4.74	N/A	N/A	-7.03 (2012)	-2.81 (2)
^Rusk 3702905	Wilcox	0.45	-0.09	N/A	N/A	-1.18 (2011)	-0.32 (3)
Bastrop 5862208	Wilcox	2.5	-3.53	4.36	5.05	0.66 (2003)	0.06 (11)
^Milam 5911621	Wilcox	-2.06	-0.39	-5.93	-5.92	-5.89 (1981)	-0.17 (33)
Washington 5953915	Gulf Coast	0.14	1.41	-3.16	-3.31	-3.73 (2002)	-0.29 (12)
***San Jacinto 6032219**	Gulf Coast	0.7	N/A	N/A	N/A	-0.06 (2013)	-0.03 (1)
***Polk 6119417**	Gulf Coast	-1.15	N/A	N/A	N/A	-0.53 (2013)	-0.4 (1)
Jasper 6148209	Gulf Coast	2.07	-7.64	-3.89	N/A	-122.94 (1956)	-2.09 (58)
Harris 6514409	Gulf Coast	4.76	4.56	13.51	17.58	-55.74 (1947)	-0.83 (67)
Wharton 6631107	Gulf Coast	-7.48	-0.87	N/A	N/A	-14.14 (2010)	-3.33 (4)
Wharton 6653406	Gulf Coast	0.81	-1.22	-4.35	N/A	-31.06 (1947)	-0.46 (67)
Wharton 6661302	Gulf Coast	1	-1.5	-1.36	N/A	16.79 (2005)	1.77 (9)
^Wilson 6862104	Carrizo	-13.13	19.14	-29.82	-24.59	-20.93 (1994)	-1 (20)
^Zavala 7702509	Carrizo	-3.99	-0.79	-28.32	N/A	-32.52 (2002)	-2.64 (12)
^Frio 7708511	Carrizo	-11.03	-6.73	N/A	N/A	-27.41 (2011)	-7.83 (3)
^LaSalle 7738103	Carrizo	-23.09	-26.25	-203.42	N/A	-257.51 (2003)	-23.41 (11)
^Atascosa 7804508	Carrizo	25.85	-8.15	-5.93	N/A	0.77 (2008)	0.12 (6)
Karnes 7910406	Gulf Coast	-32.53	4.3	N/A	N/A	-152.24 (1956)	-2.58 (58)
Bee 7934409	Gulf Coast	-1.9	-0.02	N/A	N/A	-4.83 (2011)	-1.38 (3)
Live Oak 7950106	Gulf Coast	2.01	2.13	N/A	N/A	20.62 (2011)	5.89 (3)
Victoria 8017502	Gulf Coast	0	-1.25	-4.53	-4.16	-3.94 (1958)	-0.07 (56)
Duval 8415702	Gulf Coast	44.76	-16.7	N/A	58.87	-4.92 (1964)	-0.1 (50)

^ = well in the confined portion of the aquifer, * = recorder added for the 2013–2014 report, ft = feet, yr = earliest year measured, yrs = years over which average determined, N/A = not available

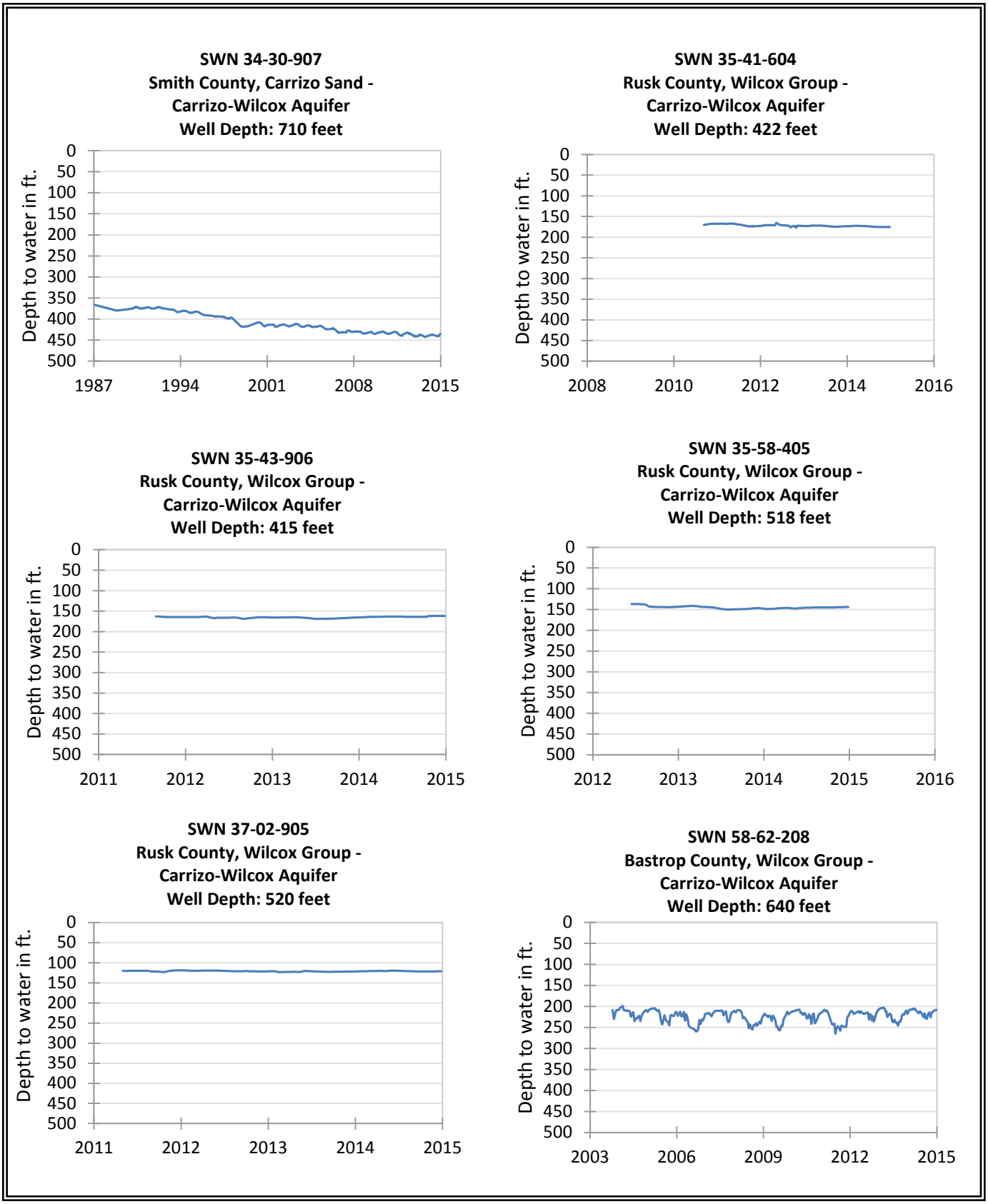


Figure 6-2. Hydrographs of TWDB recorder wells in South and East Texas. SWN=state well number

