Texas Water Conditions Report

Texas Water Development Board

January 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) for January indicate that total rainfall in January [Figure 1(a)] over the western half of the state was mostly below-average compared to historical data from 1981–2010. There were isolated patches of above-average rainfall in the northeastern High Plains, eastern Trans Pecos, and northeastern Lower Rolling Plains climate divisions. Above average rainfall occurred over northern and southern regions of the South Central climate division, southern regions of the North Central climate division, northern and southeastern regions of the East Texas climate division, northern regions of the Upper Coast climate division, and southeastern regions of the Southern climate division [Figure 1(b)].

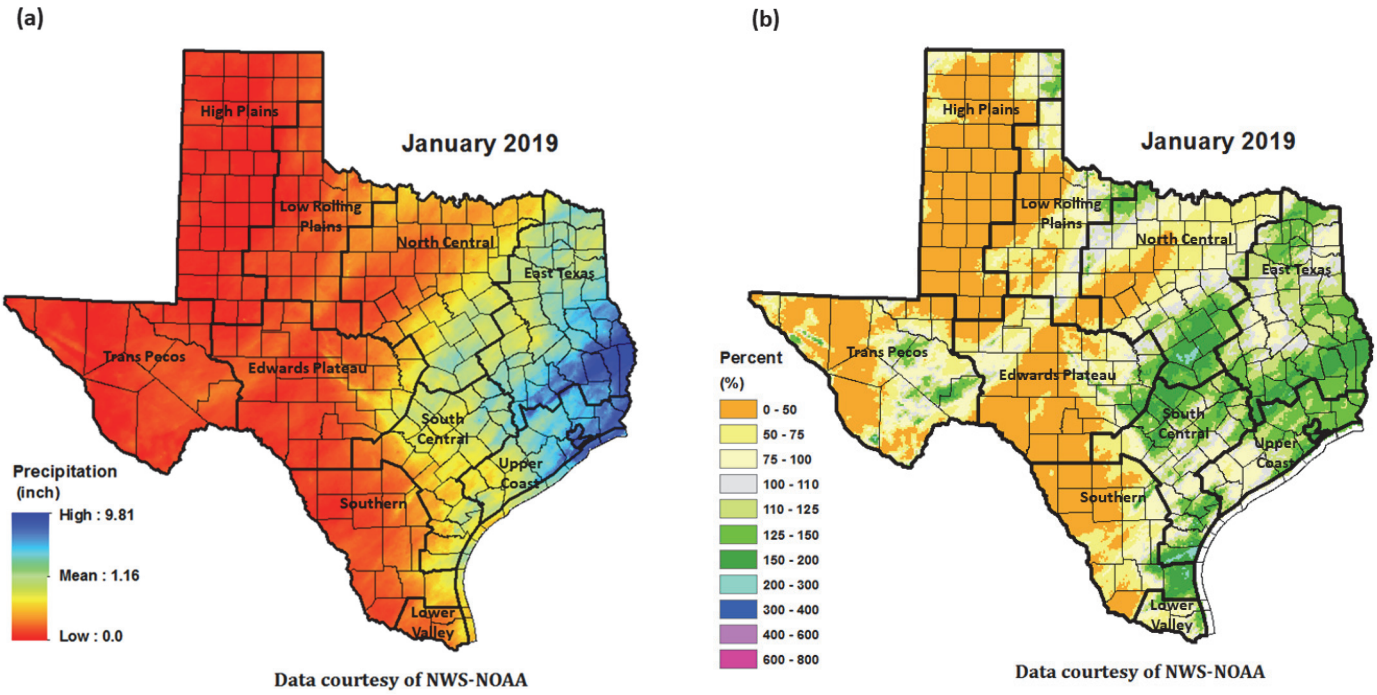

Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for January 2019

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RESERVOIR STORAGE

At the end of January 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.20 million acre-feet or 87 percent of total conservation storage capacity (Figure 2). This is approximately 0.3 million acre-feet less than a month ago and 2.4 million acre-feet more than end-January 2018.

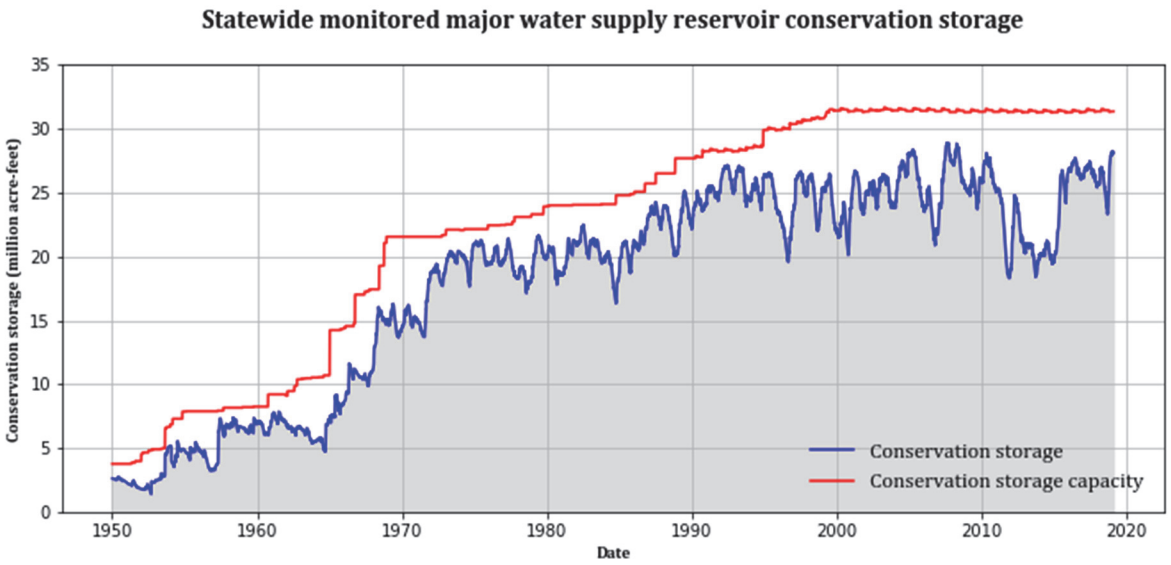


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 79 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 15 were above 90 percent full. These high storage reservoirs are in the North, Central, and East Texas climate divisions. However, Palo Duro Reservoir was only 1 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (16 percent full) Greenbelt (20 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was only 7 percent full.

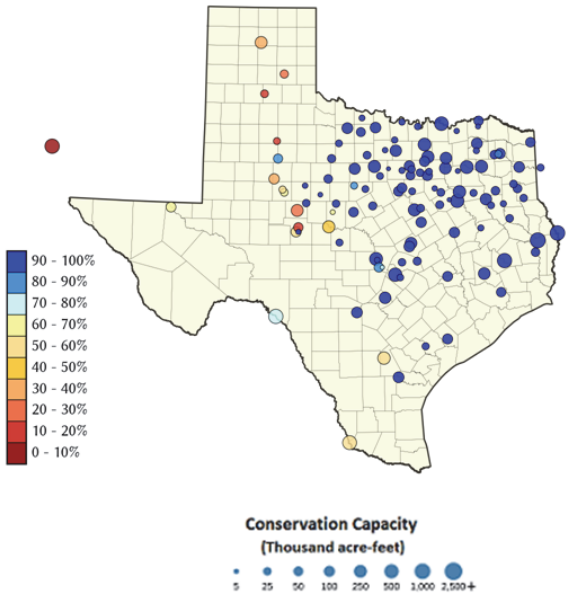


Figure 3: Reservoir conservation storage expressed as percent full (%)

*Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (99 percent full), East Texas (100 percent full), North Central (99 percent full), South Central (100 percent full), and Low Rolling Plains (76 percent full) regions (Figure 3). The High Plains (32 percent full) and Trans-Pecos (16 percent full) regions had the lowest storage. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the north central, eastern, and south central regions of the state is normal to high (>70 percent full). The Upper/Mid Rio Grande had extremely low storage, the Canadian River basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

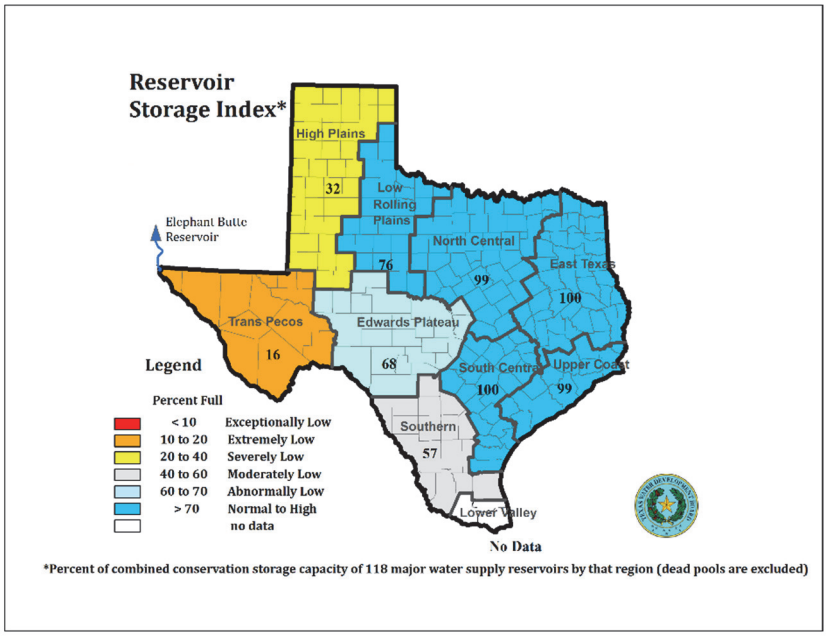


Figure 3: Reservoir Storage Index by climate division at 1/31/2019

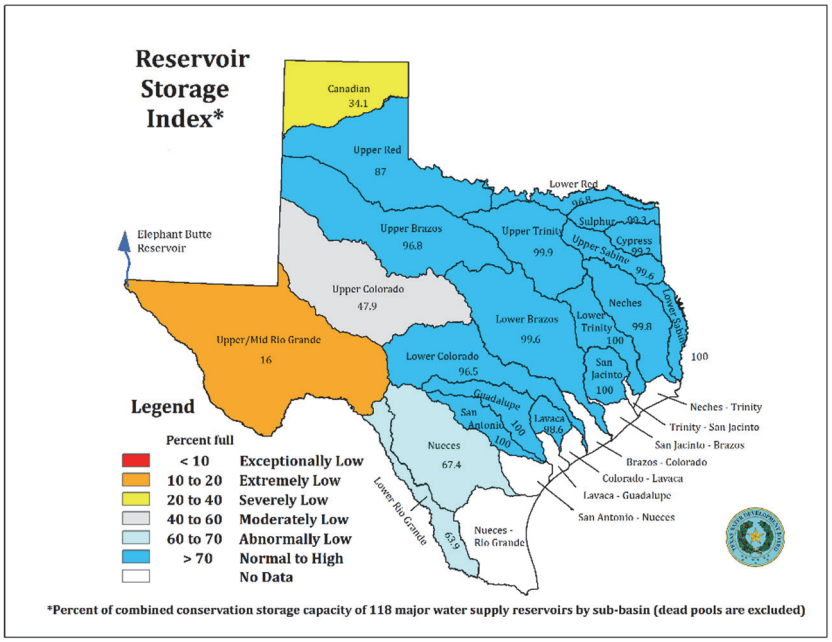


Figure 4: Reservoir Storage Index by river basin/sub-basin at 1/31/2019

*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS

Name of lake or reservoir	Storage capacity	Storage at end-January 2019		Storage change from end-December 2018		Storage change from end-January 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Abilene, Lake	7,900	7,900	100	0	0	3,423	43
Alan Henry Reservoir	96,207	82,699	86	-1,202	-1	1,449	2
*Amistad Reservoir (Texas & Mexico)	3,275,532	1,964,665	60	29,805	1	-40,889	-1
*Amistad Reservoir (Texas)	1,840,849	1,378,513	75	20,702	1	-13,377	-1
Amon G Carter, Lake	19,266	19,266	100	0	0	391	2
Aquilla Lake	43,243	43,243	100	0	0	7,373	17
Arlington, Lake	40,188	40,054	100	-134	0	4,261	11
Arrowhead, Lake	230,359	230,215	100	-144	0	34,509	15
Athens, Lake	29,503	29,503	100	0	0	0	0
*Austin, Lake	23,972	23,282	97	356	1	510	2
B A Steinhagen Lake	66,961	60,869	91	5,331	8	-6,092	-9
Bardwell Lake	46,122	46,122	100	0	0	7,228	16
Belton Lake	435,225	435,225	100	0	0	39,584	9
Benbrook Lake	85,648	85,648	100	0	0	6,601	8
Bob Sandlin, Lake	192,417	192,417	100	0	0	2,287	1
Bonham, Lake	11,027	10,953	99	-74	-1	1,066	10
Brady Creek Reservoir	28,808	28,808	100	0	0	13,011	45
Bridgeport, Lake	366,236	366,236	100	0	0	47,726	13
*Brownwood, Lake	128,839	128,839	100	0	0	22,018	17
Buchanan, Lake	860,607	816,904	95	-8,258	-1	54,946	6
Caddo, Lake	29,898	29,898	100	0	0	0	0
Canyon Lake	378,781	378,781	100	0	0	29,997	8
Cedar Creek Reservoir in Trinity	644,686	644,359	100	-327	0	64,496	10
Champion Creek Reservoir	41,580	29,853	72	873	2	10,555	25
Cherokee, Lake	40,094	40,094	100	0	0	0	0
Choke Canyon Reservoir	662,820	362,922	55	-1,771	0	163,465	25
*Cisco, Lake	29,003	24,371	84	-169	-1	592	2
Coleman, Lake	38,075	37,967	100	-108	0	4,564	12
Colorado City, Lake	30,758	15,381	50	-176	-1	3,083	10
*Coleto Creek Reservoir	31,040	31,040	100	0	0	2,906	9
Conroe, Lake	410,988	410,988	100	0	0	0	0
Corpus Christi, Lake	256,062	256,062	100	0	0	17,150	7
Crook, Lake	9,195	9,143	99	-52	-1	-52	-1
Cypress Springs, Lake	66,756	66,756	100	0	0	4,580	7
E. V. Spence Reservoir	517,272	139,952	27	1,523	0	75,414	15
Eagle Mountain Lake	179,880	179,880	100	0	0	17,555	10
Elephant Butte Reservoir (Texas)	852,491	61,697	7	12,234	1	-136,137	-16
Elephant Butte Reservoir (Total Storage)	1,973,358	142,817	7	28,319	1	-315,132	-16
*Falcon Reservoir (Texas & Mexico)	2,646,817	1,008,282	38	-170,458	-6	-404,620	-15
*Falcon Reservoir (Texas)	1,551,007	787,684	51	-16,228	-1	-55,058	-4
Fork Reservoir, Lake	605,061	598,728	99	-6,333	-1	23,975	4
Fort Phantom Hill, Lake	70,030	70,030	100	0	0	8,286	12
Georgetown, Lake	36,823	36,823	100	0	0	10,820	29
Graham, Lake	45,288	45,288	100	0	0	2,824	6
Granbury, Lake	132,949	132,949	100	1,870	1	3,720	3
Granger Lake	51,822	51,822	100	0	0	0	0
Grapevine Lake	164,703	164,703	100	0	0	5,224	3
Greenbelt Lake	59,968	12,229	20	-21	0	-2,837	-5
*Halbert, Lake	6,033	5,356	89	-380	-6	-194	-3
Hords Creek Lake	8,443	5,645	67	61	1	308	4
Houston County Lake	17,113	17,113	100	0	0	0	0