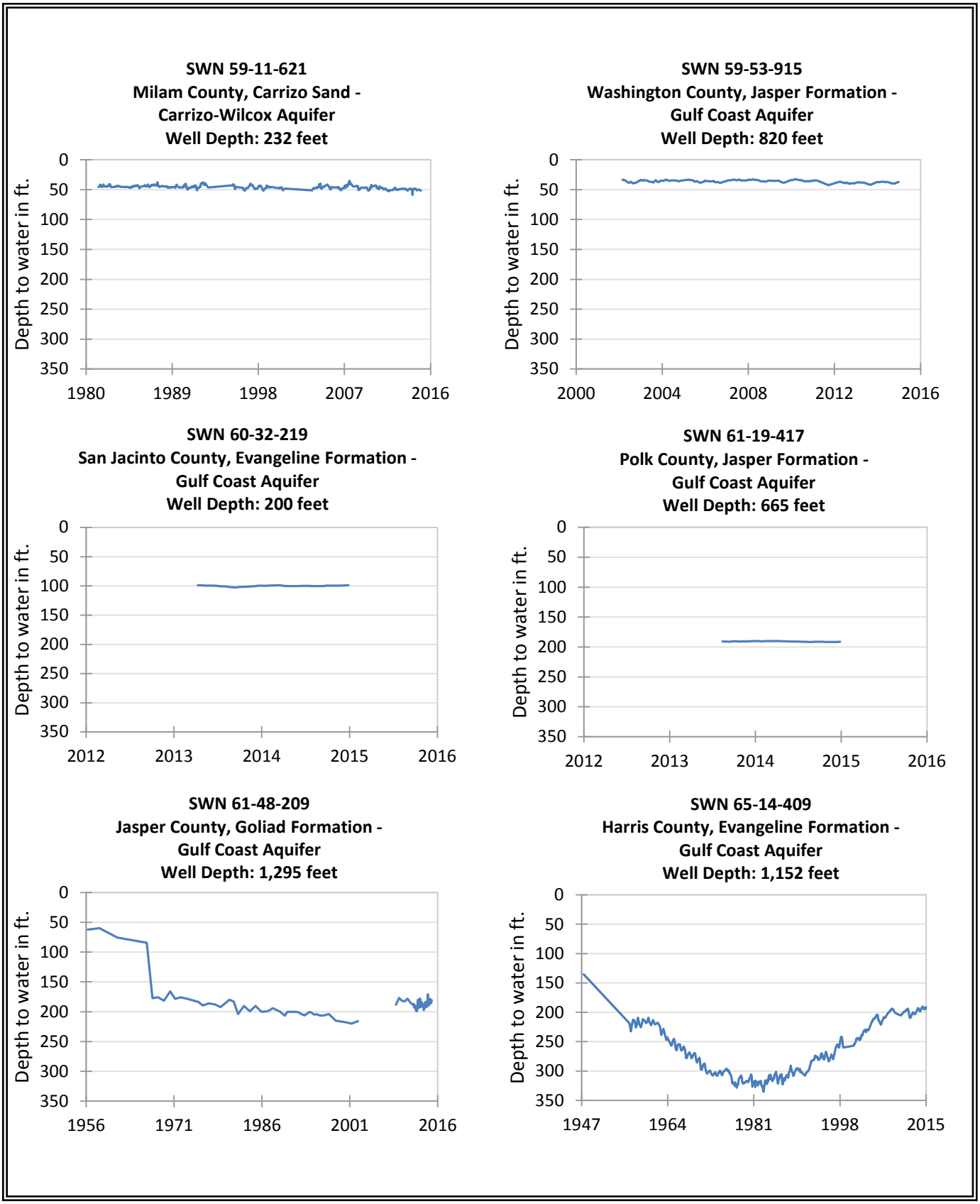


Figure 6-2 (continued) Hydrographs of TWDB recorder wells in South and East Texas. SWN=state well number

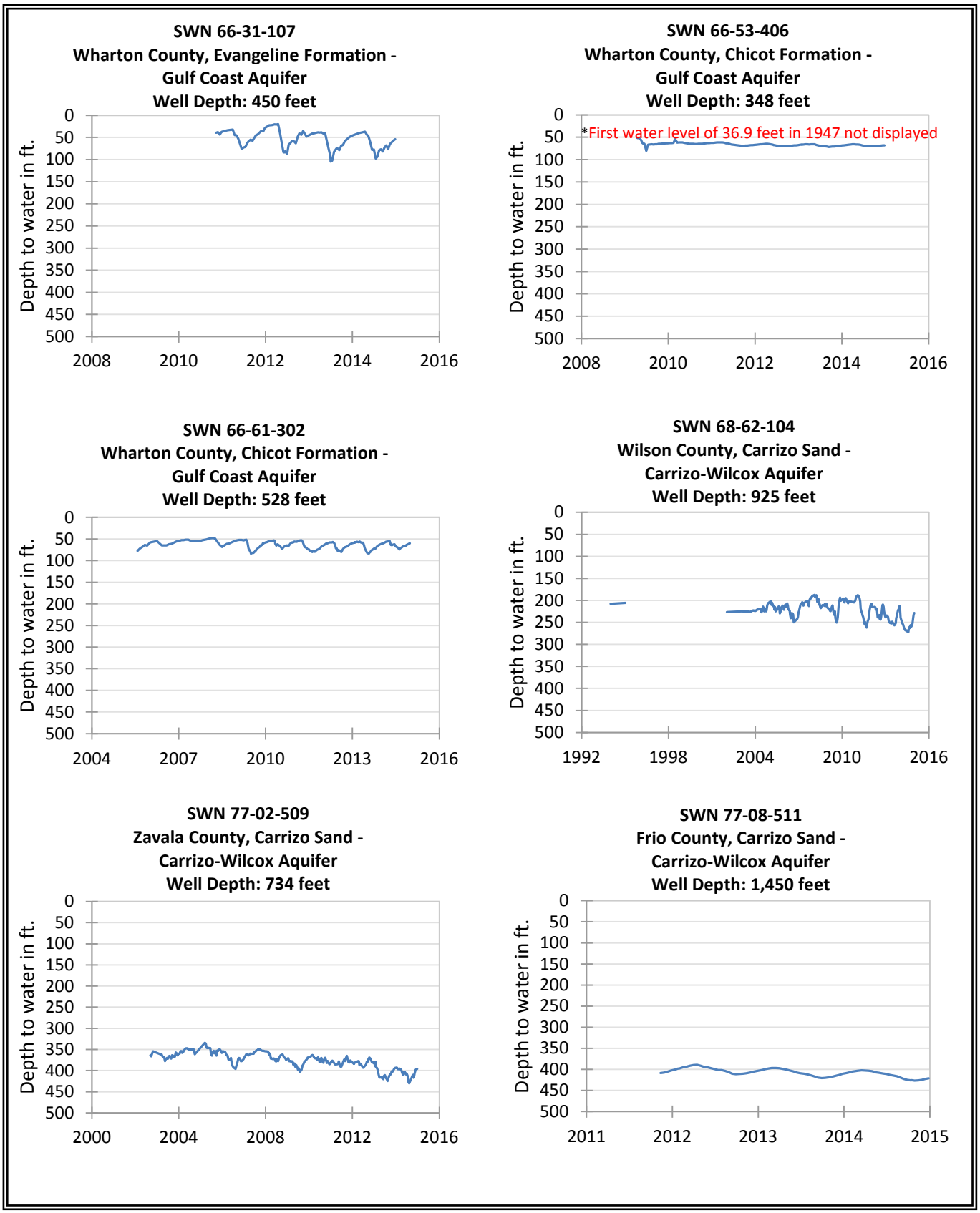


Figure 6-2 (continued) Hydrographs of TWDB recorder wells in South and East Texas. SWN=state well number

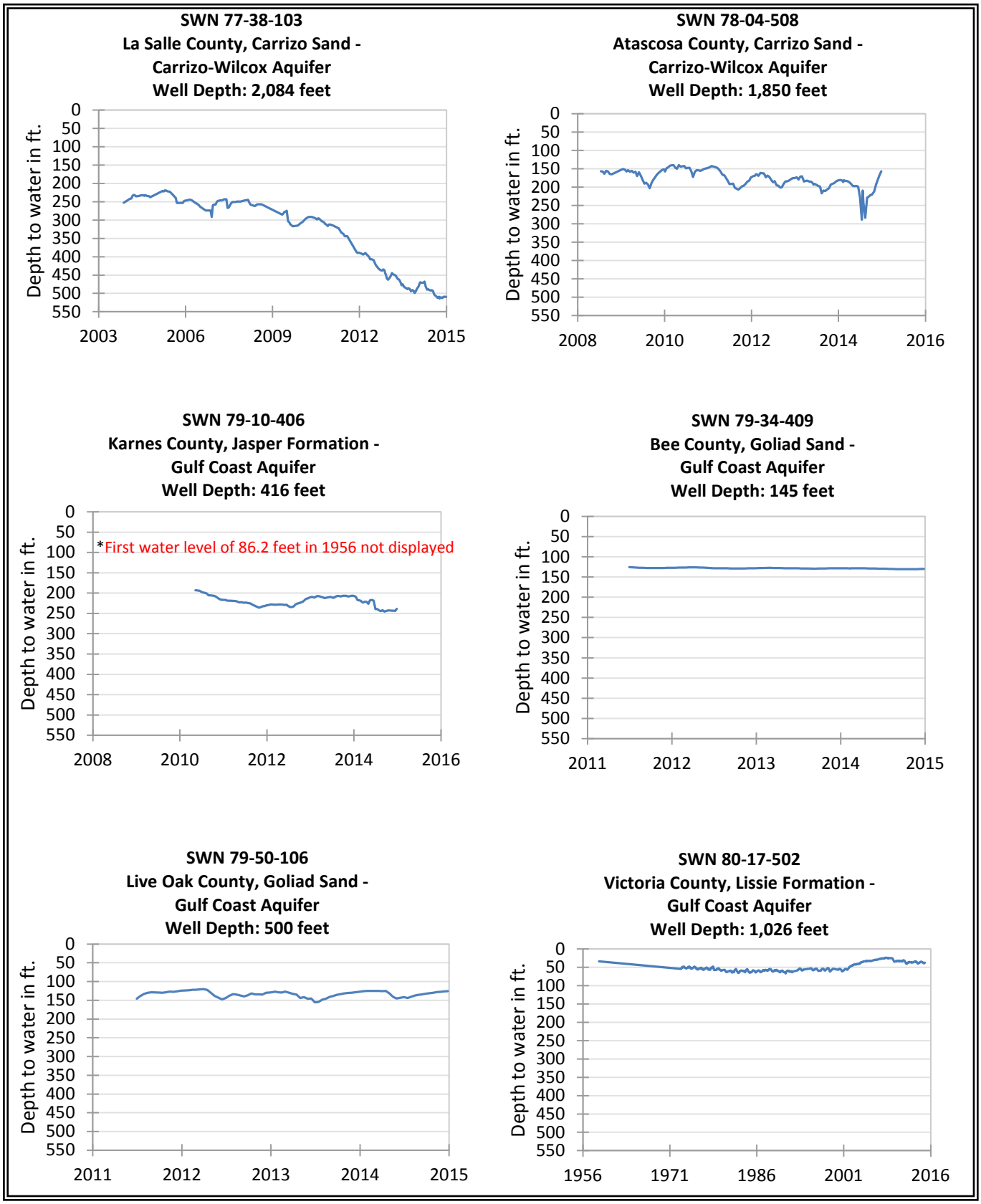


Figure 6-2 (continued) Hydrographs of TWDB recorder wells in South and East Texas. SWN=state well number