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS

Name of lake or reservoir	Storage capacity	Storage at end-January 2019		Storage change from end-December 2018		Storage change from end-January 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Houston, Lake	120,686	120,686	100	0	0	0	0
Hubbard Creek Reservoir	313,298	313,298	100	0	0	48,533	15
Hubert H Moss Lake	24,058	23,961	100	-97	0	2,138	9
Inks, Lake	13,962	12,885	92	-128	-1	5,114	37
J. B. Thomas, Lake	199,931	72,059	36	-1,999	-1	-22,402	-11
Jacksonville, Lake	25,670	25,670	100	0	0	0	0
Jim Chapman Lake (Cooper)	260,332	260,332	100	0	0	30,267	12
Joe Pool Lake	175,358	172,923	99	-2,435	-1	3,690	2
Kemp, Lake	245,307	245,307	100	0	0	23,855	10
Kickapoo, Lake	86,345	86,345	100	0	0	14,055	16
Lavon Lake	406,388	406,388	100	0	0	54,155	13
Leon, Lake	27,762	27,587	99	-175	-1	4,632	17
Lewisville Lake	563,228	563,228	100	0	0	44,441	8
Limestone, Lake	203,780	203,780	100	0	0	49,435	24
*Livingston, Lake	1,785,348	1,784,629	100	-719	0	-719	0
*Lost Creek Reservoir	11,950	11,950	100	0	0	487	4
Lyndon B Johnson, Lake	115,249	88,580	77	-12,265	-11	-22,117	-19
Mackenzie Reservoir	46,450	5,728	12	-61	0	-1,051	-2
Marble Falls, Lake	6,901	3,828	55	-2,156	-31	-2,959	-43
Martin, Lake	75,726	75,578	100	-148	0	12,475	16
Medina Lake	254,823	254,823	100	5,130	2	91,388	36
Meredith, Lake	500,000	190,940	38	425	0	-12,697	-3
Millers Creek Reservoir	26,768	26,768	100	0	0	2,465	9
*Mineral Wells, Lake	5,273	5,273	100	0	0	784	15
Monticello, Lake	34,740	30,136	87	-720	-2	669	2
Mountain Creek, Lake	22,850	22,850	100	0	0	0	0
Murvaul, Lake	38,285	38,285	100	0	0	206	1
Nacogdoches, Lake	39,522	39,522	100	0	0	2,720	7
Nasworthy	9,615	8,657	90	-25	0	461	5
Navarro Mills Lake	49,827	49,827	100	0	0	9,170	18
New Terrell City Lake	8,583	8,583	100	0	0	673	8
Nocona, Lake (Farmers Crk)	21,444	21,444	100	0	0	2,444	11
North Fork Buffalo Creek Reservoir	15,400	15,400	100	0	0	4,289	28
O' the Pines, Lake	241,363	241,363	100	0	0	0	0
O. C. Fisher Lake	119,445	17,160	14	-148	0	5,461	5
*O. H. Ivie Reservoir	554,340	290,102	52	15,249	3	184,470	33
Oak Creek Reservoir	39,210	39,210	100	0	0	20,196	52
Palestine, Lake	367,303	367,303	100	0	0	0	0
Palo Duro Reservoir	61,066	400	1	0	0	-320	0
Palo Pinto, Lake	26,766	26,766	100	0	0	5,271	20
Pat Cleburne, Lake	26,008	26,008	100	0	0	4,916	19
*Pat Mayse Lake	113,683	113,683	100	0	0	0	0
Possum Kingdom Lake	538,139	537,781	100	9,776	2	27,375	5
Proctor Lake	54,762	54,762	100	0	0	12,672	23
Ray Hubbard, Lake	439,559	437,888	100	-1,253	0	21,234	5
Ray Roberts, Lake	788,167	788,167	100	0	0	40,729	5
Red Bluff Reservoir	151,110	99,220	66	2,193	1	-13,848	-9
Richland-Chambers Reservoir	1,087,839	1,087,839	100	0	0	122,551	11

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-January 2019		Storage change from end-December 2018		Storage change from end-January 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Sam Rayburn Reservoir	2,857,077	2,857,077	100	0	0	285,927	10
Somerville Lake	147,104	147,104	100	0	0	0	0
Squaw Creek, Lake	151,250	151,250	100	0	0	0	0
Stamford, Lake	51,570	51,570	100	0	0	3,917	8
Stillhouse Hollow Lake	227,771	227,771	100	0	0	25,531	11
Striker, Lake	16,934	16,934	100	0	0	0	0
Sweetwater, Lake	12,267	12,267	100	0	0	9,905	81
*Sulphur Springs, Lake	17,747	14,979	84	-1,911	-11	-2,768	-16
Tawakoni, Lake	871,685	871,685	100	0	0	27,792	3
Texana, Lake	159,566	157,275	99	-183	0	23,746	15
Texoma, Lake (Texas & Oklahoma)	2,525,281	2,425,947	96	-372,551	-15	-60,552	-2
Texoma, Lake (Texas)	1,258,113	1,212,970	96	-45,143	-4	-30,276	-2
Toledo Bend Reservoir (Texas & Louisiana)	4,472,900	4,510,432	100	-122,952	-3	710,260	16
Toledo Bend Reservoir (Texas)	2,236,450	2,236,450	100	0	0	338,414	15
Travis, Lake	1,113,348	1,113,348	100	0	0	213,958	19
Twin Buttes Reservoir	182,454	111,001	61	7,061	4	98,680	54
Tyler, Lake	72,073	72,073	100	0	0	0	0
Waco, Lake	189,418	189,418	100	0	0	31,467	17
Waxahachie, Lake	10,780	10,780	100	0	0	1,518	14
Weatherford, Lake	17,812	17,584	99	-228	-1	2,349	13
White River Lake	29,880	4,680	16	-147	0	-1,049	-4
Whitney, Lake	553,344	545,646	99	-7,698	-1	89,719	16
Worth, Lake	33,495	32,744	98	-751	-2	5,290	16
Wright Patman Lake	122,593	122,593	100	0	0	0	0
STATEWIDE TOTOL							
STATEWIDE TOTAL	**32,198,346**	**28,196,311**	**87**	**-30,983**	**-0**	**2,398,118.00**	**7**

* Total volume below elevation of conservation pool top is used as conservation storage capacity, because the dead pool storage is unknown.
**Monthly and yearly changes do not include reservoirs that did not have data in last month or last year, respectively.

Note:

Conservation storage capacity is the space available to store water above the lowest outlet and below the top of the conservation pool (some may have seasonal variations), or normal maximum operating level. Conservation storage refers to the volume of water held within the conservation storage space. Not included is any water in flood control storage (above the top of the conservation pool or normal maximum operating level) or any water in the dead pool storage. Conservation storage percentage is based on the conservation storage capacity of the reservoir and the conservation storage in the reservoir on date shown. Percent change is given by 100 * (current conservation storage - past conservation storage)/conservation storage capacity.

STREAMFLOW CONDITIONS

Daily streamflow percentiles* for 29 stream gauges, minimally impacted by development, is presented in Figure 6 (below). Streamflow was at or below the 20th percentile at five stream gauges, with two of these gauges recording flow at or below the 10th percentile (*brown shaded circles in Figure 6*). Streamflow was at or greater than the 90th percentile at 13 stream gauges.

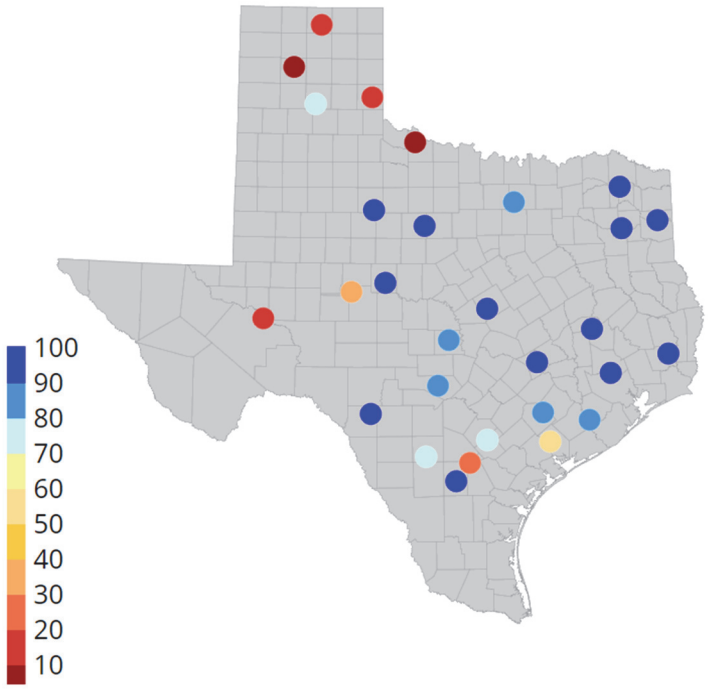


Figure 6: Daily streamflow percentile at 1/31/2019

*A 30-day moving average flow is calculated from the historical mean daily flow records. For each day, the 30-day average flow is presented as a percentile of the historical record for that calendar day.

SOIL MOISTURE CONDITIONS

Soil moisture at the end of January 2019 [Figure 7(a)] was mostly moderate [> 0.20 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in all climate divisions of the state except the Trans Pecos where the area averaged soil moisture was 0.18 m^3/m^3. On a regional basis, and compared to conditions at the end of December 2018, soil moisture content decreased (brown shading in Figure 7(b)]in the High Plains, Low Rolling Plains, North Central, Edwards Plateau, most of the Trans Pecos except for the southwest, central East Texas, southern South Central, and the Southern climate divisions. Soil moisture content increased [green and blue sharing in Figure 7(b)] in the northern High Plains, northern North Central, northern South Central, southern East Texas, Upper Coast and the Lower Valley. The greatest decrease in soil moisture content was in the Edwards Plateau and the central High Plains. The greatest increase in soil moisture content was along the Upper Coast.