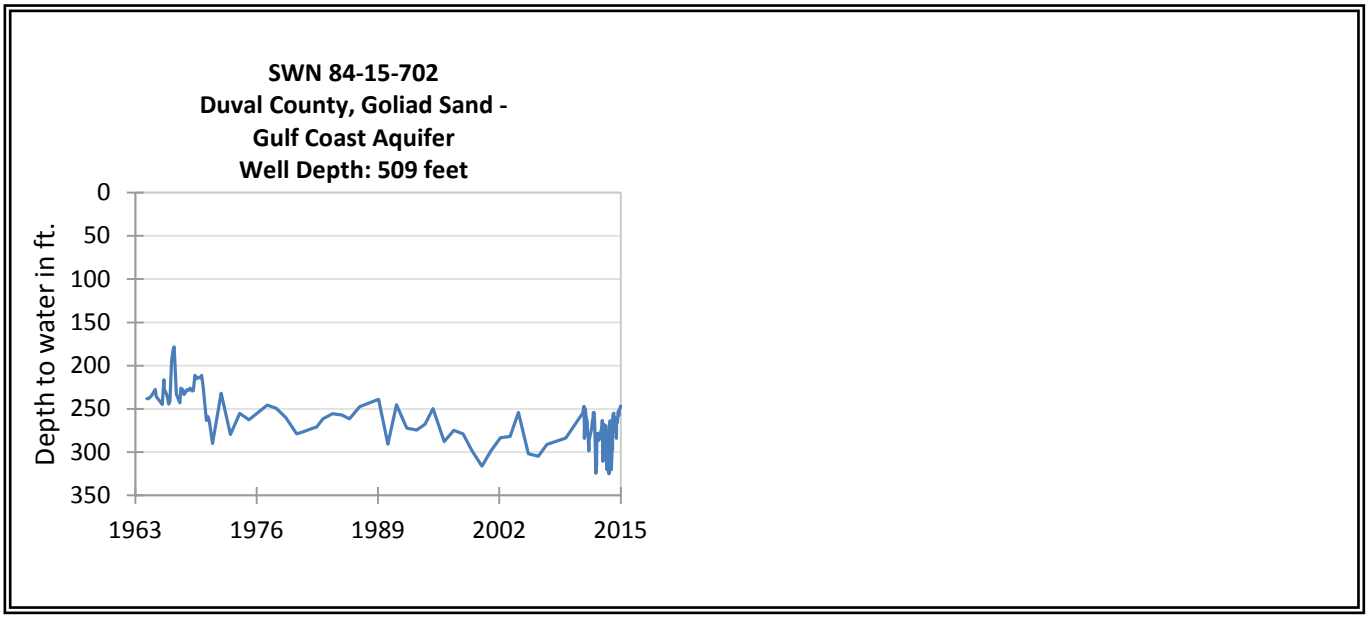


Figure 6-2 (continued) Hydrographs of TWDB recorder wells in South and East Texas. SWN=state well number

7.0 Central Texas (including the Hill Country)

The total number of recorders in 2014 in this area remains at 49 sites (Figure 7-1). However, one Ellenburger-San Saba Aquifer well in Burnet County (5723406) was dropped while another Hickory Aquifer well in Burnet County (5714604) was added for a total of four recorders in the Ellenburger-San Saba Aquifer, four in the Hickory Aquifer, and 41 in the Trinity Aquifer. 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. Overall, the Headwaters Groundwater Conservation District in Kerr County has facilitated the installation of 18 recorders in the Trinity Aquifer with most installed since 2005.

7.1 Major aquifers

Water levels from 2013 to 2014 in the 41 Trinity Aquifer recorder wells experienced a median change of -2.4 feet and an average change of -4.9 feet, compared to the previous year's median change of +0.7 feet and average change of +0.3 feet (Table 7-1 and Figure 7-2). The water-level changes ranged from +4.8 feet in the 5764705 Hays County well, completed in the unconfined zone of the aquifer, to -60.3 feet in the 6819806 Bexar County well, also completed in the unconfined zone. Of the Trinity wells, 20 percent (8) experienced water-level rises from 2013 to 2014 compared to 50 percent (21) from 2012 to 2013. 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. While water levels recover during periods of reduced pumpage, 38 of the 41 Trinity Aquifer recorders experienced historical water-level declines for their periods of record. As of December 31, 2014, the 6819806 Bexar County well had experienced the greatest change: a decline of 163.2 feet since its initial measurement in 1990. The 6811417 Kendall County well, first measured in 2005, had experienced the greatest overall rise of 30.0 feet.

7.2 Minor aquifers

Water levels from 2013 to 2014 in the four Ellenburger-San Saba Aquifer recorder wells, all in the confined zone of the aquifer, experienced changes ranging from +2.2 to -0.9 feet with a median change of -0.1 feet and an average change of +0.3 feet. Water-level changes from 2012 to 2013 in the five available Ellenburger-San Saba wells ranged from +22.6 to -1.2 feet with a median change of +0.9 feet and an average change of +5.6 feet.

The four recorder wells in the Hickory Aquifer experienced water-level changes ranging from -9.9 feet in the 5714604 Burnet County well to -1.1 feet in the 5606614 McCulloch County well with a median change of -1.4 feet and an average change of -3.4 feet. The median water-level change from 2012 to 2013 in the three available Hickory Aquifer wells was barely a decline of 0.02 feet.

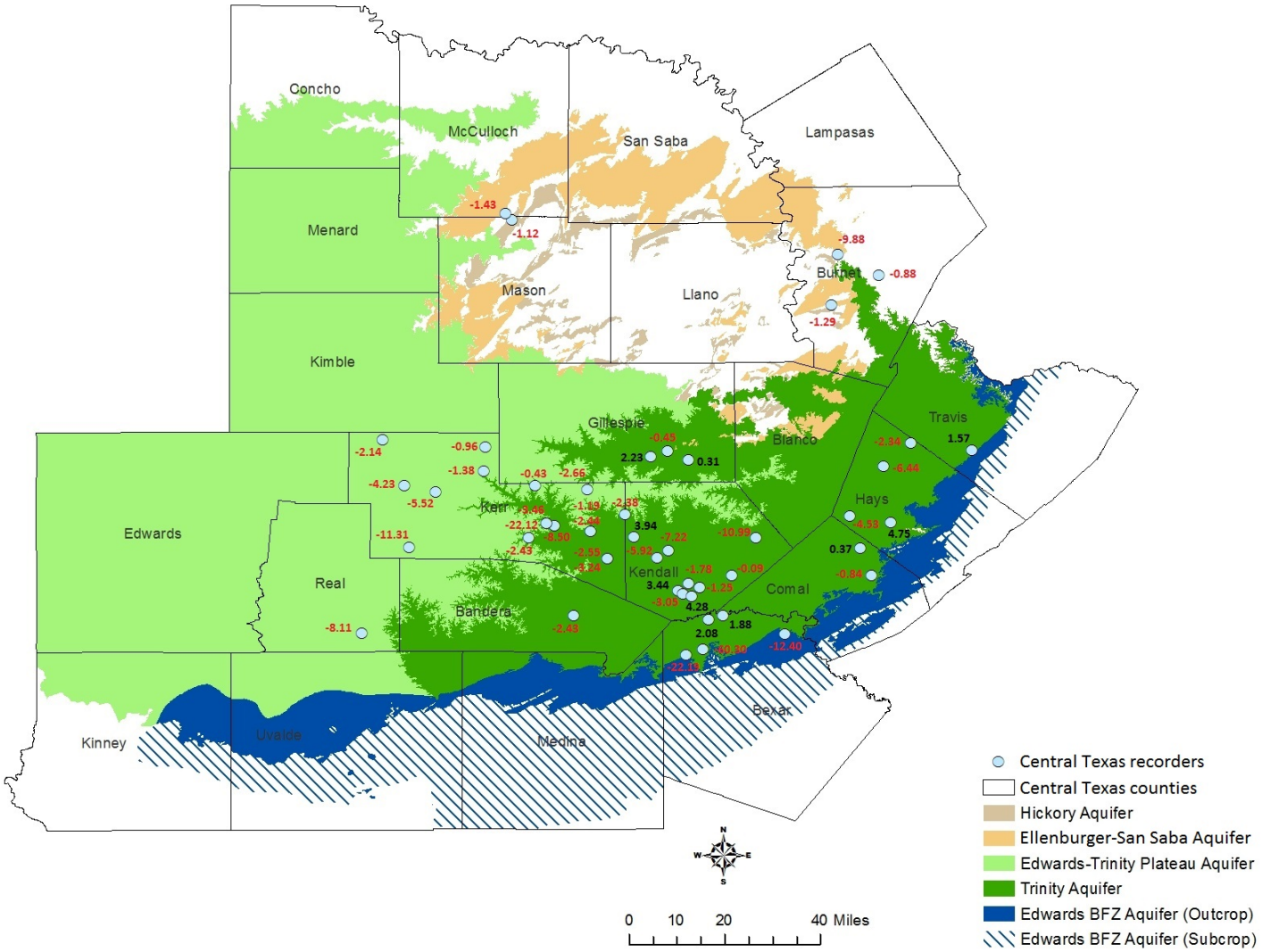


Figure 7-1. Location of wells with TWDB-operated automatic water-level recorders in Central Texas. Water-level changes from 2012 to 2013 are shown in feet. Black indicates a rise in water level and red indicates decline. BFZ = Balcones Fault Zone.