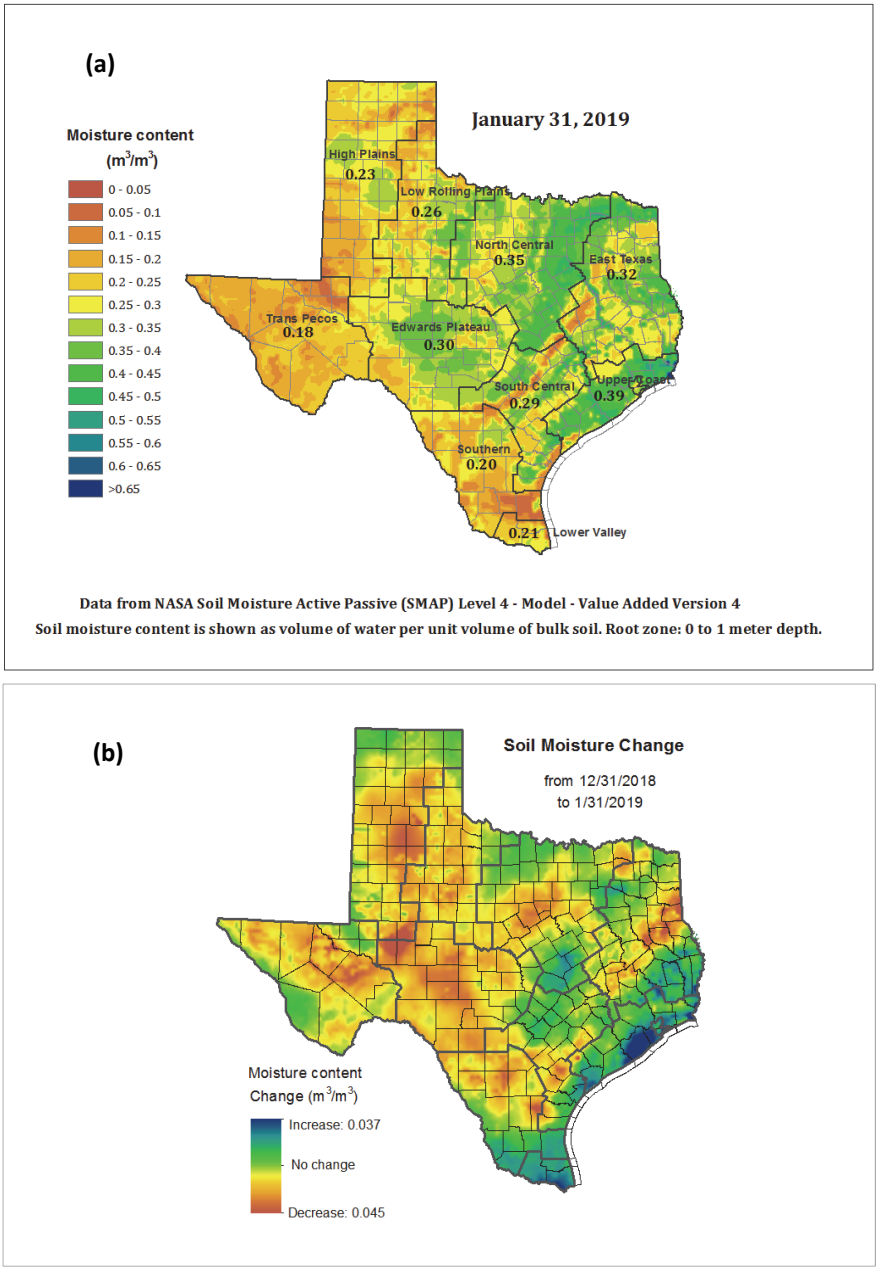
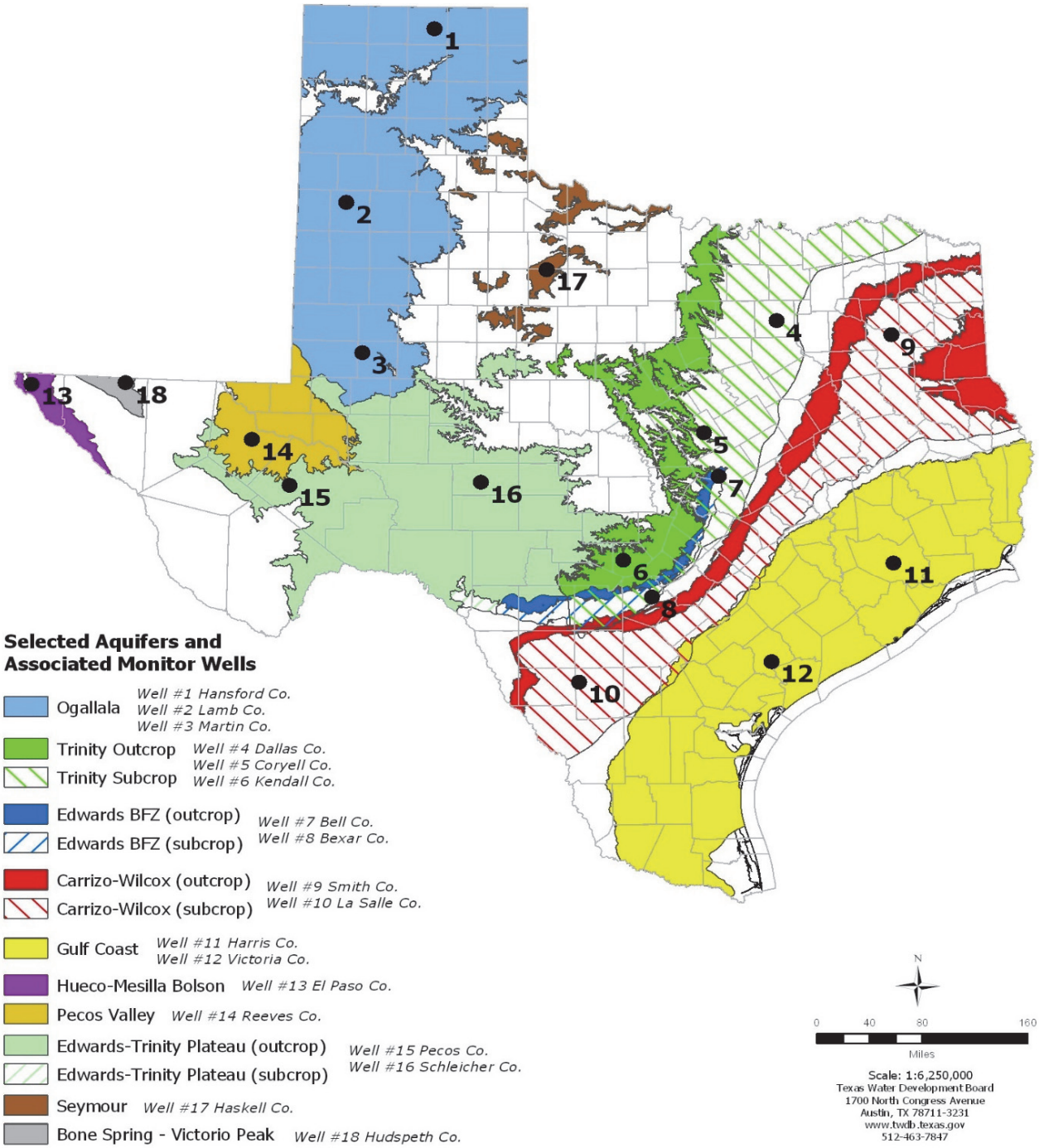


Figure 7: Root zone soil moisture conditions on January 31, 2019 (a) and the difference in root zone soil moisture from end-December 2018 and end-January 2019 (b)

January 2019 GROUNDWATER LEVELS IN OBSERVATION WELLS

Water-level measurements were available for all 18 key monitoring wells in the state. Water levels rose in 11 monitoring wells since the beginning of January, ranging from an increase of 0.04 feet in the Victoria County Gulf Coast Aquifer well (#12 on map) to 6.38 feet in the Kendall County Trinity Aquifer well (#6 on map). Water levels declined in 7 monitoring wells, ranging from a decline of -0.19 feet in the Lamb County Ogallala Aquifer well (#2 on map) to -4.20 feet in the La Salle County Carrizo-Wilcox Aquifer well (#10 on map). The J-17 well (#8 on map) in San Antonio recorded a water level of 44.50 feet below land surface or 686.10 feet above mean sea level. Water levels rose 26.50 feet above the Stage 1 critical management level for the San Antonio portion of the Edwards (Balcones Fault Zone) Aquifer.