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 and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010-2014 change (ft)	2005-2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
Mason 5606613	Hickory	-1.43	-0.02	-2.61	-1.81	-5.32 (1974)	-0.13 (40)
^McCulloch 5606614	Hickory	-1.12	-2.08	-3.07	1.13	-21.39 (1974)	-0.53 (40)
^Kerr 5643901	Trinity	-2.14	-1.83	-9.3	N/A	-13.48 (2007)	-1.93 (7)
^Kerr 5652704	Trinity	-4.23	-2.97	-18.84	N/A	-26.84 (2008)	-4.29 (6)
^Kerr 5654106	Trinity	-0.96	-0.44	N/A	N/A	-3.39 (2010)	-0.7 (4)
^Kerr 5654405	Trinity	-1.38	-0.7	-7.88	-15.93	-15.39 (2004)	-1.43 (10)
^Kerr 5655805	Trinity	-0.43	-0.26	-0.8	N/A	-1.63 (2005)	-0.18 (9)
^Kerr 5661101	Trinity	-5.52	-1.52	-19.4	N/A	-27.64 (2005)	-3.04 (9)
^Kerr 5663922	Trinity	-8.5	7.9	-26.18	N/A	-87.92 (1998)	-5.25 (16)
^Kerr 5663923	Trinity	-3.46	4.94	-73.08	N/A	-82.78 (2007)	-11.83 (7)
^Kerr 5663924	Trinity	-22.12	20.34	-19.21	N/A	-104.11 (2007)	-14.87 (7)
***^Kerr 5664301**	Trinity	-2.66	N/A	N/A	N/A	-2.07 (2012)	-0.71 (2)
^Burnet 5714604	Hickory	-9.88	N/A	N/A	N/A	-5.21 (2013)	-3.72 (1)
^Burnet 5715902	Ellenburger-San Saba	-0.88	0.16	-2.54	N/A	-0.90 (2010)	-0.17 (4)
Burnet 5722505	Hickory	-1.29	1.39	N/A	N/A	-6.16 (2010)	-1.47 (4)
^Hays 5748811	Trinity	-2.34	4.39	N/A	N/A	6.68 (2011)	2.09 (3)
^Gillespie 5750108	Ellenburger-San Saba	2.23	0.92	-8.91	-24.8	-19.44 (1987)	-0.71 (27)
^Gillespie 5750324	Ellenburger-San Saba	-0.45	5.33	-14.82	-10.62	-20.91 (1995)	-1.08 (19)
^Gillespie 5751407	Ellenburger-San Saba	0.31	-1.17	-6.14	N/A	-14.94 (2008)	-2.13 (6)
Hays 5755607	Trinity	-6.44	5.63	-13.54	N/A	-20.71 (2006)	-2.37 (8)
^Kerr 5757805	Trinity	-2.38	-1	-9.36	-49.38	-35.36 (2003)	-3.07 (11)
^Hays 5763705	Trinity	-4.53	1.97	-13.58	-22.88	-11.71 (2002)	-0.92 (12)
Hays 5764705	Trinity	4.75	2.46	1.32	N/A	-10.18 (1997)	-0.63 (17)
^Travis 5850120	Trinity	1.57	-6.55	-24.22	-76.98	-92.52 (1987)	-3.4 (27)
Kendall 6801314	Trinity	3.94	-0.74	-21.07	-71.02	-63.05 (1984)	-2.03 (30)
^Kerr 6801703	Trinity	-2.55	2.03	-16.39	-56.1	-47.60 (2001)	-3.61 (13)
^Kerr 6801704	Trinity	-3.24	-1.36	-24.83	-58.21	-57.52 (2001)	-4.37 (13)
Kendall 6802609	Trinity	-7.22	-0.15	-19.68	-80.57	-80.61 (1975)	-2.04 (39)
^Kendall 6802807	Trinity	-5.92	2.68	-11.43	-46.21	-80.64 (1978)	-2.19 (36)
Kendall 6804312	Trinity	-10.99	3.1	-13.67	N/A	-27.32 (1999)	-1.71 (15)
Comal 6807407	Trinity	0.37	16.1	-43.37	-41.48	-21.31 (1997)	-1.18 (17)
Kendall 6810616	Trinity	3.44	11.06	47.96	N/A	-108.04 (1985)	-3.66 (29)
Kendall 6811417	Trinity	-3.05	4.47	0.34	N/A	-32.15 (1999)	-1.4 (15)
Kendall 6811418	Trinity	-1.78	9.42	0.93	N/A	29.97 (2005)	3.15 (9)
Kendall 6811509	Trinity	-1.25	1.32	-5.01	N/A	-2.48 (2005)	-0.26 (9)

County and state well number	Aquifer	2014 change (ft)	2013 change (ft)	2010-2014 change (ft)	2005-2014 change (ft)	Historical change (ft, yr)	Historical yearly average (ft, yrs)
Kendall 6811708	Trinity	4.28	-4.87	-16.03	-8.99	-24.74 (1962)	-0.47 (52)
Kendall 6812106	Trinity	-0.09	0.75	-7.21	N/A	-1.96 (2005)	-0.21 (9)
Comal 6815211	Trinity	-0.84	1.54	N/A	N/A	-3.16 (2010)	-0.7 (4)
Bexar 6819208	Trinity	2.08	2.21	4.18	-1.62	-57.81 (1977)	-1.56 (37)
Bexar 6819806	Trinity	-60.3	-43.33	-130.97	-243.77	-163.18 (1990)	-6.73 (24)
Bexar 6820110	Trinity	1.88	3.78	-16.96	-118.2	-24.60 (1987)	-0.9 (27)
Bexar 6821519	Trinity	-12.4	-3.3	N/A	N/A	-69.70 (2011)	-17.78 (3)
Bexar 6827112	Trinity	-22.19	-24.05	N/A	N/A	-64.49 (2009)	-11.73 (5)
^Kerr 6904503	Trinity	-11.31	-0.9	-27.44	N/A	-35.31 (2007)	-4.97 (7)
^Kerr 6907107	Trinity	-2.43	-0.51	-15.51	-67.79	-57.22 (2003)	-4.83 (11)
^Kerr 6908304	Trinity	-1.19	-1.34	-23.14	N/A	-51.94 (2006)	-6.33 (8)
^Kerr 6908305	Trinity	-2.44	-0.08	-20.07	N/A	-47.47 (2006)	-5.79 (8)
^Real 6919401	Trinity	-8.11	-4.14	-43.29	-70.13	-84.83 (1974)	-2.09 (40)
^Bandera 6924225	Trinity	-2.43	5.16	-5.89	N/A	10.73 (2008)	1.65 (6)

* = recorder added for the 2013–2014 report, ^ = well in the confined portion of the aquifer (none in this region), ft = feet, yr = earliest year measured, yrs = years over which average determined, N/A = not available