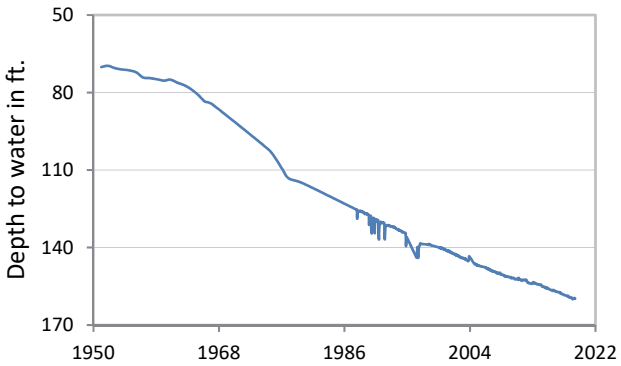
***Well numbers used in this publication on the aquifer map to indicate the monitoring well location (numbers 1 - 18) are different than the TWDB's seven-digit state well number.**

Monitoring Well	January	December	Month Change	Year Change	Historical Change	First Measured
(1) Hansford 0354301	159.81	159.52	-0.29	-1.12	-89.69	1951
(2) Lamb 1053602	149.70	149.51	-0.19	-1.54	-121.53	1951
(3) Martin 2739903	144.73	144.45	-0.28	-1.34	-39.84	1964
(4) Dallas 3319101	498.30	498.87	0.57	-4.00	-276.30	1954
(5) Coryell 4035404	526.22	526.56	0.34	-3.58	-234.22	1955
(6) Kendall 6802609	121.32	127.70	6.38	10.52	-61.32	1975
(7) Bell 5804816	119.35	120.87	1.52	4.72	4.16	2008
(8) Bexar 6837203	44.50	44.81	0.31	22.81	2.14	1932
(9) Smith 3430907	434.31	435.04	0.73	-2.13	-134.31	1977
(10) La Salle 7738103	513.52	509.32	-4.20	-29.33	-260.45	2003
(11) Harris 6514409	189.37	191.00	1.63	3.07	-53.87*	1947**
(12) Victoria 8017502	34.91	34.95	0.04	-1.41	-0.91	1958
(13) El Paso 4913301	295.22	294.67	-0.55	-0.91	-63.32	1964
(14) Reeves 4644501	166.52	163.64	-2.88	-5.72	-74.43	1952
(15) Pecos 5216802	180.51	184.97	4.46	3.13	66.37	1976
(16) Schleicher 5512134	266.49	265.05	-1.44	43.25	35.41	2003
(17) Haskell 2135748	45.90	46.17	0.27	0.71	-2.90	2002
(18) Hudspeth 4807516	140.52	143.17	2.65	-0.89	-36.60	1966

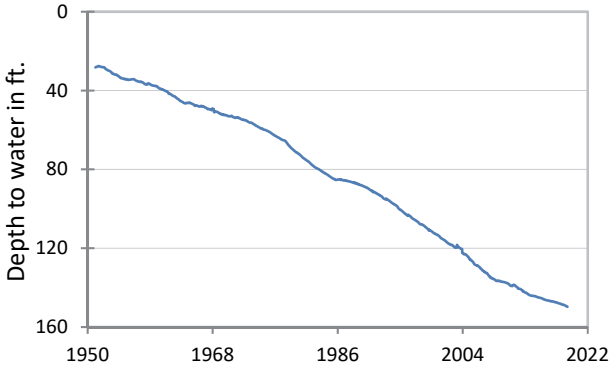
*Change since the original measurement of 135.5 feet below land surface in 1947 (**measurement not shown on the hydrograph)

January 2019 OBSERVATION WELL HYDROGRAPHS

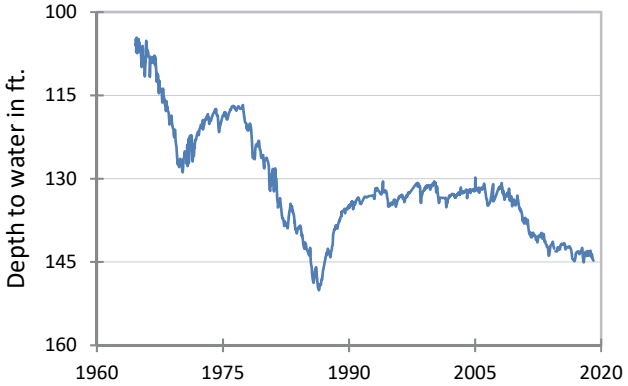
(1) State Well #03-54-301
Near Spearman, Hansford County
Ogallala Aquifer



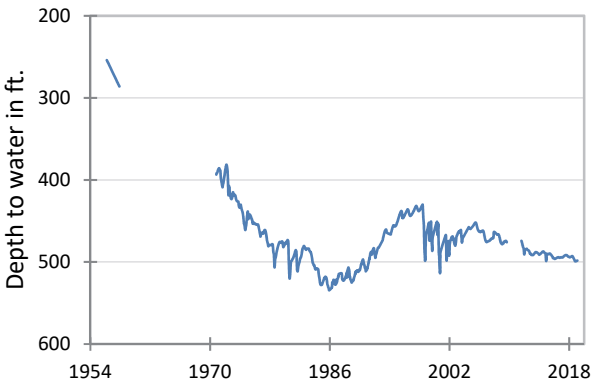
(2) State Well #10-53-602
Near Earth, Lamb County
Ogallala Aquifer



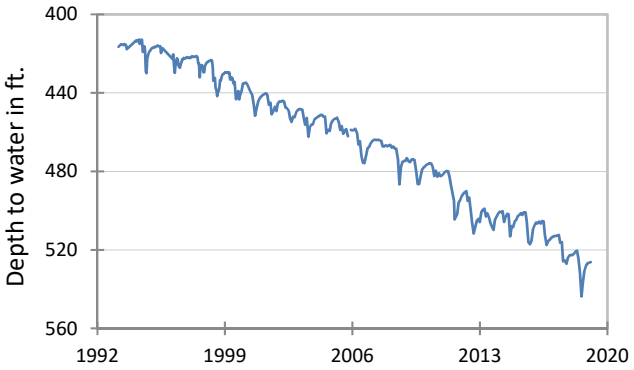
(3) State Well #27-39-903
Northwest Martin County
Ogallala Aquifer



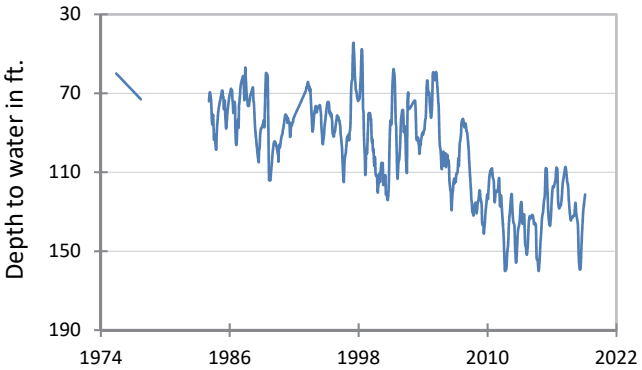
(4) State Well #33-19-101
Southeast Dallas, Dallas County
Twin Mountains Formation-Trinity Aquifer



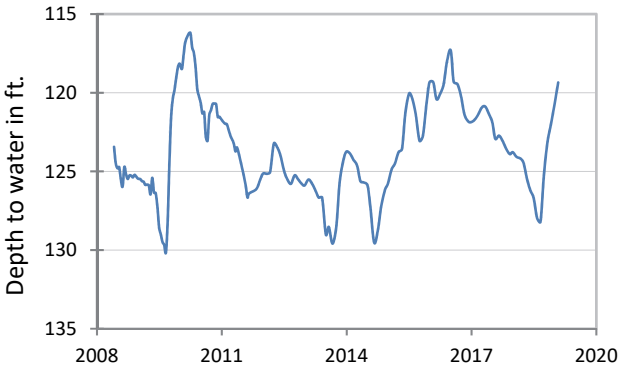
(5) State Well #40-35-404
Gatesville, Coryell County
Hosston Formation-Trinity Aquifer