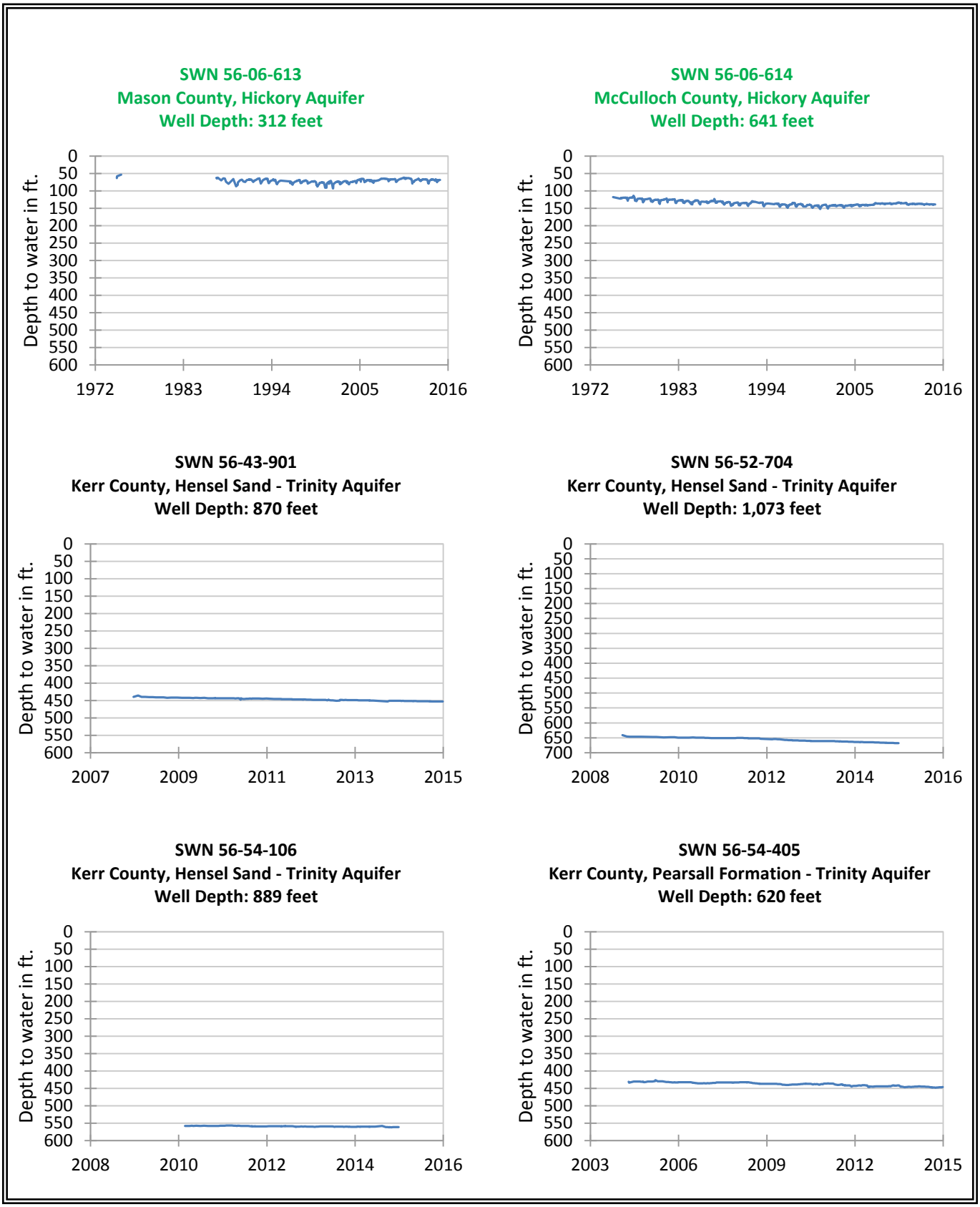


Figure 7-2. Hydrographs of TWDB recorder wells in Central Texas. Minor aquifers indicated in green text. SWN=state well number

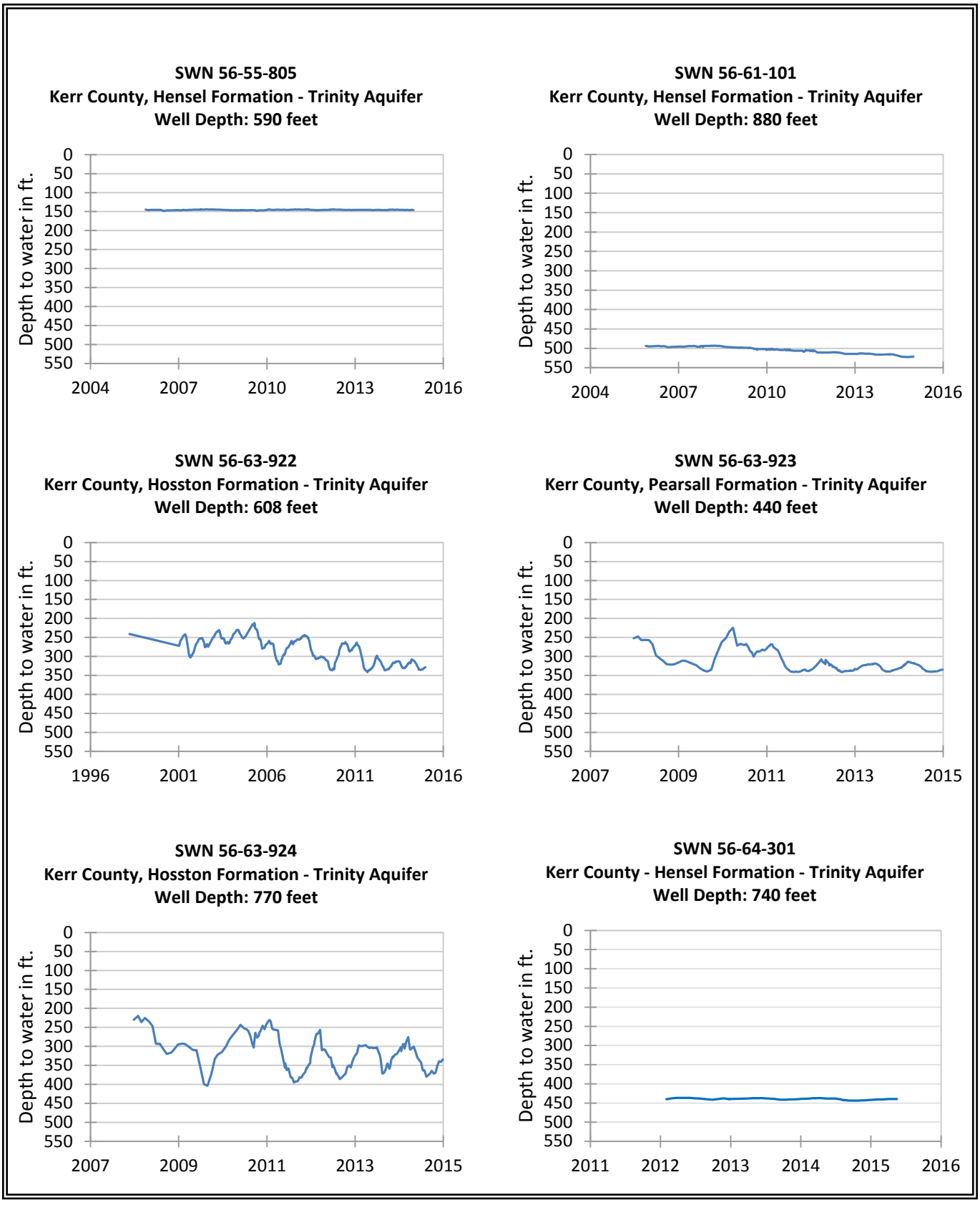


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

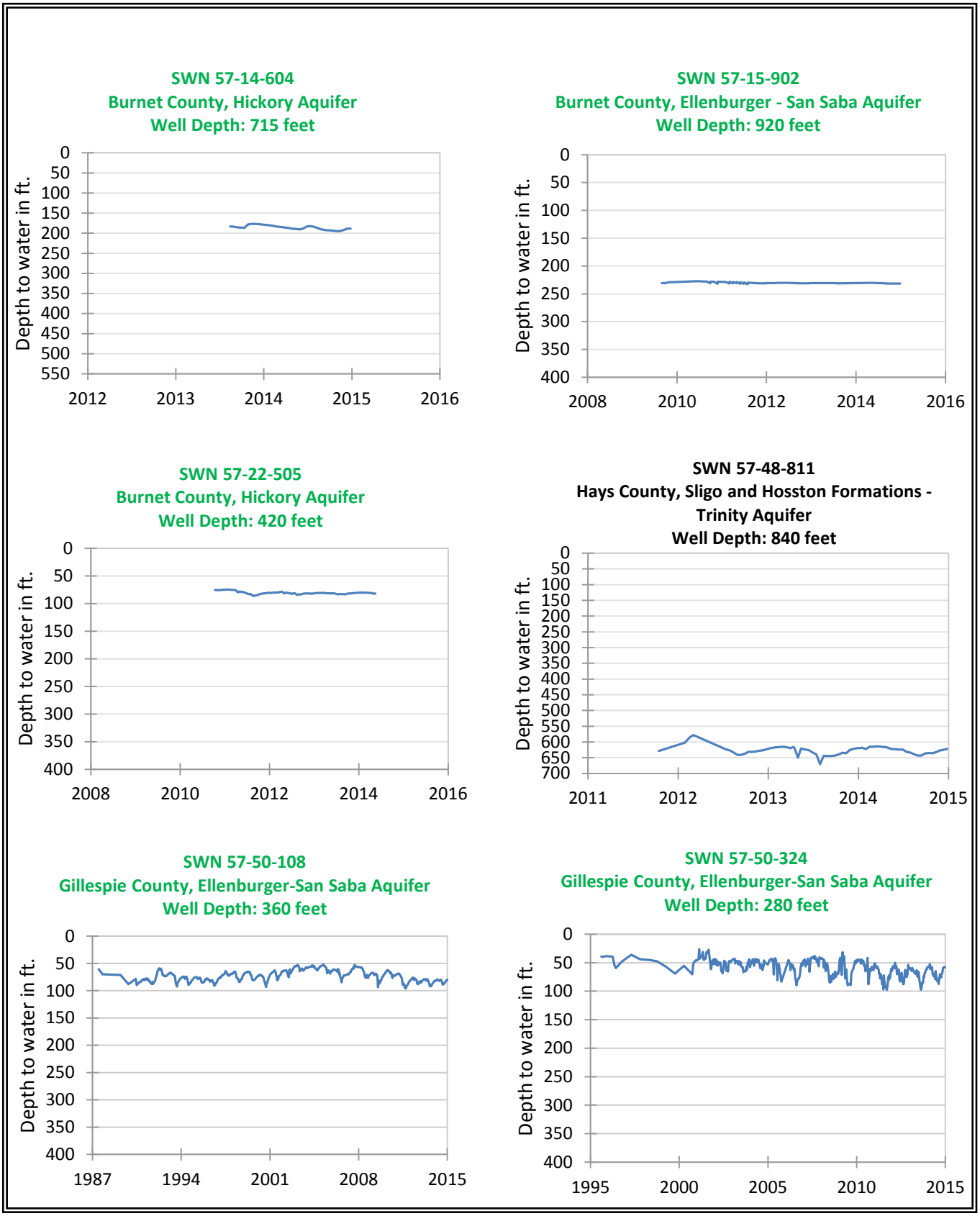


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. Minor aquifers indicated in green text. SWN=state well number

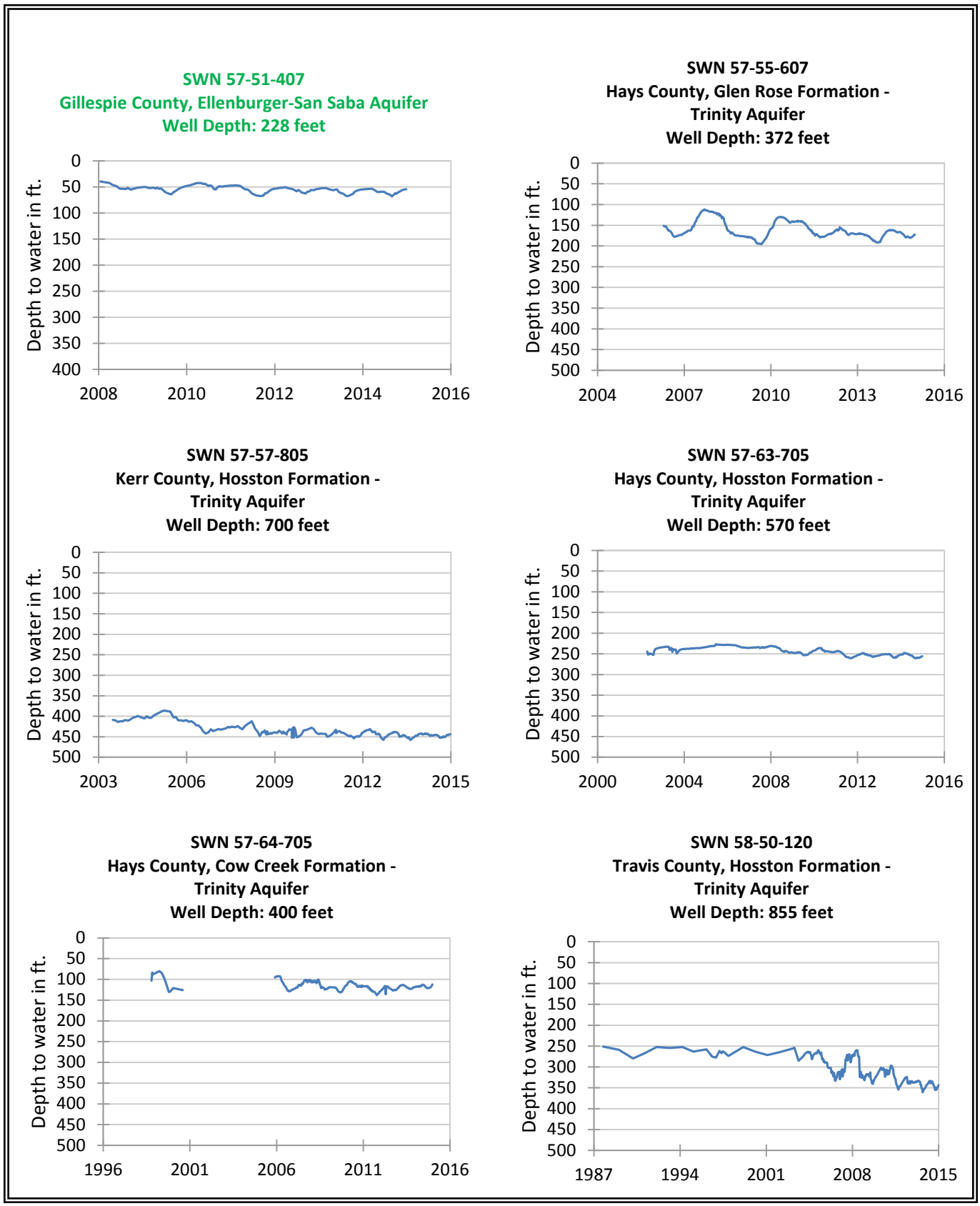


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. Minor aquifer indicated in green text. SWN=state well number