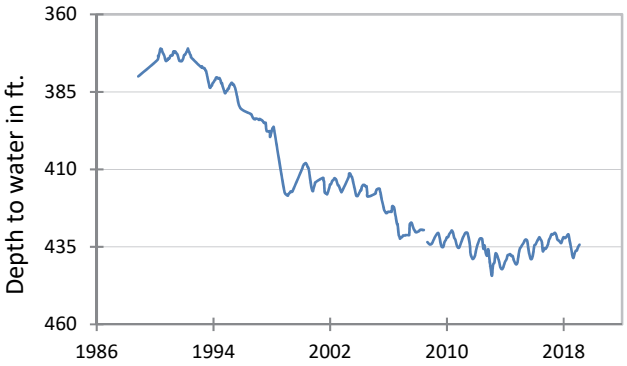
(6) State Well #68-02-609
Waring, Kendall County
Cow Creek Formation-Trinity Aquifer



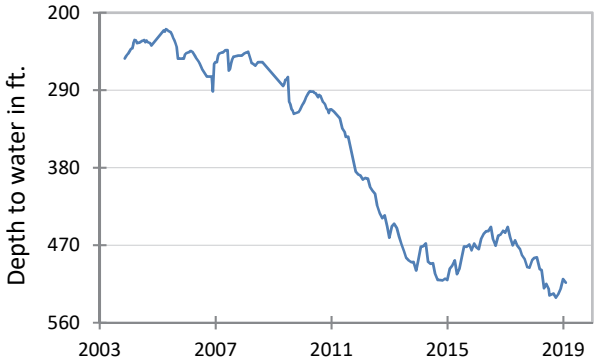
(7) State Well #58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer



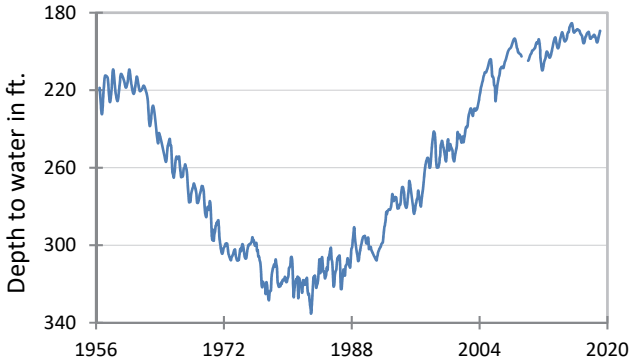
(9) State Well #34-30-907
Red Springs, Smith County
Carrizo-Wilcox Aquifer



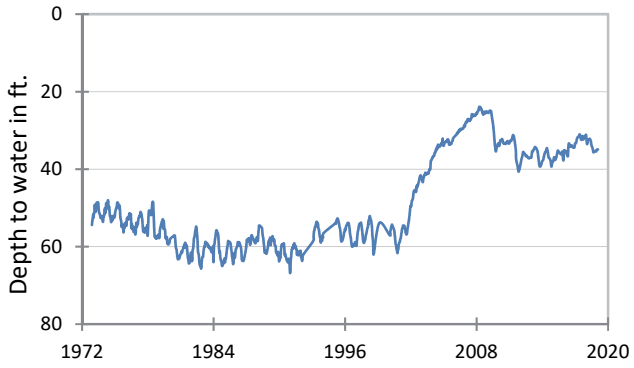
(10) State Well #77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer



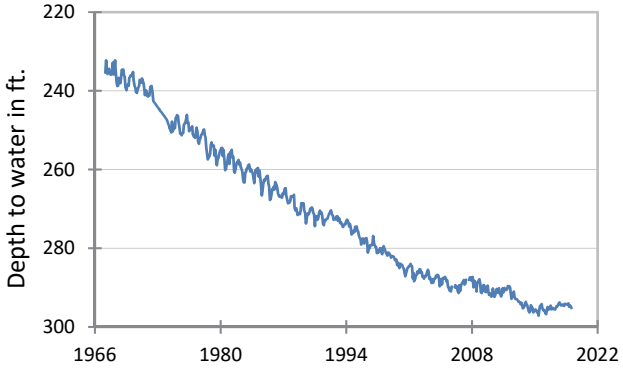
(11) State Well #65-14-409
Alief, Harris County
Evangeline Formation-Gulf Coast Aquifer



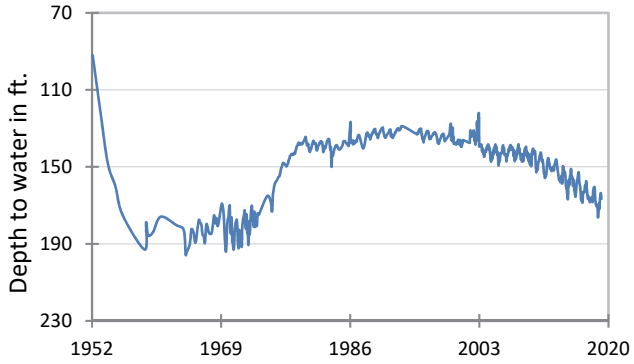
(12) State Well #80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



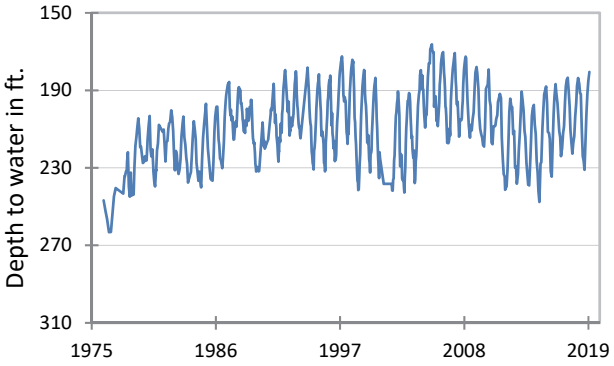
(13) State Well #49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolson Aquifer



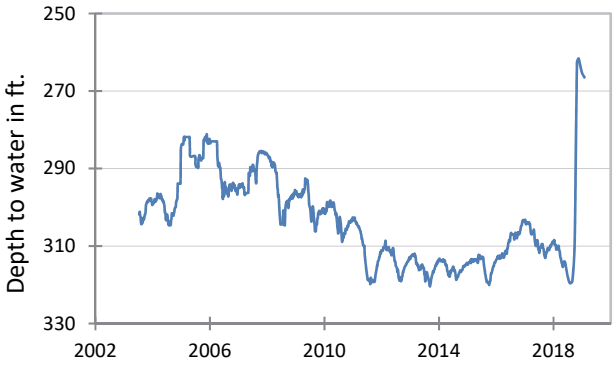
(14) State Well #46-44-501
Near Pecos, Reeves County
Pecos Valley Aquifer



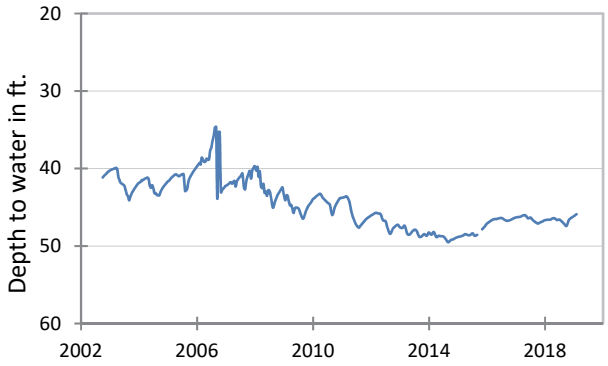
(15) State Well #52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



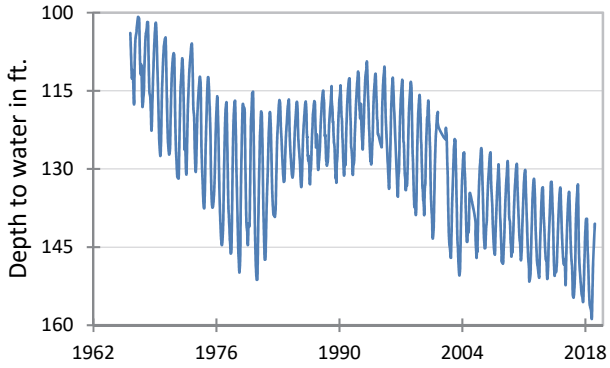
(16) State Well #55-12-134
Eldorado, Schleicher County
Trinity Aquifer



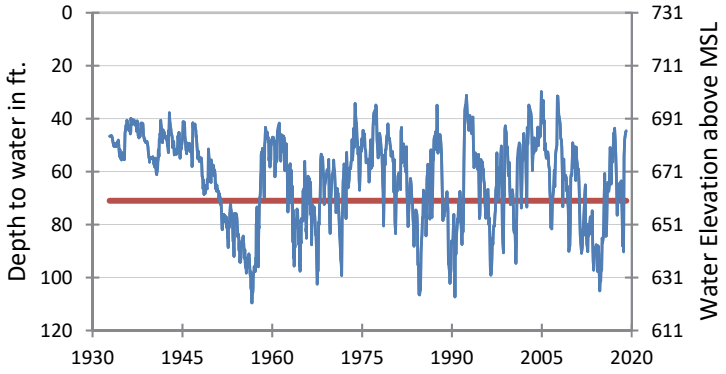
(17) State Well #21-35-748
Near O'Brien, Haskell County
Seymour Aquifer

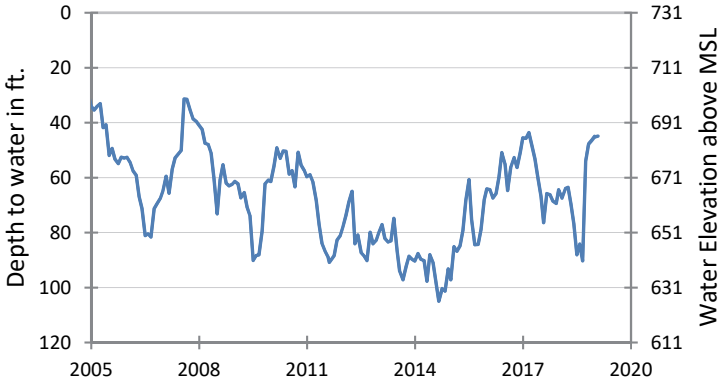


(18) State Well #48-07-516
Dell City, Hudspeth County
Bone Spring - Victorio Peak Aquifer



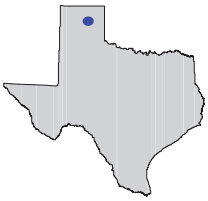
(8) State Well #68-37-203 (J-17)
San Antonio, Bexar County
Edwards (Balcones Fault Zone) Aquifer





The late January water-level measurement in this Edwards (Balcones Fault Zone) Aquifer well, elevation 731 feet above mean sea level, was 44.50 feet below land surface, or 686.10 feet above mean sea level. This was 0.31 feet above last month's measurement, 22.81 feet above last year's measurement and 2.14 feet above the initial measurement recorded in 1932.

Water levels below the red line indicate periods in which Edwards Aquifer Authority Stage 1 drought restrictions are in effect.

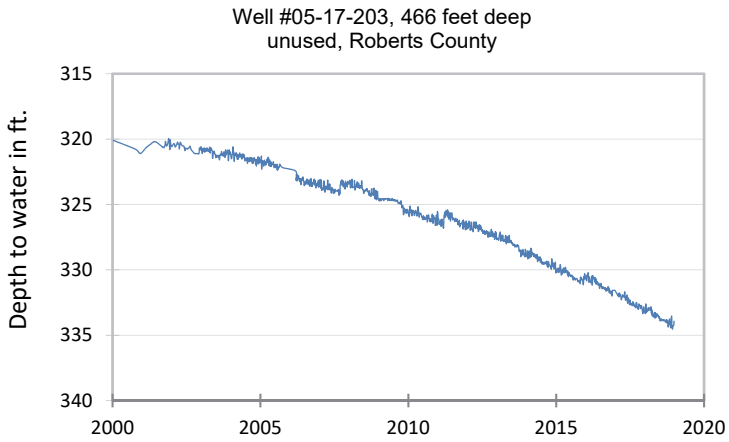


HYDROGRAPH OF THE MONTH

Each month this space features a new hydrograph (marked with the • symbol on the map) depicting different aquifers and their conditions in Texas.

Ogallala Aquifer

The Ogallala Aquifer is the largest aquifer in the United States and a major aquifer of Texas underlying much of the High Plains region. The aquifer consists of sand, gravel, clay, and silt and has a maximum thickness of 800 feet. Water to the north of the Canadian River is generally fresh, with total dissolved solids typically less than 400 milligrams per liter; however, water quality diminishes to the south, where large areas contain total dissolved solids in excess of 1,000 milligrams per liter. High levels of naturally occurring arsenic, radionuclides, and fluoride in excess of the primary drinking water standards are also present. The Ogallala Aquifer provides significantly more water for users than any other aquifer in the state. The availability of this water is critical to the economy of the region, as approximately 95 percent of groundwater pumped is used for irrigated agriculture. Throughout much of the aquifer, groundwater withdrawals exceed the amount of recharge, and water levels have declined fairly consistent through time.



The initial measurement of 320.1 feet below land surface was recorded by a Groundwater Conservation District in January of 2000. Near-monthly measurements were taken by the GCD and USGS until March of 2006 when the TWDB installed an automatic water-level recorder in the unused well which then took hourly measurements (displayed online) and near-weekly measurements (in the groundwater database). The period of record reveals a steady decline in water level of about 14 feet over 19 years (equivalent to -0.73 feet per year). This gradual decline is largely the result of nearby pumping for irrigation.

Far away (left), and close-up (right) images of well #05-17-203.