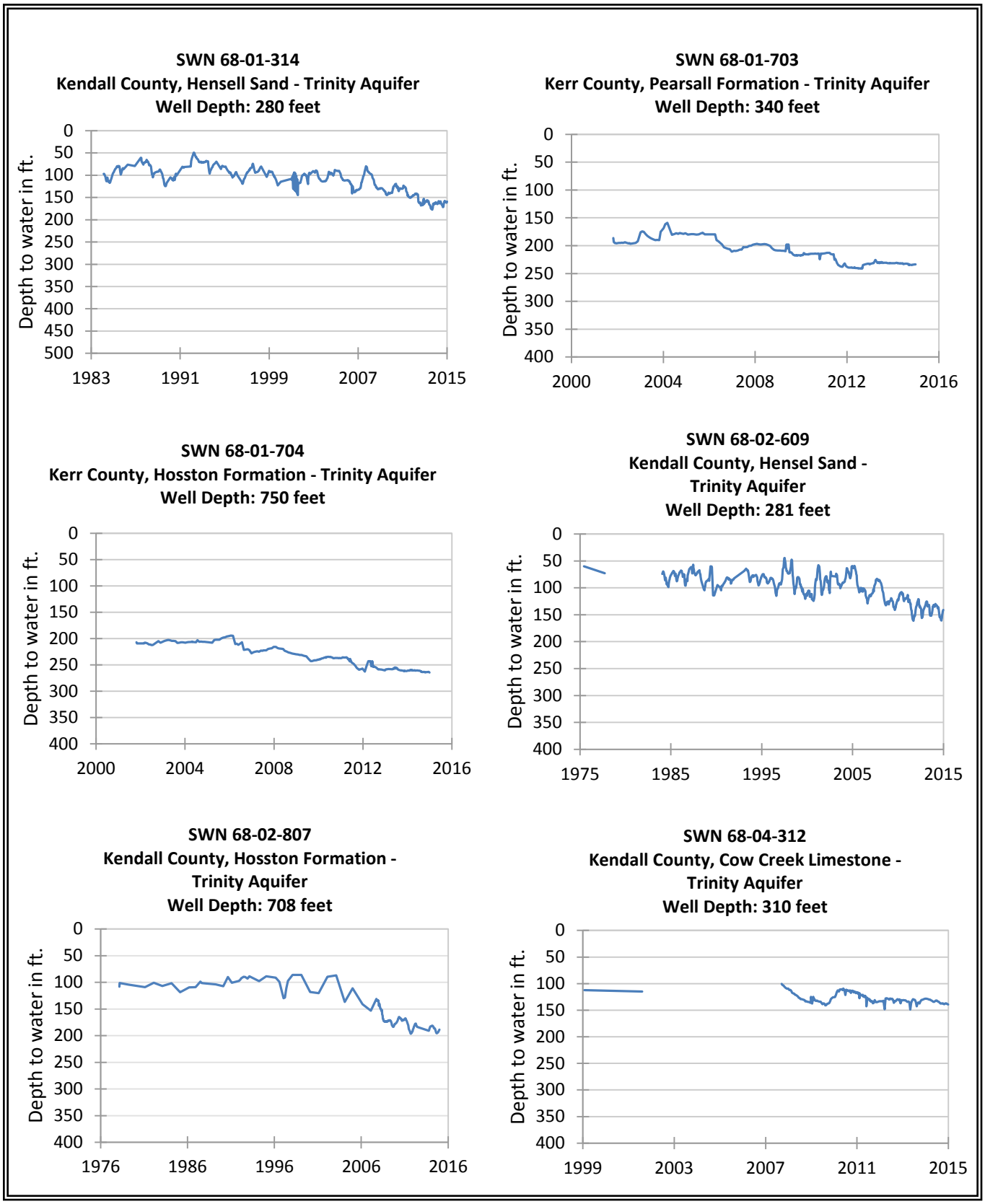


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

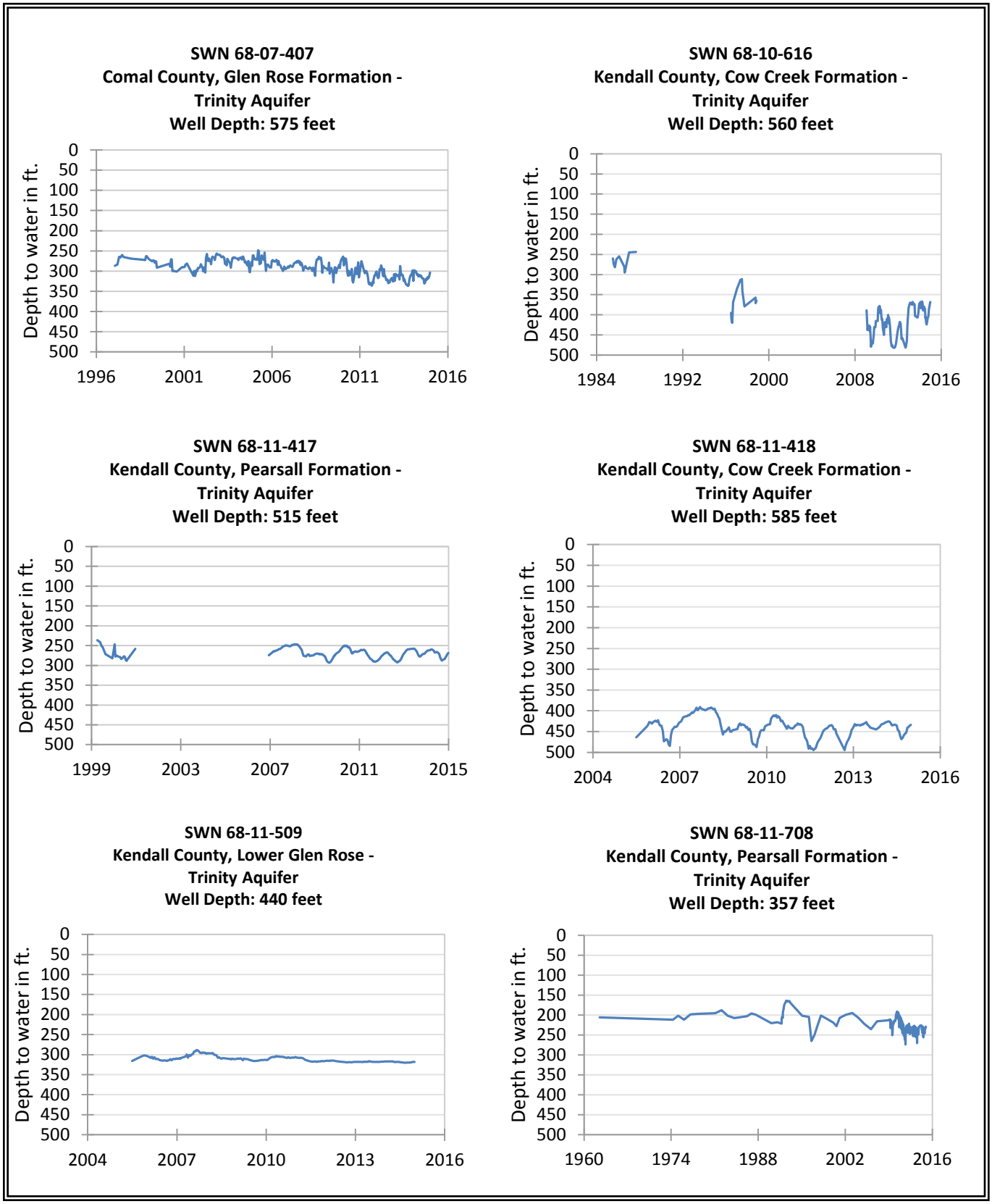


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

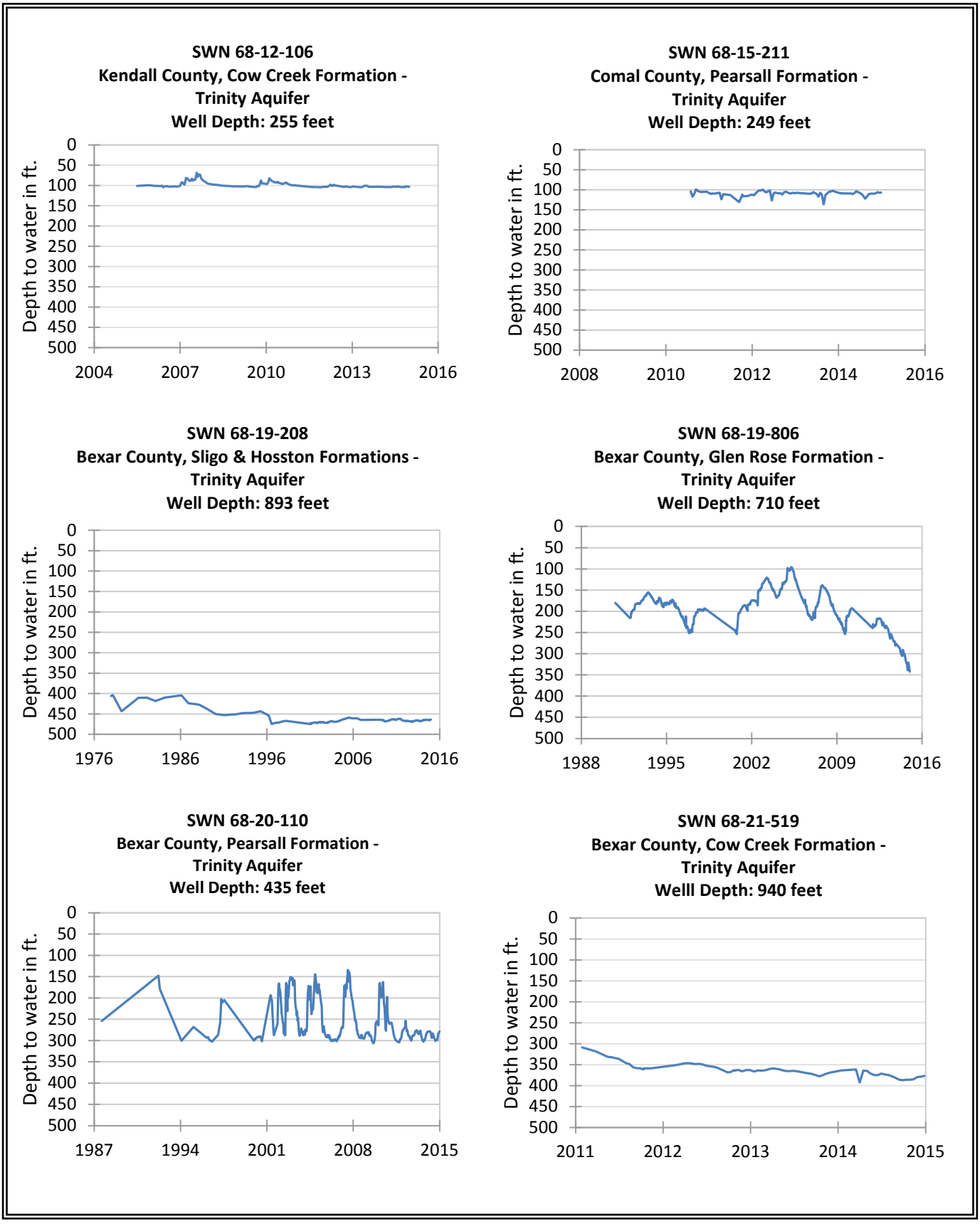


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

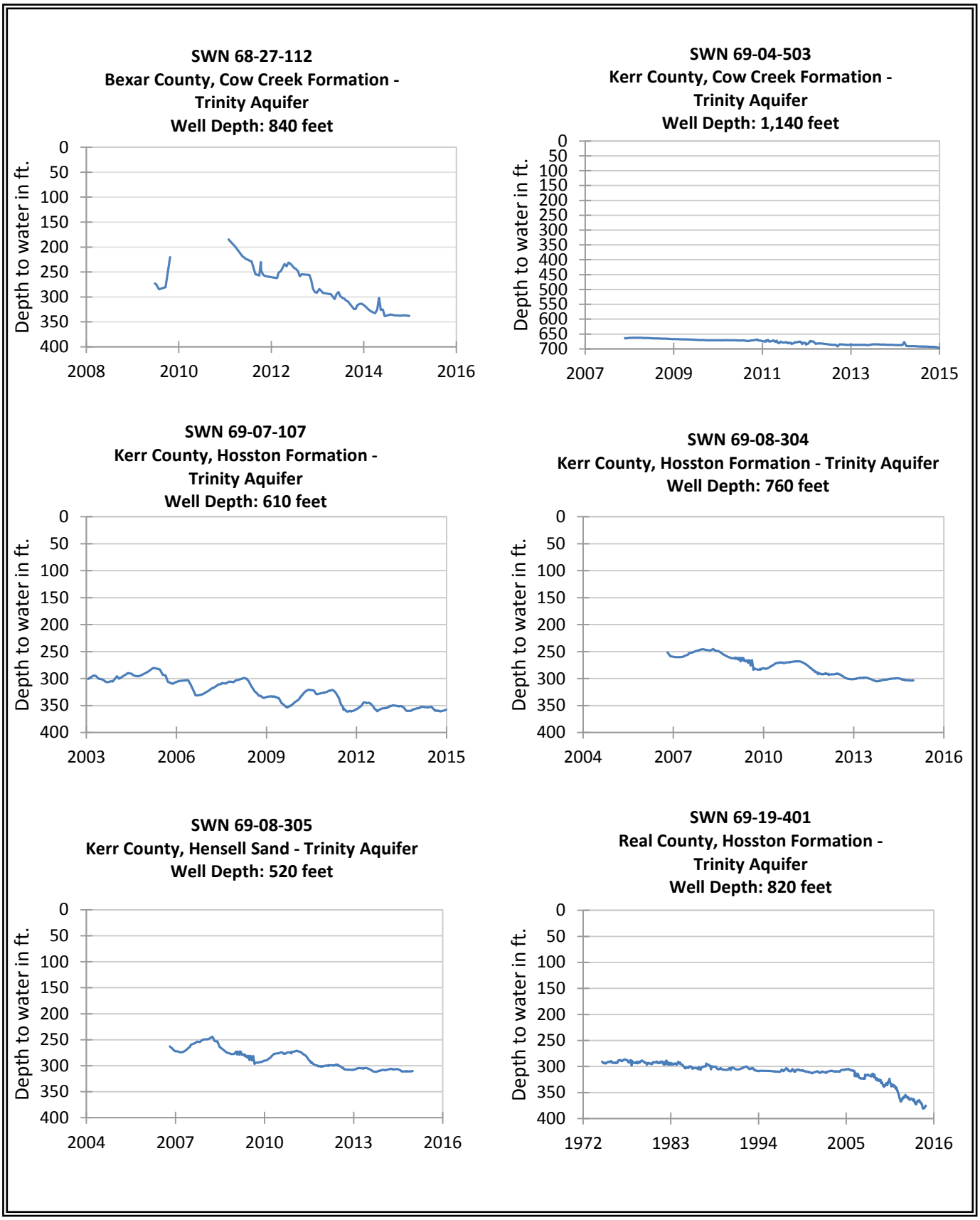


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

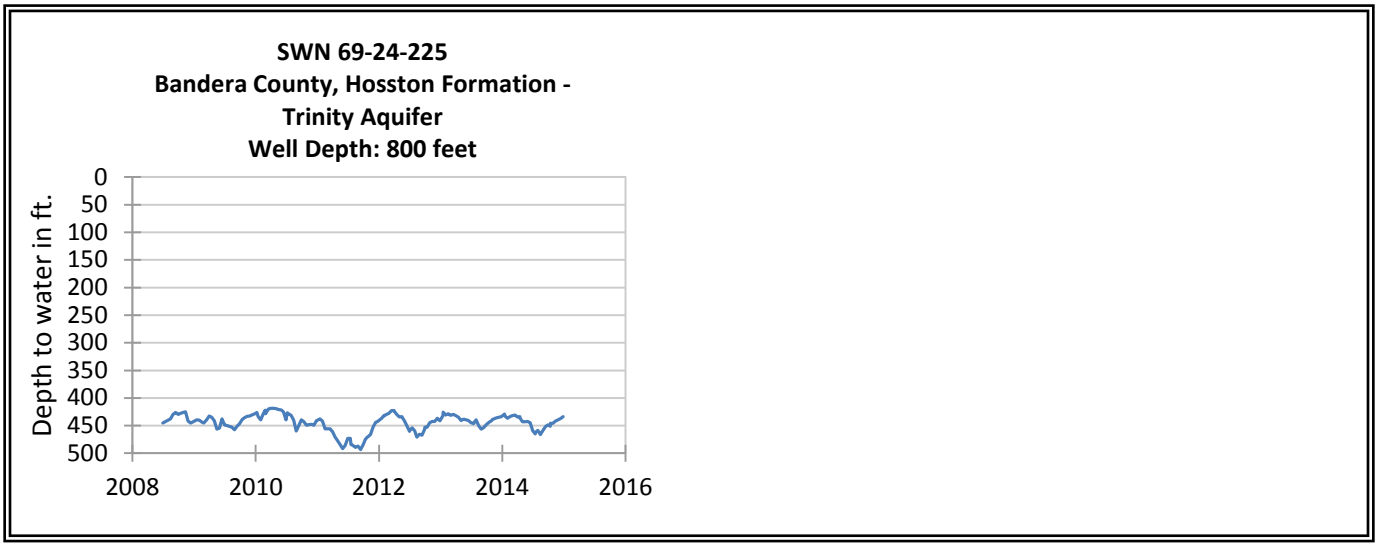


Figure 7-2 (continued) Hydrographs of TWDB recorder wells in Central Texas. SWN=state well number

8.0 Statewide changes in recorders in major aquifers by region

Additional recorders are added each year in major aquifers and a few have been deleted from the program in the last four years. Comparison of median changes in water levels in recorders (of major aquifers) by regions through time, a comparison of different sets, is less than ideal but still informative. Comparison between regions is most helpful for the recent year.

The median water-level change from 2013 to 2014 was greatest in wells in the Trinity Aquifer in Central Texas, a decline of 2.4 feet, and least in wells in the Edwards-Trinity (Plateau) Aquifer of West Texas, a rise of 0.5 feet. The decline of 2.2 feet in the one Hueco-Mesilla Bolsons Aquifer recorder well was not included in this comparison.

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

Major aquifer	Region	Number of wells	Median change (feet) 2013–2014	Median change (feet) 2012–2013	Median change (feet) 2011–2012	Median change (feet) 2010–2011
Trinity	Central	41	-2.4	-0.1	-0.9	-16.7
Hueco (-Mesilla) Bolsons	West	1	-2.2	-0.4	-3.5	1.5
Pecos Valley	West	4	-1.7	-0.9	-0.6	-7.6
Edwards (Balcones Fault Zone)	Northern Central	4	-1.4	12.1	0.9	-3.5
Ogallala	High Plains	26[a]	-1.2	-1	-1.8	-1.9
Seymour	Rolling Plains	2	-1	-0.8	-0.9	-3.2
Trinity	Northern Central	16	-0.9	-0.8	-1.6	-8.5
Edwards-Trinity (Plateau)	West	24[b]	0.5	-0.8	-0.9	-0.7
Gulf Coast	South and East	13[c]	0.7	-0.9	0.5	-6.3
Carrizo-Wilcox	South and East	12	1.5	-0.2	-0.9	-4.4

Changes in the well recorder program in major aquifer wells in 2014:

a. Three wells in Dallam, Armstrong, and Terry counties replaced three wells taken out of service in Armstrong, Carson, and Dawson counties
b. Three wells added in Schleicher County
c. Two wells added in San Jacinto and Polk counties

9.0 Conclusions

In 2014, the TWDB maintained and monitored a statewide network of 161 wells equipped with automatic groundwater-level recording instruments and dataloggers. The number of recorder wells has increased by 28 percent since 2011. These wells primarily monitor water-level conditions in major and minor aquifers defined by the TWDB. Three wells monitor water-level conditions in undesignated or local aquifers.

The Central Texas region continues to have the largest number of recorder wells (49) and the largest number of recorder wells (41) completed in a major aquifer—the Trinity—reflecting an interest in groundwater availability in an area with high population growth and variable patterns of rainfall. By region, the Central Texas Trinity Aquifer wells also experienced the greatest median water-level decline from 2013 to 2014. This year's median decline is greater than median declines in the previous two years of 0.1 and 0.9 feet, but does not surpass the largest median decline in the last four years yet experienced in any region, or 16.7 feet in the Central Trinity wells from 2011 to 2012.

The Trinity Aquifer contains the greatest number of recorders statewide (57), with 16 in northern Central Texas and 41 in Central Texas.

Total statewide median water-level change from 2013 to 2014 determined in the 143 recorders in major aquifers was -1.2 feet. This compares to the median water-level change in major aquifers of -0.5 feet from 2012 to 2013 in 138 wells; -0.9 feet from 2011 to 2012 in 125 wells; and -4.8 feet from 2010 to 2011 in 110 wells.

Generally, groundwater levels in the total number of TWDB recorder wells declined in 2014, with the decline slightly greater than that observed from 2012 to 2013, but less than in each of the previous two years. In major aquifers, 104 recorder wells experienced water-level declines and 39 recorder wells experienced water-level rises. Median water levels rose between 0.5 and 1.5 feet from 2013 to 2014 in the Edwards-Trinity (Plateau), the Gulf Coast, and the Carrizo-Wilcox aquifers.

Total statewide median water-level decline in recorder wells in major aquifers from 2013 to 2014 as determined from declines occurring in 73 percent (104 of 143) of wells was 2.0 feet. The median water-level decline occurring in 68 percent (94 of 138) of the wells from 2012 to 2013 was 1.2 feet, in 75 percent (94 of 125) of the wells from 2011 to 2012 was 1.7 feet, and in 92 percent (101 of 110) of the wells from 2010 to 2011 was 4.9 feet.

Total statewide median water-level rise in recorder wells in major aquifers from 2013 to 2014 as determined from rises occurring in 27 percent (39 of 143) of the wells was 1.9 feet, compared to the median water-level rises of 2.5 feet in in 32 percent (44 of 138) from 2012 to 2013, 1.9 feet in 25 percent (31 of 125) from 2011 to 2012, and 1.5 feet in eight percent (9 of 110) from 2010 to 2011.